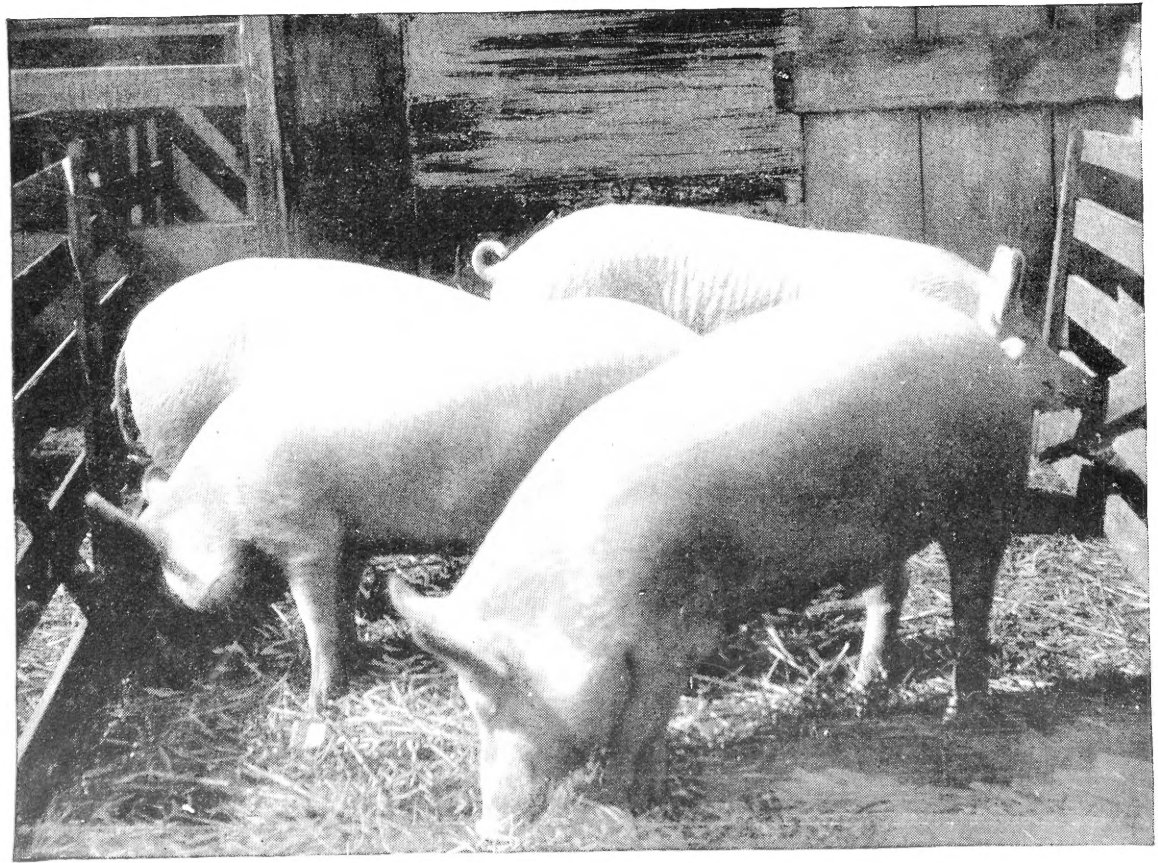
THE HOG

SPECIAL REPORT OF THE INDIANA STATE BOARD OF AGRICULTURE.



SPECIAL REPORT

OF THE

Indiana State Board of Agriculture

ON THE

HOG

PREPARED UNDER THE DIRECTION OF HON. W. W. STEVENS, MEMBER OF THE BOARD, AND CHARLES DOWNING, SECRETARY.

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INTRODUCTORY.

The Indiana State Board of Agriculture is very desirous of enlarging its sphere of usefulness, and to this end herewith presents the first of a proposed series of special reports on such leading agricultural topics as are of paramount importance to the farmer.

The swine industry is first to receive consideration. The hog has always been an important factor in the State's advancement, and in order that he may be still better understood and become a more important factor than ever before in the commonwealth's prosperity and welfare, his rearing and successful management from start to finish is carefully considered.

Probably the most complete and carefully prepared work on swine diseases and their remedies ever issued in this country is presented herewith, and the very best talent in the land has contributed interesting and valuable suggestions along the lines of practical breeding and management.

We felt that no one man knew all there was worth knowing on a subject so extensive and important as that of swine husbandry, and therefore drew upon a host of practical breeders and specialists for such contributions as we thought would make the most valuable report.

To all who have thus gratuitously given us a helping hand we are under lasting obligations, and to them we will give credit for any good results that may follow.

W. W. STEVENS,
For the Board.

BREEDS OF SWINE.

To give anything like a complete history of the different breeds of swine bred in this country would require more space than is allowed us for this special report, so we must, under the above heading, give only a very brief synopsis of the characteristics of the different breeds that are favorites among our farmers.

The introduction of the hog into this country dates back to the very first settlements. It is said that Columbus brought swine to Hispanolia in the year 1493. They were introduced into Florida by DeSoto in 1538. They were first introduced into Virginia in 1609. It is said that the fecundity of swine in Virginia forests was so great that in eighteen years after their introduction the inhabitants of Jamestown had to palisade the town to keep them out. There were no wild hogs in America when first discovered, but they soon ran wild as then managed, and spread rapidly through many parts of the country. The improved swine we have to-day is not the outcome of the wild hog, but has gradually developed from the frequent importation of the best breeds found in other countries. The origin and history of the several prominent breeds will necessarily have to be very brief in this connection.

THE POLAND-CHINAS.

The contentions and discussions among the breeders and friends of the different strains of these hogs as to their origin and name, as well as who should have the most credit for efforts to perfect and bring them into popular favor, would, if published, fill volumes. Among the names which have been given them from time to time, and by which they are still known in some parts of the country, are, "Magie," "Moore," "Poland," "Butler County," "Big-boned China," etc. This breed had its origin in that part of southwestern Ohio lying between the Big Miami and Little Miami rivers, namely, in the counties of Butler and Warren, during the years from 1835 to 1840. It is also generally conceded that the groundwork was stock locally known as Warren County hogs, and these were the result of crossing together the "Byfield," the "Russia" and the "Big Chinas." Later on the Irish Grazier blood was introduced, and probably some Berkshire blood was mixed in as well. No one man probably had more to do in the formation of this breed than another. It was, in fact, the result of the labors of many. For more than half a century now they

have been bred as a distinct breed without any infusion of foreign blood, and in the hands of progressive breeders have developed into probably the most popular breed of swine found in the whole country.

This breed of swine has gradually developed with the country, or rather has been bred up to meet the demands of farmers in the great corn belt of the United States where large size, quick maturity and hardiness are the main characteristics of a hog. In the detailed description of the Poland-China as now bred, we find the following characteristics:

Head short and wide; face short and slightly dished; eyes large and prominent; ears small and thin, with tips drooping gracefully; neck wide, deep and short, and slightly arched; jowl broad and deep; shoulders deep and full; chest large, deep and roomy, making a large girth just back of the shoulders; back broad, carrying same width from shoulder to ham; sides and ribs full and smooth; belly and flank wide, straight and full; hams and rump broad, full, long and wide; legs and feet medium length, straight, set well apart and squarely under the body; tail small, smooth and tapering; coat fine, straight and smooth; color black, with white face or on lower jaw; white on feet and tip of tail, and a few small, clear white spots on body not objectionable; size, large for age and condition; boars two years old and over, if in good flesh, should weigh not less than 500 pounds. Sows, same age and condition, not less than 450 pounds. Boars, eighteen months old, in good condition, not less than 400 pounds; sows, 350 pounds. Boars, twelve months old, not less than 300 pounds; sows, 300 pounds. Boars and sows, six months old, not less than 150 pounds. Other ages in proportion.

BERKSHIRES.

The first importation of Berkshires into America of which we have any record was in 1823. For some years this breed was very popular, and large importations were made. But the careless, neglectful systems then in vogue with too many farmers are not adapted to maintaining the good qualities given the breed by English breeding and feeding, and deterioration followed, and the breed was everywhere discarded. About 1865 new importations were made and the breed suddenly sprang into popularity again, and is now widely disseminated through all parts of the country. When fine quality of meat is the object sought for the Berkshire probably stands second to no other breed. Great improvement has been made in size and symmetry in the past forty years, but the spirit of improvement is still abroad and the standard of perfection is placed high.

Prominent among the good qualities that seem to make them favorites are:

1. Great muscular power and vitality which render them less liable to disease than some other breeds.

2. Activity combined with strong digestive and assimilative powers.

3. They are remarkable for their prolificacy, as well as for being careful mothers and good sucklers.

4. The pigs are strong, smart and active at birth and consequently less liable to mishaps.

5. They fatten readily at any age, while they may be fed to any reasonable weight desired.

6. Their flesh is the highest quality of pork.

7. Power of the boar to transmit the valuable qualities of the breed to its progeny, when used as a cross.

8. Their unsurpassed uniformity in color, marking and quality.

It is doubtful if we have any hog that is nearer thoroughbred in its best sense or more certain to reproduce themselves with fidelity, than the improved Berkshires crossed with other breeds, especially the larger ones. They make the best feeding hogs possible.

Characteristics.—Head and face short and well dished; eyes large and dark hazel or gray; ears medium size and erect; neck full, deep and arched; jowl firm and neat; shoulders broad, deep and full; chest large, wide and roomy; back broad and straight; hams broad, full and long; legs straight and strong; coat firm, straight and smooth; color, black, with white on feet, face, tip of tail and an occasional splash on arm; size, large for age. Boar, two years old and over, not less than 450 pounds; sow, same age, 400 pounds. Boars, eighteen months old, 350 pounds; sow, same age, 325 pounds. Boar, twelve months old, 300 pounds.

CHESTER WHITE.

The Chester County white hog is a native of Chester County, Pennsylvania. In the year 1818 a pair of fine white pigs was imported from Bedfordshire, England. They proved to be a good hog, and by careful selection and judicious crossing for many years the modern Chester White was produced. They are appropriately classed with the large breeds, growing, if kept, to probably the largest size of any other hog, and they will hold their white color perfectly under all circumstances. Docility and cleanliness are some of their marked characteristics. The greatest objection urged against the breed is their lack of hardiness, or their tendency to degenerate under careless treatment or neglect. Their description calls for:

Head and face short and wide; eyes large and bright; ears medium size and pointing forward; neck short and thick; jowl large; back and loin broad and straight; body lengthy and deep; hams broad and deep; legs short and straight and well set apart; coat firm and either straight or wavy; color white; the action easy and graceful, and style attractive; disposition is quiet, and they are easily handled; take good care of themselves; size large for age and condition; boars two years and over, if in good flesh, should weigh not less than 500 pounds. Sow, same age and

condition, not less than 450 pounds. Boars, eighteen months old, in good flesh, should weigh not less than 400 pounds; sows, 350. Boars, twelve months old, not less than 300 pounds; sows, 300. Boars and sows, six months old, not less than 150 pounds each, and other ages in proportion.

VICTORIAS.

This is a breed that has not won a very wide reputation throughout the country, but they are a hog of considerable merit, and are fancied by good breeders here and there in many parts of the country. Mr. Leland, of New York, says they originated in Saratoga County, of that State. They were made by crossing the Byfield hog with the native in which there was a strain of the Grazier. Subsequent crosses were made with the Yorkshire and Suffolk, the result being a purely white hog of medium size. These pigs, if pure bred, should all have a direct descent from a sow called Queen Victoria, which may be said to be the mother of the family. They seem to suit breeders in the Eastern States, where a medium-sized hog is desirable, and white is not an objectionable color. In size, boars two years old and over, when in good condition, should weight not less than 550 pounds; sows, same age and condition, 450 pounds. Boars, twelve months old, not less than 300 pounds; sows, in good flesh, 250 pounds. Pigs, five to six months old, 140 to 160 pounds.

SUFFOLKS.

This is an old breed of swine of English origin, and it is a true breeder. It is probably the most popular breed in England. It attains maturity at an early age and is said to be always in condition to kill from the time they are a month old. The breeders of this hog claim that they get from it the most meat to the least bone and the most pork with the least food. They are highly recommended for crossing on other hogs. They are invariably white, but sometimes have bluish spots on the skin. They can be made to weigh four hundred pounds.

ESSEX.

The Essex is a black hog, originating in the south of England. They are very squarely built, fatten easily and weigh, when full grown, from 250 to 275 pounds. For the gentleman in town, or the small farmer, they will give satisfaction. They thrive well on pasture without any grain food. They will get fat and ready for the market on clover. Their color enables them to withstand the hottest sun of July or August without having their skin the least affected, and they are never known to scald or mange. They have the power of transmitting to their progeny an excess of their good qualities. They are very prolific.

THIN RINDS.

The Thin Rind hog was imported into America from the Hampshire districts of England. The earliest importations to this country came to Massachusetts, where they were known as the McKay hog, the name probably taken from the importer. They also were imported into Canada, where they were called the Hampshire, and from Canada they found their way into New York, where they were called the ring-middle hog, on account of having a white belt around the body.

The type which is being bred by the American Thin Rind Association came from New Jersey into Boone County, Ky., in 1835, and was long known as the Belt breed until the name Thin Rind was given it by some of its admirers on account of its glossy coat of hair and soft, mellow skin. Its admirers commend it as an ideal hog possessing all the hardness and vitality and prolificacy of the unrestrained muscular animal of pioneer times. In color they are either listed or blacks, the most desirable consisting of black extremities with a white belt from three to ten inches wide, encircling the body and including the forelegs. They have small heads; ears of medium length, slightly inclining forward; jowl very light; broad back of nearly uniform width, slightly arched, standing very erect on feet, with legs set well apart, denoting great carrying capacity. The Thin Rind breeders claim that jowl and flabby belly are cheap meats, and that they have bred grossness down to the minimum. Early maturity, docility and fattening qualities are strong points for the Thin Rind. It is also claimed that they are distinctly a lean meat hog, and the best bacon type, and that the color is admired by all.

DUROC-JERSEYS.

The origin of the "red hog," known to-day as the Duroc-Jersey, can not be positively traced, and was evidently unknown to the earliest historians of the hog. They have been traced back over half a century, but earlier than that very little is known of them.

It is generally conceded by those interested in this popular breed of swine that there were two families of them some years ago, one known as the Jersey Red, and the other as Duroc or Red-Rocks. In some of the counties of New York they were called Durocs, while in others they were called Red-Rocks.

Joseph B. Lyman has the credit of first giving the red hog the name Jersey-Red. He was agricultural editor of the New York Tribune at the time, and resided in New Jersey, and in discussing the merits of the red hog in New Jersey he called them Jersey-Reds; hence the name. Previous to his naming them they had simply been called "red hogs." Mr. Lippincott, of New Jersey, was the first man to advertise the hogs as Jersey-Reds.

Clark Petit's history of Jersey-Reds states that in 1832 there was a pair of red pigs shipped to Salem, New Jersey, but did not state who was the importer or exporter.

The question arises in the mind of the intelligent imaginer how the red hogs known as the Jersey-Reds sprang from the progeny of this pair of pigs. Oldest citizens of Windsor, New Jersey, could not trace them twenty years ago, and they were bred with uniformity and great size then as we are told. The same reports come from Burlington and adjoining counties of New Jersey, forcing the conclusion that there must have been red hogs there prior to 1832, or they would not have been the best variety known to the farmers of that State at the time they were. The name Duroc was given by Isaac Frink, a prominent farmer living in Milton, Saratoga County, New York. He named them for a noted stallion owned by Henry Kelsey, in the town of Florida, Montgomery County, New York. Mr. Kelsey had a red sow with a litter of red pigs, claiming he had imported the sire and dam. Mr. Frink bought a pair of pigs and called them Durocs. Concerning their characteristics, Mr. J. D. Kiger says:

"Many breeders who have at different times raised two or three varieties of swine assert that the Duroc-Jerseys are the best general-purpose hogs in America, having a stronger constitution, being more prolific and better sucklers. As bred to-day they grow faster when young and fatten as readily as a pig when matured, and will put on more flesh for a given amount of feed than any other hog. They are doubtless the most prolific of any breed of swine in existence. Young sows usually farrow from eight to twelve pigs at a litter, and from ten to eighteen is not uncommon for old sows. The pigs are very strong at birth, and the sow and pigs very seldom need any attention at this time. They almost invariably impart to their offspring their wonderful prolific breeding qualities; are good, quiet mothers, supplied with a generous flow of milk, raise large, even litters, and other breeds when crossed with them are greatly improved in vigor, and as breeders and feeders."

DISEASES OF THE PIG.

BY A. W. BITTING, D. V. M., M. D., AND R. A. CRAIG, D. V. M., PURDUE UNIVERSITY.

DISEASES OF THE MOUTH.

INFECTIOUS SORE MOUTH OF PIGS.

This disease is especially prone to attack sucking pigs, and while no special germ has ever been discovered which causes the trouble, the history of the cases makes it seem very probable that the disease is infectious.

Symptoms.—This disease is characterized by ulceration within and outside of the lips. Its favorite seat is inside of the lips, just in front of the point of union on each side. The disease extends inward to about the line of union between the lip and jaw, and then runs forward. It extends outward, involving the angle and the exposed mucous surface to the line of growth of hair. In very bad cases these limits are exceeded, the gums, hard palate, and tongue being involved, and it may extend on the outside so far as to include the nose. By the extension of the disease it is not intended to convey the impression that this all arises from one or two ulcers. It is more likely that there will be a half dozen or more ulcers. In the beginning these ulcers are light colored, circular spots, considerably elevated above the healthy tissue. After they break down they become rough and irregular in shape and often cavernous, and two or more of them may run together. The deep tissues are involved as well as the superficial layers, and therefore the swelling is very marked, so much so that if the nose be involved breathing will be cut off through that organ or the lips will be so swollen that they can not suckle. The pig may therefore die from impaired breathing or from starvation. The ulceration progresses so rapidly that considerable pieces of tissue may die at once and drop off. In some cases reported the whole nose dropped off or large pieces from the upper or lower lip. In almost any case it is possible to pick off pieces as large as a pea or grain of corn. The disease is usually fatal in from three to ten days; occasionally a pig will recover with a much deformed nose or lip.

While the cause of this trouble has been ascribed to feverish milk from the mother, to poison obtained from the teats as a result of the sow coming in contact with poison vine, grass or weeds, and thereby carrying some irritating substance on the teats, that such views are very superficial it need only be shown that the disease occurs under conditions when

none of these factors are present. There is a bacterial disease of lambs very much like this disease of the pig, and there is a disease of grown animals also similar in character known to be due to disease germs. We have every reason to believe that this disease too is caused by a germ and that the pigs get it while nursing. The sow's udder being exposed to dirt and filth of every description could easily become the carrier. In fact, some observers assert that swellings and vesicles are seen upon the mammae before the pig's mouth becomes affected.

Treatment.—The treatment should be based upon the assumption of an infectious disease. If any evidence of trouble should occur, the sow and pigs should be moved to clean quarters. The pigs should be isolated from all other little pigs, as they may carry the infection. The medicinal treatment should consist in applying crude creolin prearations thoroughly to all the diseased parts and washing the sow's udder. This will usually be sufficient, and from three to six applications will suffice. There is little danger in using the creolin preparations and they are cheap. A two per cent. carbolic acid solution may be used in the same manner. Permanganate of potash, about a teaspoonful to the pint of water, is also good. If taken early and treated as directed above little loss need follow.

BLACK TEETH.

This condition is frequently brought to the attention of the veterinarian, but as yet we have no satisfactory explanation to offer for their presence. They are also found in health, as we have observed in heads at the slaughter house. Undoubtedly too much stress has been laid upon this condition. We are not inclined to attribute any disease to this condition upon the present evidence. In very young pigs, where this condition is most frequently seen, there may be very long, sharp teeth present which it would be better to cut off. Dentition may also be taking place at that time and the black tooth may be a shell, and there may be irritation of the gums, causing the pig to hold the mouth open, to salivate and to refuse to eat.

DISEASED TEETH.

The hog eats all sorts of objects and cracks nuts, coal, gravel, etc., upon the teeth, so that when the hog becomes old he is almost sure to have a bad mouth. Hogs sold for stock purpose are seldom affected in this way. Boars sometimes have very long tusks.

The symptoms of some derangement of the teeth are pain upon grinding, holding the head to one side while eating, insufficient mastication, as seen in the half or whole grain passed, and inability to shell corn from the ear.

The treatment is to give largely ground or sloppy grain and pasture. Cut off with dentist's cutters all long tusks, but do not knock out with a punch or cold chisel, as the latter method is almost sure to fracture the jaw.

DISEASES OF THE STOMACH AND INTESTINES.

GASTRO INTESTINAL DISEASES.

The intestinal tract is subject to a great many diseases, but it is not the intention here to go into details for each one. The causes of nearly all are much the same, the symptoms are so much alike that sometimes they can not be differentiated and the treatment does not differ materially. The different affections show their greatest differences upon post-mortem and in the pathological laboratory.

Gastro-enteritis or inflammation of the intestines is not an uncommon occurrence. The stomach may be affected alone or the intestines alone, or both together. Inflammation of the stomach can not be distinguished from that of the intestines, and vice versa, nor can either of them be separated from the inflammation of both parts by any set of symptoms. The causes of inflammation in either are the same, and are foreign bodies, as pieces of bone, bits of coal, glass, nails, gravel, etc., spoiled food, as rotted corn and musty grain; easily fermented food, as green corn; impaction, as with clay and hardened faeces; irritants, as lye, soap, washing powders, etc., and injuries from without.

People seem to think that because the hog has exceptional powers of digestion that he can eat anything and can take poisons with impunity. Such is not the case, and as a result the hog suffers from ignorant practices in feeding and in medication.

In inflammation of the stomach and bowels the lining membrane is the part involved in most cases. In severe attacks the muscular and outer layers may also be involved.

Symptoms. — The symptoms are vomiting, pain, squealing, unrest, champing and grinding the teeth, stamping the feet, rooting places to lie down and then getting up soon, fever, rapid breathing, dryness of the skin, thirst but no appetite. In stomach involvement there may be vomiting of blood and bile. In intestinal inflammation there is nearly always diarrhea, but the reverse condition may occur. If the offending matter is fermentive or obstructive there is bloating. In severe cases nervous symptoms are also developed; there will be frothing at the mouth, delirium and paralysis. There is no rule as to the duration of the affection; it may last only a short time or it may continue for a week or more. The usual course is about four days.

The post-mortem appearances in a case of gastro-enteritis are a congested condition of the mucous membrane, an abundance of flaky mucus in the tract, flakes and shreds hanging on the wall and in the cases due to strong chemicals complete erosion. The affected intestines are always darker than normal. The lymphatic glands are reddened and thickened and if due to some slow infection there may be follicular ulcers in the mucous membrane.

Treatment.—The treatment consists in the removal of the offending

material with the least irritation possible. This usually requires a purgative, and raw linseed oil or castor oil may be given—four ounces of the former or one ounce of the latter. Epsom salts, Glauber salts, or Rochelle salts in two-tablespoonful doses are more active and also more irritating. Calomel may be used if the case is not very urgent. The pain must be relieved with laudanum—a teaspoonful every hour until quiet. In the place of laudanum two grains of powdered opium may be administered. There are many other sedatives that may be used, but when these will not answer it is doubtful whether others will do any better. Use soapsuds injections, if necessary, to evacuate the bowels. Give the pig all the cold water it will drink, give no food of any kind, and when convalescence begins give sweet slops.

COLIC.

Colic is simply pain in the bowels without inflammation. The causes are the same as those producing inflammation. The symptoms are the great uneasiness, squealing, stamping, getting up and lying down, attempts to defecate and urinate and grinding of the teeth. The treatment is a good dose of laudanum. (Teaspoonful for 150 to 200 pound weight.)

INDIGESTION.

Indigestion may be due to a variety of causes, principally exposure, unsuitable food and worms. It is characterized by impaired appetite, the desire for unnatural food, as the excrement of chickens, chewing rotten wood, eating clay and dirt, brick, etc., rooting, excessive greediness and rapid eating, but without proper digestive powers. The treatment is to place the pigs in a pen and limit the quantity of food given for a time. Give a variety. Give access to salt, charcoal, and ashes, and give an ounce of the powdered sulphate of iron to each half bushel of the above mixture. Recovery will usually take place in a short time.

SCOURS, OR DIARRHEA.

Scours may occur at any time after birth, and we have cases developing so soon that it would seem as though the pigs were born with the affection.

Scours, or diarrhea, is a profuse and frequent discharge of faeces, and they are usually watery in consistency. While the pig is young and the discharges are whitish, gray, or clay-colored, the trouble is usually designated as scours, and when the pig becomes older it is then generally spoken of as diarrhea. This condition is present as a symptom in many other diseases.

When the disease occurs within the first few days after birth it is nearly always due to a feverish condition in the sow and affecting the pig through the milk. It may also be produced by a chilly, damp bed,

by getting out into the grass when too young, by fermented food, as slops and mouldy corn, affecting the mother's milk. When the pigs become old enough to eat and drink it is nearly always due to the feed, as old table slops and sour milk, green corn in the fall of the year and spoiled, mouldy, and rat-soiled corn. It is the exception to raise swill-fed pigs without experiencing this trouble. We also have outbreaks that would seem to indicate that the trouble might be due to a germ, and that the affection might be infectious.

Symptoms.—The symptoms of the trouble are loose evacuations, which become more and more watery. In little pigs these are of a decidedly gray color and adhere to the tail and to different parts of the body. The appetite may be good at the beginning, but as the pig becomes decidedly feverish the appetite is lost. The back becomes arched; the flanks hollow, the hair rough, and there is indisposition to move about much.

Treatment.—Scours, being a disease largely due to bad dietetics and hygiene, must have as a foundation for treatment the correction of these errors. The sow should be in the farrowing pen for a week prior to farrowing; she should be fed lightly on easily digested food. Very little corn should be given. No active purgatives should be administered, but a little mild laxative, as oil meal, has an excellent effect. Charcoal, salt, and wood ashes should be accessible. These measures will tend to prevent the feverish condition that brings on scours that is so fatal at birth.

For a few days after farrowing the feed should be light. If due to cold and wet quarters, these must be corrected. When the pigs become old enough to eat and drink they should be given sweet food. There is no doubt in the writer's mind but that the value of sour swill is greatly overestimated, and if it is fed diarrhea may be expected. Start pigs off on green corn gradually, using with it some dry feed.

In the treatment of the attack use dry feed and not much of it. More can be done by penning the pigs, giving pure well water and a mixture of bran, corn meal and oats, than by medicine. Theoretically, we should clear the bowels of the irritant first by a purgative, and then give a sedative. Practically, good results come from administering a tablespoonful of laudanum for each three hundred pounds of weight two or three times a day. For very small sucking pigs give three or four drops of laudanum on the tongue, or give a large dose to the sow. The addition of carbolic acid to the slop at the rate of a tablespoonful for each gallon is also advantageous.

CONSTIPATION.

Constipation is just the opposite condition from scours or diarrhea, and is characterized by a diminution in the number of evacuations or in the quantity during a day.

It is caused by dry feed, lack of water, fever or paralysis.

It is a condition that is not hard to correct as a rule. The changing

of food from dry grain to sloppy feed is usually sufficient. The addition of small quantities of oil meal to dry feed will tend to keep the bowels open. When medication is indicated Epsom, Rochelle or Glauber salts, one or two tablespoonfuls, calomel, one to ten grains, castor oil, two tablespoonsfuls, or raw linseed oil, four ounces, will be all that is necessary.

OTHER DISEASES.

Other diseases of the abdominal organs are inflammation of the peritoneum, or peritonitis. It is an inflammation of the membrane surrounding the intestines and lining the cavity. The causes are exposure, cold, extension of inflammation from other structures, and injuries, as in spaying, castration; etc. It is difficult to distinguish from gastro-enteritis from the symptoms. The treatment consists in letting the animal alone.

Hepatitis, or inflammation of the liver, may sometimes be diagnosed by the jaundice (yellow color of the eyes and lips). The treatment is the administration of calomel, one to five grains, and repeat every other day.

Nephritis, or inflammation of the kidneys, is seldom present except as a complication of some other disease, and is rarely recognized. The cases usually called inflammation of the kidneys are nearly always due to paralysis.

EFFECTS OF MEAT BRINE.

It sometimes happens that the brine from meat barrels is emptied where hogs gain access to it and it is eaten. Salt in small quantities is highly beneficial, but if taken in large quantities it causes a most intense gastritis. Hogs will not eat salt to excess if they have access to it all the time, but will if received only occasionally. The meaty taste probably adds to their desire for this particular kind.

Symptoms.—The symptoms of salt or brine poisoning develop in a short time after the eating. At first there is great restlessness, getting up and lying down, running from first one place to another, evidence of pain by the stamping of the feet and the crying squeal. Vomiting nearly always occurs, and diarrhea, with profuse watery stools, will come on if the hog lives long enough. When the animal stands the breathing will be very short. The posterior parts will become paralyzed and he will drag himself from place to place. There will be convulsions (fits), during which the body will be thrown about with great violence, and there will be frothing at the mouth. These convulsions usually are of short duration, but the interval between them becomes shorter and shorter as death approaches. If the animal is discovered for the first time during the convulsions the case may be mistaken by the laity for rabies. The duration of the attack may be from a couple of hours to three or four days.

Upon post-mortem we find the mucous membrane of the stomach and intestines will loosen in great masses and there is intense congestion of the tract and peritoneum in contact with it.

Treatment is seldom successful. Give all the water the animal will drink and raw linseed oil—a half pint. A tablespoonful of laudanum will quiet the pain.

EFFECTS OF WASHING POWDERS

It is a common practice to save the dish water as slop for hogs. People living near towns and cities consider the slops from restaurants and hotels a very cheap food and haul it away by the barrel or tank. The use of these slops is not as important a factor in pork production in this and other central and western States as in the East, but is being utilized more and more each year. Hogs fed upon such slops often sicken and die, the symptoms and course of the disease being very much like cholera. In 1897 Dr. Moore investigated and described the trouble, and the post-mortem appearances. By experiments he determined the cause to be due to the alkali of the washing powders in the dish water.

Symptoms.—The symptoms of the affection are diarrhea, vomiting, fever, lameness, partial paralysis, nervous disturbance and death of the majority of those attacked. The disease was not contagious in any case, and the course would run from a few hours to a few days—apparently depending upon the quantity of alkali ingested at one time. Upon post-mortem examination the lymphatic glands along the bowel were found to be swollen and dark colored. The mucous membrane lining the intestine was pale and slimy. The liver and kidneys were only occasionally affected, and the brain was congested in those showing marked nervous disturbance. The lungs contained areas of collapse in some cases. Attempts to inoculate the disease into other animals failed. An examination of the slops determined the presence of large amounts of alkalies, and three experiments made upon well hogs by feeding known amounts of the washing compounds developed typical cases.

The trouble has been referred to quite often in swine breeders' journals in the past three years. The writer has seen two such outbreaks. The remedy is plain—do not feed water containing alkalies.

EFFECT OF COTTON SEED.

While cotton seed finds no particular usage as a food for hogs, in this State, it is largely used in the South. It has a very high feeding value, but when continued for a long time it will cause death. This fatal result follows, no matter whether the seed is given raw, ground, roasted, boiled, or as droppings from cattle. The first evil effects of cotton seed are noticed from six to eight weeks after using the raw or ground seed and a longer time for the roasted or boiled, but is not always

observed after feeding cattle. The cause of the trouble has not been discovered, all attempts at getting an active extract having proven unsuccessful, and post-mortem examinations failed to show any effects that might be attributed to the hulls.

Symptoms.—The symptoms vary somewhat with the different animals. In the majority of cases the animals are found dead in their pens in from ten to twelve hours after they had apparently been in the best of health. In the cases which have been observed throughout the whole course there is first a moping dullness, staggering gait, labored breathing, spasmodic in character, or generally called thumps, loss of sight, restlessness, walking slowly in a circle and running into obstructions, lying down flat upon the belly—not upon the side—sudden exhaustion and death. The post-mortems thus far reported give no definite lesions.

WHEAT AND BARLEY BEARD.

It not infrequently happens that after hogs have been turned upon wheat or barley stubble that some will die. The symptoms which the pigs will present are quite variable. In some cases it will be an intensely sore mouth, in others it will be those of general bowel disturbance, and in a third it will be those of loud and difficult breathing. The writer has post-mortemed many such cases and found accumulations of beards in the mouth, stomach, or windpipe. A roll of beards may form and get down by the side or at the root of the tongue and penetrate the mucous membrane. The animal can not get rid of them; the parts become intensely swollen and inflamed, interfering with eating, and starvation will occur. Plugs of the beards may lodge at any point between the larynx and bronchi—producing loud, distressing breathing and coughing. The foreign body can not be removed and death takes place from suffocation. In the stomach the beards may puncture the walls. The injury may be so slight as to cause only a mild inflammation and interference with the appetite for a short time, until the beards become softened and pass on, or the inflammation may be so severe as to cause death.

The trouble is one that is not amenable to treatment except in those cases in which the beard is in the mouth.

EFFECTS OF COCKLE-BURRS.

Numerous articles have appeared in the swine breeders' journals and agricultural papers indicating that young cockle-burrs were poisonous to hogs and calves. While the cockle-burr is young and only three or four inches high it is very fleshy and tender, and relished by stock. The claims of poisoning of stock attracted sufficient attention that the Indiana Experiment Station made a chemical examination and a feeding test to determine the poisonous properties, but in both the results

were negative. The young plants, stripped of the burrs, were fed to calves, pigs, rabbits and guinea pigs. These were allowed all they would eat. In no case was any untoward effect noticed. We have been called upon to post-mortem some animals claimed to have died from such poisoning, and in all cases death was due to the burrs. A few burrs would be swallowed with the young plants, and their horny prickles would irritate the stomach wall and cause inflammation, which finally terminated in death. In three cases the burrs lodged in the throat and could not be expelled.

INTESTINAL PARASITES.

THORN HEADED WORM.

The thorn-headed worm is the largest of the several species that infest the pig. The technical name is *Echinorhynchus gigas*. The worm is cylindrical and larger at the head end than at the tail. The females are from five to eight inches in length and the males from one and one-half to two and one-half inches. The female is about the same diameter as a lead pencil, will not fully straighten out, but remains partly coiled. The body is crossed by striae or wrinkles. The head is on a short proboscis and is surrounded by five or six rows of hooks. The color is white or sometimes tinged with pink or green.

The home of this worm is in the small intestine, particularly toward the stomach end. They are migratory and sometimes find their way into the stomach and are expelled by vomiting. It is rare to find them in the large intestine. We usually find them tightly attached to the intestinal wall, and so firm is their grip that they can not be removed without tearing either the worm or the intestine. The hooklets penetrate the mucous membrane and in some cases the muscular coat. It is reported that they may perforate the intestine and be found in the abdominal cavity. This last occurrence must be quite rare, as the writer has made a large number of autopsies without observing such condition. The small intestine may be greatly scarred by the punctures of the mucous and muscular coats.

The worm lays eggs that are passed with the faeces, and they have an interesting history. They become mixed with the manure and are eaten by the grub worm in the dung hill or pasture. Here the egg hatches and burrows its way outside of the intestinal tract of the grub and may live for a considerable time, even until after the grub has undergone its transformation into the June bug. The hog eating these grubs or June bugs sets free this parasite and thus becomes affected. Hogs are not generally affected with the parasite, but those pasturing upon clover or a very old meadow are more liable to be affected than those kept under other conditions. Every hog raised upon some farms may be affected by

from one to a dozen or more of these parasites, while other hogs in the neighborhood may be comparatively free. Some seasons in which we find great numbers of grubs we may have the hogs quite generally affected. This was true for 1896, when the loss upon sausage casings alone due to this cause resulted in a loss of about $7,000 to the business of a single packing house.

Symptoms.—The symptoms as described by observers are loss of appetite, constipation, diarrhea, restlessness, general emaciation, weakness of the loins, stiffness of the hind quarters, and in young pigs convulsions and spasms. The majority of cases present no symptoms at all and the worms are only found at slaughtering. In other cases the pigs have depraved appetites and are hard feeders. In only a few instances are the worms found in the vomitus.

Treatment.—The treatment should be the administration of worm-seed and areca nut, or turpentine in milk, followed by a good physic. The pigs should be kept in a pen over night and not permitted to have supper; the next morning they may be given each one teaspoonful of a mixture of equal parts of powdered worm-seed and areca nut. This may be administered by mixing with a little cornmeal. To this may also be added one grain of calomel to act as a purgative. Salts make a better purgative, but can not be given so readily. The turpentine may be given one teaspoonful for each one hundred pounds of weight, and is best administered in milk. This should likewise be followed by a purgative. The fast should continue for from four to six hours after the medication. Gasoline might be tried in place of the turpentine and in the same manner.

THE LUMBRICOID WORM.

The large round worm is known as *Ascaris suilla*, or lumbricoid worm. This worm is said by some authorities to be rare, but it is more common in this State than the thorn-headed worm. The large round worm is from five to seven inches in length for the female and from three to four inches in length for the male. It is milky white and the body smooth. The head is small. It is an inhabitant of the small intestine, but is migratory and may get into the stomach or pass out of the rectum. It lays eggs and these pass out of the body with the faeces and after a time undergo changes and are probably taken in with the water or while rooting in the mud. The worms irritate the intestine by their biting.

Symptoms.—The symptoms of this parasite may amount to nothing in some cases, or in other pigs it may be a depraved appetite as to the character of the food or in the quantity consumed. Some pigs will eat an enormous amount and still remain poor. In others there are symptoms of pain as indicated by restlessness, and they may become cross. In a few autopsies it has seemed as though they had caused obstruction.

Treatment.—The treatment is the same as for the thorn-headed worm.

PIN WORM—*Oesophagostoma Dentatum.*

This small worm inhabits the caecum and colon of the hog and is very small. The male is only from one-fourth to a half inch in length, and the female a half inch in length. They are white or brownish in color, straight and pointed at both ends. The worms in all probability find entrance by the drinking water, and may be present in large numbers without causing recognizable symptoms.

WHIP WORM—*Trichocephalus Crenatus.*

This is the worm so commonly seen in the large intestine. The worm is small, being about one and a half inches long, fairly stout at one end and tapering to a point at the other. The worm produces eggs that may hatch in the intestine and become an adult in about four weeks. All pigs are more or less affected, and it is probable that the method of infection is through the water. No serious trouble has been attributed to them. A soapsuds injection is the best treatment.

KIDNEY WORM.

While the swine breeder is inclined to attribute many cases of weak back and paralysis to kidney worm, we can not believe that this parasite is the cause of many such cases. The worm is not often found upon post-mortem, and in the hogs in which it is found rarely showed symptoms of serious import.

The kidney worm is *Stephanurus dentatus.* The male is from three-fourths to one and a fourth inches long, and the female from one and a fourth to one and a half inches long. The worm is pointed at both ends and the mouth has six teeth.

The worm is also found in other parts of the abdominal cavity. As medicines can not reach them, there is no use wasting either time or medicine in treatment.

HYTADIDS, OR BLADDER WORMS.

It is not uncommon upon butchering or upon autopsy to find the liver or some other organ studded with small cysts or bladder-like formations. These contain the so-called bladder worms *(Echinococcus polymorphus)* and are the cystic state of the tape-worm of the dog *(Taenia echinococcus).*

The segments of the tapeworm are passed from the dog and fall upon the pasture or some other accessible place and are taken in with the food or drink by the hog. The segments contain hundreds of eggs and are very resistive to drying, so that the hog may become infected months after they are passed. When the segments reach the stomach or intestine the outer portion is digested and permits the eggs to escape. The young bladder worms soon begin to migrate, and the liver is the special point of

attack. The lungs, kidneys, muscles, and even the brain may be attacked. The bladders form very slowly and cause considerable enlargement of the organ. The liver may be increased to ten or twenty times its normal size. The lungs will become more solid. The bladders consist of a fairly stout membrane and contain a watery fluid. The mother reproduces and causes daughter cells, and these in turn reproduce, so that there will be several parasites inside of one cyst. The cysts may vary from the size of a grain of wheat to the size of an egg. They may occur inside an organ as well as on the outside.

Usually there are no distinguishing symptoms by which the case may be diagnosed during life. The symptoms present are not different from that of other diseases. When the brain is affected the head is carried twisted and to one side, later gradually developing paralysis on one side, and finally profound nervous symptoms.

There is no treatment for affected animals. It can be prevented by keeping dogs away.

The affected organs of a carcass should not be used under any circumstances, and a close inspection be made of all other parts to determine their presence.

MEASLES.

Measles in the pig have no resemblance nor any relation to that disease in the human. Measles in the pig is a parasitic disease due to the *Cysticercus cellulosae*, the larval form of the *Tænia solium* or tapeworm in man.

The cause of the disease is the eating of human excrement which contains segments of the tape-worm. Hogs finding excrement about barns or pens, or having access to privies may become infected. The disease is of very rare occurrence in this country, compared with other countries, as people are seldom affected and more care is exercised in preventing hogs gaining access to faecal deposits. This is one of the diseases which government inspectors constantly search for, as the eating of measly pork, if not well cooked, will result in the development of the tapeworm in the human.

The tape worm segments, when they reach the hog's intestines, are digested and liberate the thousands of eggs, and these begin to develop and to migrate from the intestine to all parts of the body—the intestines, diaphragm muscles, and even the skin may be invaded. They produce small cysts from the size of a grain of sand to that of a millet seed. It is not known how long they can live in this condition, but it seems probable that it may be for years.

Symptoms.—There are no symptoms produced which are especially characteristic of this disease. Many hogs never show any ill health as a result of infection, and those that do, present symptoms that might more readily be mistaken for some other affection. The symptoms as usually

described are a hoarse voice, falling out of the hair, depression, general weakness, inappetency, paleness of the buccal membrane, anaemia (bloodlessness), emaciation (starvation), oedema (swelling) of the head, neck and shoulders, etc., diarrhea, general paresis (paralysis) or local paralysis. The diagnosis is made when the nodules appear on the eye lids inside of the cheek, lips and alongside of the tongue.

Ordinarily the disease is only recognized after death, as the parasites appear as small granules in the tissues, and the microscope is necessary to reveal the head, hooks, etc.

Such meat should not be used for food. There is no treatment.

TRICHINA.

While we have no means of diagnosing cause of trichina in the pig before it is killed, we are still under the necessity of calling attention to a disease that necessitates an expenditure of several million dollars for the inspection of pork in order that our meat products may be admitted into foreign countries. The disease is not of any considerable importance because of any serious disturbance to the pig, but because it may, under favorable circumstances, be communicated to people. The danger in this country, where it is the practice to properly cook meat, is very small and is greatly overestimated. There are only a few cases of death reported in this State as caused in this manner.

The trichina is a small worm, and exists in two states—an active, reproductive state in the intestines, and an encysted state in the muscles. In both states they are too small to be detected with the naked eye. The development of the case of trichina when it starts with a piece of meat is as follows. The encysted trichinae taken into the stomach with food become free in about twenty-four hours, in from twenty-four to forty-eight hours they begin to breed, and in a few days immense numbers of living embryos appear. It is estimated that a single female produces 1,500 eggs. The life of the parasites here is about five or six weeks. At the end of about seven days the parasites begin to migrate from the intestines to the muscles. This continues to the third week. It requires from three weeks to three months for the trichina to find a suitable resting place in the muscles and to become encysted. Then comes the resting period, during which the worm becomes coiled upon itself and surrounded with a lime deposit, and here it may live for years.

The trichina is probably spread in a herd by the pigs eating food soiled by the droppings of other hogs, by eating mice, rats and other rodents, and by eating the offal from slaughter houses. Mice and rats are quite frequently affected, and hogs that eat the offal from the slaughter house are much more frequently affected than those not so fatted, showing that they must have contracted the trouble from this source.

The places at which we find the infection in greatest abundance is in the diaphragm and the tenderloin. The hams and shoulders, too, become affected in bad cases. Young hogs, eight or nine months old, are seldom affected. Hogs kept until they have become too or three years or older are the principal victims.

Symptoms.—The symptoms of the disease observed in experimental animals are lessened appetite, arching of the back and persistent diarrhea for a week or two during the intestinal stage and a little later during the muscular invasion an intense itching. These correspond to the conditions found in the human subject.

There is no treatment either in the lower animals or in man, and we must depend wholly upon preventive measures. The preventive measures consist in destroying all rats that infest the premises, and not to feed the refuse from the slaughter house. Also to turn the hogs off to market while young.

Trichinous pork, when found in the packing houses, is not condemned as waste, but is cooked thoroughly for three hours which insures the destruction of the parasites, and the product is sold as cooked meat.

RESPIRATORY DISEASES.

The respiratory diseases of the hog are the same as occur in other animals, as coryza, or inflammation of the nose, commonly called sneezing, pharyngitis, laryngitis or sore throat, bronchitis or cold, pneumonia or lung fever, and pleurisy. It is much easier for the veterinarian to make these and other distinctions in describing the diseases than it is for the owner to recognize them. Broadly speaking, these diseases are nearly all due to the same causes, and the hygienic treatment is so nearly alike in all that no attempt will be made to go into the details of each.

The causes of respiratory troubles are nearly always bad hygienic conditions. First, exposure to cold, rain, snow, mud and wind, lack of shelter and a damp bed. The repeated chilling of the surface of the body results in congestion and inflammation of the internal organs, and naturally the respiratory organs suffer most. Second, the overcrowding of pigs in pens, so that the under pigs become overheated and thus contract colds easily. Third, the use of the manure pile as a bed. The heat from the fermenting heap not only heats the body, but the gases generated are poisonous and irritating to the air passages. Fourth, the inhalation of dust also has a bad effect in producing irritation and cough. Fifth, the use of cold springs and creeks as wallows. Hogs that have the range of a pasture in the hot sun become much heated and if allowed access to cold water are sure to be chilled and contract cold, pneumonia or pleurisy. Sixth, other diseases may affect the respiratory organs as rachitis may affect the nose, foreign bodies may affect the

throat, parasites may cause bronchitis and pneumonia, and hog cholera may be complicated by pneumonia and pleurisy.

CORYZA.

In coryza the first symptom is dryness of the nostrils and frequent sneezing. The dry stage lasts for about one day and is succeeded by a moist stage during which there is a profuse, watery discharge. This continues about four days and recovery takes place. Medication is unnecessary.

CATARRH.

Catarrh is like coryza in the early stage, but the disease tends to involve deeper structures and to extend to other parts. The discharge becomes thick and whitish or yellowish and purulent. The surface of the membrane becomes more or less ulcerative. Sometimes we have very severe outbreaks known as malignant catarrh. The disease does not run any well defined course.

SORE THROAT.

Sore throat is nearly always secondary to nasal trouble. It may assume the form of swelling of the glands of the neck and is known as quinsy. The swelling may become so great as to cause death by suffocation. The symptoms are distressed, noisy breathing and a greatly swollen throat. In sore throat proper there is inflammation of the pharynx and larynx, but the neck is either not swollen or only slightly so. There is a dry, hard, throaty cough, often quite hoarse, ordinarily spasmodic in character, but when through the coughing does not seem to give relief. The breathing is rough and noisy. There is much difficulty in swallowing food or water. There is some fever and loss of appetite, but the refusal to eat may be due to the difficulty in swallowing. There is considerable restlessness. The disease may develop rapidly and the air passages be closed in a few hours, or the disease may run a course of a week or more and then make a recovery. The usual course is about four days.

BRONCHITIS.

Bronchitis is generally what is meant when speaking of coughs and colds. It is an inflammation of the trachea and bronchial tubes. The prominent symptoms are the cough and some little distress in breathing. There is usually a little fever at some stage and but little impairment of appetite, although the pig will not be thrifty. The coughing may take place at any time, but is especially prone to occur upon leaving the bed, after eating and after exercise. A little dust will greatly aggravate it. Pigs seldom die of this affection, but fail to grow properly. The disease does not run a definite course, but keeps up as long as the exciting cause

is present. An attack may continue through a winter, or through a summer season if it should be dry and dusty.

PNEUMONIA.

Pneumonia is an inflammation of the lung tissue and is probably more fatal to the hog than any other class of animals. It begins as a chill and is attended with high fever. The breathing is short and quick, a distinguishing feature from the diseases already mentioned. There is coughing and sometimes nose bleeding. The hog will lie down all the time unless made to move, and exercise brings on exhaustion and sometimes death. The cough at first is deep and dry, but afterwards is moist and brings up much mucus. The appetite remains only fair, but emaciation follows quickly. The attack runs a course of from ten days to three weeks, and in fat hogs is almost always fatal. Hogs that are thin in flesh have a good chance for recovery. The disease may involve only one lung or parts of both.

PLEURISY.

This is a much more common affection than is generally suspected. It is an inflammation of the membrane covering the lungs and lining the chest cavity. The outset of this affection is seldom observed, and when discovered the symptoms are those of pain. The breathing is characteristic, the breath is short and jerky, the ribs are held rigid, and there is the large movement of the flank often ending in a quick jerk, as in thumps. There is a cough, but it is cut off suddenly as if suppressed. There is sometimes lameness in one or the other of the fore legs. The appetite is fair and the general appearance may be good. The attack runs its course in from about nine days to two weeks.

A post-mortem in a case of bronchitis would show a reddened, inflamed trachea and larger and smaller bronchial tubes, with more or less frothy mucus, but the organ will float. In pneumonia the lung substance will be found to be involved and the affected area will be solid and liver like. The air spaces are completely filled. The inflammation may involve the whole of the right or left side, more often only a portion of either lobe and but rarely both lobes. Such a lung when placed in water, will not float. Sometimes abscesses form in the affected areas and may contain liquid or cheesy pus. In pleurisy there is thickening of the membrane covering the lungs or lining the ribs, adhesions between the lungs and ribs, and fluid in the chest.

COUGH.

A cough is not a disease of itself, but is a symptom of some disease. It is nature's method of getting rid of mucus and other foreign matter. It is a symptom in troubles in the throat, trachea, bronchi, lungs and pleura. It may be present in some heart diseases, and may also be

due to a constantly overfull stomach. It may be due to parasites. The cough should not be treated of itself but the cause producing it. A nervous cough, or a whooping cough has often been described in swine journals, but we are of the opinion that in the majority of cases, at any rate, this condition is due to parasites.

Treatment.—The treatment of respiratory diseases must be largely in care. The causes must be removed if possible, and unless these can be removed medicinal treatment will not avail. The feeding should be light and of an easily digestible character. The coryza and catarrh practically needs no treatment. In the sore throat, bronchitis, pneumonia and pleurisy, it is usually advisable to begin by emptying the bowels before they become constipated, and this can be done by a tablespoonful of epsom salts, or one to ten grains of calomel. In the absence of either of these an ounce of castor oil or four ounces of raw linseed oil may be used. To reduce the temperature and counteract the inflammation probably nothing acts better in the hog than aconite. The dose is from ten to fifteen drops of the tincture for each one hundred and fifty pounds. This may be repeated every four hours. In the sore throat, bronchitis and pleurisy, belladonna may be combined with it in the same quantity. Each case should be treated upon its own merits, and many remedies might be prescribed, but for a general treatment applicable to the great majority (nine-tenths) we can recommend nothing better than the above.

LUNG WORMS.

The pig is sometimes attacked by a parasite which affects the smaller bronchial tubes and gives rise to greater or less irritation and may be the cause of considerable loss. We have no means of knowing how prevalent the affection is or how much loss it occasions, as a sufficient number of observations have not been recorded to warrant drawing any conclusion. The writer is of the opinion, however, that the affection is far more prevalent than is generally suspected and that when it occurs at the beginning of winter it is liable to prove fatal.

The parasite which causes this trouble is called *Strongylus paradoxus*. The male is about three-fourths of an inch long and the female one and a fourth inches long. The worm is very slender and the color is whitish or brown. The worm lays a large number of eggs, but before these can hatch and develop into other mature worms it seems that it is necessary for the eggs to be expelled by coughing and undergo a part of their development outside of the body. Just what these changes are or how long it can live outside of the body is not known. We do know that the eggs of the species which inhabits the sheep may live for months in water and that they may be dried upon hay for a year and then placed in moisture and they will develop. It is probable that these parasites live under similar conditions. The pig in all probability becomes in-

fected while drinking surface water or rooting in the mud. The favorite point of attack of the lung worm is the bronchi at the apex or forward lobe but they may involve any portion. Their presence acts as a foreign body to cause irritation, thus exciting profuse secretion and consequently requiring coughing to relieve the parts. The bronchial tube becomes more or less thickened or tumefied, and at different points there will be nodules containing the parasites. In some cases the effect is to enlarge the bronchi or to cause sacculation. The inflammation may extend from the bronchi to the lung tissue and cause small patches of pneumonia. The tissue may break down, become encapsuled and later we have a cheesy mass as a remnant. In an affected lung we may find small tubercles throughout its substance due to the encystment of eggs and debris. These are probably drawn into their final resting place in the lung tissue during an act of inspiration and then remain fixed, and sometimes are called tuberculosis at a careless post-mortem.

The Symptoms.—The trouble is largely confined to pigs, as the mature hog will show little effect of the lung worm. The first symptoms begin as a cough, occurring upon leaving the bed, after exercise and after eating. The appetite in the early stages and in mild cases is not impaired. The cough may be more frequent and persistent and is generally denominated chronic. In badly infected cases the paroxysm of coughing is quite severe, beginning slowly, becoming harder and harder, and finally, the pig will put the nose on the ground and press hard while coughing. The paroxysm ends by the expulsion of a clot of mucus or vomiting. This is referred to frequently in the journals as whooping cough in the pig. If the disease occurs late in the fall or early in the spring while the conditions are favorable for an easy development of pneumonia, this complication often ensues and causes death. In many instances the pigs lose flesh and become very poor. The disease occurs as an epidemic in a herd and therefore is generally reported as swine plague. Swine plague, however, is a disease of short duration and attacks older hogs.

Treatment.—The treatment consists in the removal of the pigs from the infected pasture and the giving of pure water. The old hogs need not be moved. The treatment of the attack itself simply consists in the supplying of nutritious food and waiting until age shall give the necessary resistance to overcome the attack. Medication is of little value, although all sorts of fumigations have been recommended. A fumigation of tar or turpentine may be tried if desired.

SNIFFLES—SNUFFLES—BULLNOSE

It is evident from the descriptions given that all writers are not agreed upon the nature of this affection. There are two varieties of the affection —the catarrhal and the rachitic.

In the catarrhal form we have a more or less wheezing, respiration

occurring at irregular intervals. There is a profuse, watery discharge from the nostrils, causing the animal to blow violently when first getting out of bed or after eating. The animal can not exercise freely owing to the difficult respiration. The attacks, which are mild and of intermittent character at first, become more severe and the condition is persistent. The discharge changes from a thin, watery secretion to one containing blood, to thick mucus, and finally yellowish or purulent. Nose bleeding is frequent owing to the violent efforts to clear the nose. There is a cough, the eyes become red and the tears flow, the hair roughens and the whole appearance is "dumpish." There is difficulty in seizing, grinding and swallowing the food, owing to the soreness of the mouth and throat. The trouble runs a course of from one to five weeks and death comes from starvation or asphyxia. Those that recover nearly always remain stunted.

A post-mortem examination of such a case shows the mucous membrane lining the nasal chambers to be greatly thickened, practically blocking the air passages. The turbinates and the septum become so crowded by the uneven pressure that they are deformed. The effect is to produce a blunt, thickened, more or less twisted nose, depending upon the uneven changes in the different bones.

In the rachitic form we have essentially the same changes take place in the nose, and in addition there are changes in the bones in other parts of the body. The legs become curved and misshapen, and often there is breaking down on the feet. Not infrequently, too, there will be bulging of the bones of the head, as in hydrocephalus.

The cause of the trouble is not definitely known. By some all the cases are regarded as being primarily due to a lack of development of the bones in the nose, thus predisposing to catarrhal trouble. Others consider that the trouble may be catarrhal from the beginning, due to catching cold, and that the changes in the bones are secondary. The writer is of the opinion that some cases belong to one class and some to the other.

The disease is sometimes described as being contagious, but we are not in possession of facts to justify such a statement. It is more probable that the conditions which give rise to the trouble in one pig may also affect others. It is frequently observed to affect all the pigs belonging to one litter, but I have never witnessed the trouble pass from the pigs of one litter to pigs of another. It has also been observed in four successive litters from the same mother, thus showing a hereditary tendency. There were also other evidences of rickets present.

We find this trouble in pigs kept under good hygienic conditions as well as in those that are subject to exposure and poorly nourished, and it is more common in those breeds with stubby, turned-up noses than of the straight variety.

Treatment.—The best treatment is to destroy such pigs. It will end their misery and save expense. The majority will die and those that

recover will not be worth feeding in nine cases out of ten. Those who wish to try to save them should put the pigs upon a good pasture and feed sweet milk. Corn should not be given, or, if it be given, there should be oil meal added to balance the ration. If pasture can not be secured, provide a dry, warm pen. Keep the bowels open as the symptoms may indicate. Fumigate with burning tar and apply tar about the feed troughs. An ointment composed of equal parts turpentine, kerosene and ammonia in sufficient lard to make it stiff has been recommended as an application to the face. This is repeated twice a week for a month.

DISEASES OF THE SKIN.

LICE.

The hog louse *(Haematopinum urius)* is the largest member of the louse family. It has a very large, elongate oval body, with a long, narrow rounded head. The head and body are yellowish gray, with brownish spots, giving the whole a rusty appearance. The legs are quite strong and the fellow is capable of moving about with considerable rapidity. The favorite points of attack are along the lower part of the neck, under and behind the fore legs, and on the belly. They may be found on any part of the body. The eggs are large and white in color until soiled and are attached to the hair. As far as known the hog louse lives only a short time and does not reproduce off of the body of the hog. It is not produced by bad food or a poorly nourished body, but is conveyed from one animal to another. Some herds may be entirely exempt from the parasite, while others may be greatly annoyed. The louse is a serious handicap to growing pigs, for when they are present in large numbers they irritate the skin and cause such itching as to interfere with the appetite and general nutrition so that the animal may become very poor.

Treatment.—The louse is easily killed and at little expense. The method to pursue should depend in part upon the number of hogs to be treated. Kerosene or coal oil is a good agent and will answer very well when only a few are to be treated. The hogs may be sprinkled or the beds sprinkled with a spraying apparatus or watering pot. As all parts can not be reached easily by this method, the operation must be repeated. An ingenious method of applying the oil is by means of the rubbing post. A good solid oak post a foot or a foot and a half in height is placed in position in the hog lot. One hole is bored in the top to a depth of about eight inches and two at right angles from the sides at the bottom of the vertical hole. Soft pine pins are driven in the side holes. The upright hole is filled with kerosene and stoppered. Next a burlap strip eight or ten inches wide is wrapped around the post over the side plugs. This after a little time becomes soaked with kerosene and the pigs will rub against it at the place where it will do the most good.

If a large number of hogs are to be treated then crude petroleum is the cheapest material and may be sprayed on or still more effectively applied by the dip. A sheep dipping vat is sunk into the ground and a false bottom placed in the vat so that it will not be over three feet deep. The vat is then filled with water to the desired depth and about an inch of the crude oil poured on top. The hogs may then be driven through and a thin layer of oil will be deposited on every point. We have used this at a number of places and dipped two hundred hogs per hour at a cost of one-tenth of a cent per head for material.

The sheep dips that resemble crude creolin may be used in the same manner. These are Zenoleum, chloronaptholeum, milk-oil, creosote, Daytholeum, cresa alba, taroleum, etc.

When pigs only a few weeks old are to be dipped they may be caught and immersed in a barrel. There is no doubt but that the destruction of lice on hogs gives better returns for the money expended than any other medication.

MANGE.

This affection of the pig is quite frequently alluded to in journals devoted to the swine industry and is described in nearly every work upon swine. It must be a rare affection, however, as in the eight years which the writer has given attention to the diseases of swine he has never seen a case.

Mange is caused by a parasite *(Sarcoptes scabei*, var. *suis)*, which is much smaller than the louse and makes its home just beneath the outer layer of the skin. It begins with a violent itching about the head, especially at the base of the ears, about the eyes and gradually extends to the neck, withers, croup, inner surface of the thighs, and whole body. At first the skin is red and there may be small blisters or abrasions from rubbing. A little later the cuticle begins to rise and loosen and the affected regions look gray. These become astonishingly thick, the skin becomes deeply wrinkled, the hairs loosen and mat together. In an old case the animal looks as though he had been whitewashed several times and gotten dirty.

The scab parasite lives underneath the surface of the skin, multiplies rapidly and the irritation produced causes this immense scurf. The parasite can not be communicated to other animals and live more than one generation.

Treatment.—The treatment consists in a good scrubbing with soap and the application of sulphur or nitrate of lead ointment. The creolin dip may also be used.

URTICARIA. NETTLE RASH. SURFEIT.

This affection is marked by the more or less sudden appearance of blotches on the skin and these may disappear as suddenly as they came. These are usually accompanied by digestive disturbances and fever.

Symptoms.—The onset is without warning, usually coming on in a night. The upper part of the body is the part most likely to be affected. These blotches are dark in color, about the size of the finger-nail, but they may be so thick as to run together and be as large as saucers. Pustules form of variable size. The skin is very itchy and the hog will scratch upon any convenient object. The surface may thus be abraided and aggravate the case. In the light cases the trouble will pass off about the second day without any pustules forming. In the more severe cases large numbers of pustules form and it requires a week or more to make a recovery. The appetite is impaired and the bowels constipated at first, but become loose about the third day. The disease is not contagious The cause is probably poor feeding, too heating food, wet skin and exposure.

Treatment.—Give two tablespoonfuls of salts and follow by giving ten drops of Fowler's solution of arsenic twice a day.

ECZEMA.

This is the scaly rash, scabby rash, or pitch mange. It is caused by exposure to extremes of heat or cold and to a filthy condition of the bedding. It is seen in weakly pigs. It may extend over the whole body. The disease starts by small red spots followed by a vesicle (blister), which in time becomes pustular. These dry up and form great, thick crusts which, as they become older, wear down and get lighter and more branny. All stages of the disease may be present at the same time. There is great itching at times. The treatment is simple. Wash with some creolin preparation and give a clean bed.

Granular eruption occurs upon the face, head, ears, back of the croup and base of the tail, which very much resembles the foregoing, but is not itchy. The treatment is the same.

Warts are simply piled up epidermal cells and are best removed with the knife. A preparation of a drachm of salicylic acid in an ounce of castor oil rubbed on once or twice a day for a couple of weeks is also good treatment.

We have no evidence as yet that the hog has such diseases as measles, diphtheria, and a number of other eruptive diseases that have been ascribed to him.

SORE TAILS.

While the pig's tail is of no great value from the butcher's or feeder's standpoint, it is desirable to retain this appendage for cosmetic effect in breeding animals. The cause of sore tails and tails dropping off in nine cases out of ten is a cold, damp, unclean bed. Associated with the trouble we frequently have a cracked and irritable skin, rough hair and an unthrifty condition.

Treatment.—The treatment divides itself into prevention and the cure of the attack. The first necessitates either a change in quarters or of the litter, thus securing a dry, clean bed. The sun is the greatest purifier and germ destroyer and should be brought to our assistance in these cases whenever it is possible to do so. Sunning the bedding is an excellent remedy. The treatment of the attack consists in the application of a little carbolic acid mixed with lard or vaseline. One part of carbolic acid to from ten to thirty parts of the lard or vaseline. Sore tails are readily amenable to treatment if taken in time.

DISEASES OF THE NERVOUS SYSTEM.

PARALYSIS.

Paralysis usually occurs in the mature animal, sows and fattening hogs, and, while it may occur in the pig, it is rare. It occurs most frequently in the winter and spring and is the affection commonly called kidney worm.

Cause.—The great cause of paralysis is too rapid fattening or an over-fat condition, in which process the cord is involved by pressure. It is very rare to find a case in a lean hog. Another cause is shipping hogs in crates. We have witnessed this condition a number of times upon the arrival of breeding hogs and at fairs if the hog had been in the crate for a long time. Sometimes the recipients of such hogs claim breeders have not sent sound hogs when they arrive in such condition. They may have left the premises of the shipper apparently all right. It is also due to lack of exercise, as seen in brood sows confined in small pens prior to farrowing. Some also claim that the trouble may be due to indigestion. It may be produced by an injury. If the kidney worm causes such trouble it must be rare, as in a great many kidneys sent for examination from such cases the worm was not found.

Symptoms.—Partial or complete paralysis may develop suddenly or come on gradually, and is nearly always confined to the hind quarters. It nearly always involves both sides of the body. When the disease develops slowly the first symptoms will be an unsteady gait, the hind legs not following exactly in line with the fore legs—instead of walking directly forward the body appears to go sidewise. There is not the usual ease in movement and the legs will strike on passing. There is more or less difficulty in getting up. These symptoms become progressively worse until the animal simply drags the hind parts.

In the cases in which the paralysis develops suddenly the pig is found in bed unable to get up on the hind legs.

The appetite is usually good in the early stage and may remain so, and if lost is due to the condition of the bowels from constipation. The

bowels become constipated to a greater or less extent, depending upon the amount of paralytic involvement. The animal, upon trying to move, will squeal, but the character of the squeal does not indicate pain. Pressure over the affected regions does not indicate pain. The case will drag along and oftentimes will make a recovery in from a few days to a couple of weeks. Others will die soon, owing to the paralytic condition of the bowels.

Treatment.—The treatment consists in removing the hog to a place where it can not be disturbed, to reduce the feed to a very small quantity and that given preferably in the form of a slop, in order to overcome the tendency to constipation. No corn should be given. The medicinal treatment consists in the administration of tincture of nux vomica, ten drops twice a day for a week or ten days. This will be found to be effective in most cases. The bowels should be kept open with small doses of calomel, one to five grains, castor oil or raw linseed oil, and iodide of potash may be given in twenty-grain doses, twice a day after the first week, to good advantage. Turn the hog over occasionally but do not try to force it to walk, as it will do so as soon as able. After recovery keep it away from other animals for two weeks.

CHOREA.

This affection is known as jerks in pigs. This affection may develop at any age, but is most commonly seen in the young and half-grown and particularly in those not well developed. It is common in pigs with a bulging forehead and otherwise showing a tendency toward hydrocephalus. The causes of this trouble are not definitely known, but are probably due to errors in development and excessive fattening at an early period and to lack of exercise.

Symptoms.—The disease is characterized by spasmodic movements of some part of the body, as the head or one or more legs. The head is most often affected and is jerked to one side and is sometimes accompanied by wry neck. The jerking may come in quick succession or there may be considerable intervals between the jerks. The attacks may be semi-spasmodic—that is, very bad part of the time and only moderately so at other times. The jerking takes place more or less constantly during the waking hours. If a leg be affected it will be drawn up and put down suddenly, keeping up the motion more or less constantly while standing. There will also be some twitching when lying down and not asleep.

Animals so affected may be in good condition when the trouble first develops, but often they become thin and puny. The best treatment is to turn such cases out on clover pasture, to give plenty of milk and little or no corn. As they get older they get better without medicinal treatment. Weakly pigs are hardly worth their keeping.

SUNSTROKE OR HEATSTROKE.

Hogs unprovided with shade in a pasture sometimes suffer sunstroke. Hogs driven upon a very hot day easily become overcome by heat and it is called heatstroke. The conditions in the two cases are the same.

The symptoms are fatigue, dropping of the ears, staggering gait, sudden collapse and unconsciousness. Convulsions occur and as a rule death follows shortly.

Treatment.—Remove to a shady place, put cold water upon the head but not upon the body and give a teaspoonful of tincture of nux vomica.

APOPLEXY.

This affection occurs in pigs that are in a very fat condition and is due to a rupture of a blood vessel in the brain. This is usually brought on by exercise. The pig drops down suddenly and becomes unconscious and dies in a short time.

EPILEPSY—FITS.

This is commonly called fits, and the symptoms are sudden falling, frothing at the mouth, convulsive movements and then a gradual return to the normal. The hog may be eating at the time of a seizure and continue to chew the same mouthful of grain upon recovery. If the pig is in a herd with others and these seizures occur it is likely to be attacked during a seizure and killed.

The cause of these troubles is probably faulty development. Little can be done that is better than turning out upon pasture.

INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

While we know that there are three distinct diseases, inflammation of the outer membrane, inflammation of the middle and inner membrane, and inflammation of the brain substance, it is not easy to distinguish them in the pig.

The causes are high temperature, as in summer, unusual exercise, sudden changes in food, overfeeding, parasites and injuries.

The symptoms are excitement, restlessness, grinding and champing of the teeth, salivation, squealing and grunting, violence, but not directed as in rabies, convulsions, walking or running in a circle without much ability to dodge obstructions, pressing the head against the pen and holding it there, stupefaction, paralysis, and death. The course is short—twelve to thirty hours.

THUMPS.

This is an affection that starts in the very young pig, usually making its appearance at from two until six weeks old. It may also occur at a later period.

The nature of this disease has not been fully determined, some considering it a heart disease and others a nervous disease. The writer is inclined to the latter view and that it is due to spasm of the diaphragm, probably due to pressure.

Symptoms.—The symptom is the sudden jerking movement in the flank. When the pig is standing quietly the jerk is very noticeable and may be of such violence as to move the whole body backward and forward. It may be accompanied by a sound that may be heard some distance. These contractions are not rhythmical, but may be much more frequent at one time than at another. After exercise the jerking is more violent. The jerking is also more pronounced after a full meal than when the stomach is empty.

The causes are probably a full stomach and lack of exercise. The disease occurs in pigs that are farrowed at a season when they can not get out of their bed, in litters from mothers that are exceptionally heavy milkers, and always in the fattest, prettiest pig in the bunch. It never or rarely ever occurs in pigs that are farrowed out of doors in the field or woods, where they learn to follow the mother at once. The keeping of the stomach full of milk pressing upon the diaphragm and no exercise are the causes. After the disease once develops the pig loses the appetite to a certain extent and loses flesh, so that he may become very thin.

The thumps are often seen in pigs after an attack of pleurisy, in which the lungs and ribs become adherent to a greater or less extent.

Treatment.—The treatment requires an increase in the exercise. As soon as the first symptoms develop the pig should be picked out of its bed and placed in a barrel or box and kept there for an hour or two twice a day. If possible turn them out into a pasture. If they are kept in a pen give salts or castor oil. McIntosh recommends fifteen to twenty drops of each tincture of laudanum and digitalis every two hours until the animal is relieved, which is stated to be from twelve to eighteen hours.

DISEASES OF THE REPRODUCTIVE SYSTEM.

ABORTION.

Abortion or slipping of pigs sometimes is a troublesome problem with which to deal. There seem to be two varieties in these animals, the same as in the other domestic animals, sporadic and infectious. The sporadic form is the variety most often met with and is due to accidents, as slipping, falls, being kicked by a horse or hooked by a cow, by being run by dogs, or worried by other sows in heat, or by a boar, to spoiled or musty food, to "piling up" in bed, to sudden exposure to cold and to the effects of some other disease, as cholera. It can readily be observed that these causes will not as a rule act upon many sows in the same herd with sufficient violence to cause abortion, as the sow does not abort easily. After

an outbreak of cholera we expect a considerable percentage of abortion. While an infectious abortion of the sow has not been described, the Station has been the recipient of several accounts of such trouble that could not be accounted for upon any other hypothesis. In these cases a greater or less percentage of the herd would be affected, and, like barrenness, the trouble is much more frequent some seasons than at others.

Symptoms.—The symptoms of abortion when due to accidental causes are great uneasiness, shivering, making of a bed, violent straining and groaning. The parts are unprepared for the accident and therefore is associated with considerable pain and occupies several hours. If the abortion occurs within the first two months a discharge of blood and a macerated foetus and membrane are all that will be found. After two months the foetuses will be entire. In some cases there will be a loss of appetite and an indisposition to move about for a few days, while in others the disturbance is so slight as to be scarcely noticeable. In the infectious form of the disease the genital tract seems to be prepared and there is less disturbance than in normal labor and unless the swollen genitals and the expelled foetuses are seen the first warning of such an accident may be the recurrence of heat. Infectious abortions seem to occur most frequently at the end of the second month.

Very little can be done to arrest the act and without knowing the cause it is hard to prevent. It is a wise measure in all cases to remove aborting sows from the herd upon the assumption that it may be infectious and that the presence of such an animal may be a menace to others.

BARRENNESS.

Sterility may exist in either the male or female and may be temporary or permanent. Many animals said to be sterile are only so for a short time, due to conditions that will pass away.

Sterility may be due to faulty development of the generative organs. In the female the uterus may be abnormally small, the ovaries may be rudimentary or there may be imperforate vagina and os. In these cases the animal never comes in heat or never conceives. It is not worth the while to try to restore such cases when there is such an abundance of normal pigs. Sterility may result from excessive fattening. This may be due to occlusion of the passages due to pressure by fat, or the ovaries may become so infiltrated with fat as to cease being functional. In the former case the function can be restored by reducing the fat, but in the latter case the change is so great that nothing will insure a complete return to the normal. Such an animal may breed occasionally but is never sure. We find these two conditions in hogs quite often after they have been fitted for the fair circuit or even for a show sale. A very fat condition, even if it should not cause barrenness, is detrimental to large litters, and the pigs when born are likely to be weak.

Barrenness may be due to a rigid os, thus preventing the entrance of the seminal fluid. Such a condition may be found in sows the first time or when they become old. Such a condition may be overcome quite easily by means of a dilator.

Barrenness is also due to an inflammation of the lining membrane of the uterus. This is likely to occur after an abortion and also to follow such diseases as cholera. There is very little to aid one in recognizing this condition. The sow usually comes in heat, but fails to catch. Sometimes a discharge will be seen. In valuable animals a veterinarian should be called to make a curetment.

Barrenness also comes from old age.

Fecundity, or the number produced at each birth, is dependent upon the individual.

Barrenness in the male is due to improper development of the sexual organs, to fatty infiltration or degeneration of the organs, to inflammation, as from injuries, to a broken copulatory organ, lack of physical exercise, lack of functional exercise, and to old age. Excessive fat is probably the most frequent cause and is to be overcome by the proper kind of starvation.

INVERSION OF THE UTERUS OR VAGINA.

Inversion of the uterus or vagina may occur after parturition. The diagnosis is easy, as it will protrude from two to six or seven inches.

The treatment consists in washing the part thoroughly with creolin and very warm water. Take a strip of muslin about two yards long and two inches wide and begin winding from the outer end and wind snugly to the body. Allow the bandage to remain on for ten or fifteen minutes. Keep the body end tight and remove the outer part and then rebind in the same manner. This is for the purpose of reducing the organ. Remove the bandage and apply both thumbs to the center of the protruding mass and return at once by a slow, steady pressure. In some cases it is not necessary to wrap, but the application of a bandage at least once is a great aid. Retain the organ by placing one or two stout stitches across the vulva.

MAMMITIS (GARGET).

Inflammation of the udder, or, as it is commonly known, garget, is most likely to happen in heavy milkers and is due to the fact that the milk is not drawn. This may happen when a part or all of the pigs die and also from obstructed teats. It occurs as a complication to a feverish condition of the system. The symptoms are the hard, enlarged mammae. Usually the milk is withdrawn with difficulty and is clotted.

Treatment.—Remove as much milk as possible and bathe with hot water for twenty minutes three times a day. Knead the parts thor-

oughly. As a local application use a drachm each of tincture of belladonna and spirits of camphor in two ounces of lard. Rub in well. The sow should receive about two tablespoonfuls of Epsom salts every other day until the condition is relieved.

For sore teats wash with creolin or carbolic acid.

RACHITIS, OR RICKETS.

This condition is due to a lack of development of the bones. The mineral matter is not deposited in the normal proportion. It is seen in growing pigs after weaning. It is rare before weaning. It most often occurs in those that receive an almost exclusively corn diet with no milk and no pasture. It is seen more often in winter than in summer because the conditions enforce the penning and feeding of the pigs at that season. It is also seen in some litters which might indicate that it was hereditary.

Symptoms.—The disease is characterized by weakness of the bones, bending of the legs, breaking down upon the feet; there may be either a dropping or arching of the back, a spraddling gait, distorted face, bulging forehead, sniffles and paralysis. Such pigs are nearly always fat at the beginning. The disease does not tend to destroy the animal quickly, as it is a slowly progressing disease. The animal if allowed to get bad becomes helpless.

Treatment.—The treatment as far as it can be of service, is to feed less fattening food and substitute milk, oats, rye, and a little oil meal. An abundance of salt, charcoal, wood ashes and air slaked lime should be available.

RHEUMATISM.

Lameness, when not due to accidents, is most often due to either rheumatism of the muscles or joints. It is an affection occurring in the winter and spring especially when the weather is cold and damp. It is of more frequent occurrence in young pigs than in those that are mature.

The cause is cold, damp premises and exposure. Occasionally we find the disease among hogs kept under good hygienic conditions, but this is the exception. Some writers have ascribed feeding as a cause, but they probably mistake rickets for this trouble.

Symptoms.—The symptoms are usually quite pronounced, as lameness in one or more legs; the lameness may move from one point to another, but does so with less suddenness than in other animals. There is considerable swelling of the joints if the hock, knee or feet are affected. They become red and very tender to pressure. There is intense pain, as evinced by the manner in which the leg is handled and the character of the squeal. The leg may be handled so carefully that it may be mistaken

for a fracture. While the hog is asleep there will be sudden contractions also indicating pain due to a relaxation of the muscles. There is fever, loss of appetite, constipation and a general lack of condition. The pig will not exercise and will not go far for food on account of the difficulty in walking.

The treatment is divided into prevention and the management of the attack. Prevention is the cheaper and better plan. It means the providing of dry, comfortable quarters and the avoidance of exposure. The strawstack is to be avoided as a shelter, as it gives opportunity for the pigs to burrow under the straw, to pile up and become very warm and then easily chill upon exposure. It is better that the hogs should have a feeding floor and this should be some distance from the bed in order to insure exercise.

Treatment.—The treatment of the attack consists in removing the affected animals from the herd in order to secure quietude and providing dry, warm quarters. A purgative should be administered, as calomel one to five grains, salts an ounce to two ounces, castor oil an ounce, or raw linseed oil three or four ounces. The subsequent treatment should be salicylate of soda from twenty to forty grains three times a day for four days to a week. The hyposulphite of soda in heaping teaspoonful doses twice a day is also good. Recovery usually takes place in from one to two weeks.

INFECTIOUS ARTHRITIS.

This trouble affects pigs within a few days after birth, is generally noticeable the third or fourth day and as a rule proves fatal inside of the first three weeks. The trouble is due to pus germs entering the navel before it is dry. The trouble has been known for a long time in colts and calves and is commonly called joint ill. When the pus enters along the navel tract it may be localized and form a pocket or abscess cavity or they may be distributed throughout the circulation and involve any part and in this event the joints seem to suffer most. When the pus is localized about the umbilicus the accumulation may amount to from a teaspoonful to six or eight tablespoonfuls. When the joints are involved the hock, knee and pasterns suffer most, those of only one or two legs may be involved or the joints on all the legs may be involved at once.

The disease may attack only one pig in a litter or it may affect all. It may attack the majority of all pigs out of several litters occurring close together on the same premises.

Symptoms.—The symptoms are tenderness of the affected joints, a large swelling of the part, which is rapidly developed, fever, loss of appetite, usually diarrhea and great weakness. In the more severe cases the course lasts only a couple of days. In the less acute types the pig is unable to get up to suckle and dies of starvation. Occasionally the

abscesses about the joints will break or the foot may drop off. In the mildest type the joints do not swell much and the cases drag along for ten days or more and a few make a recovery. In case the pus is along the umbilicus it may discharge outside and recovery take place, or into the abdominal cavity, in which event death is sure to occur. Upon post-mortem abscesses are frequently found diffused throughout the body.

Treatment.—Medication is of little or no benefit in these cases. The writer does not believe that enough can be saved to warrant an attempt at treatment. It is important to prevent the recurrence of the trouble and the bedding should be removed and burned. If the pen can admit of sunlight so much the better and do not use for farrowing again for a season. Pens that can not be thrown open to the sun should be disinfected with carbolic acid or whitewash. Do not permit the sows to farrow close to an affected litter.

HYDROPHOBIA.

Hydrophobia in the hog is always the result of the bite of some other animal and is probably of less frequent occurrence than in the horse, cow or sheep.

Symptoms.—The symptoms are first quiet and dullness, which may last from six hours to two days. During this time the hog will eat and the condition would pass unnoticed in the first cases that occur in a herd. This is succeeded by a period of nervous excitement. The pig is on the alert, and will stand and stare as if looking at some object at a distance. There is grunting and squealing, champing of the jaws, frothing at the mouth, running about in an aimless manner, crawling under buildings and burrowing under litter, and in most cases will rub some spot with great violence. This is usually the point at which he has been bitten. If it happens to be where it can be reached with the teeth it will be torn out. The hog becomes cross and will bite stock or man that comes in his way. If in a pen he will back up in a corner and continue to back with all his might, but will start with fury toward an observer. The genesic instincts are very pronounced. Spasms occur and end the suffering in from twenty-four to thirty-six hours.

ANTHRAX.

Anthrax in the pig is a very rare disease, seldom occurring except from the ingestion of the carcass of an animal that had died of the disease. Some authors even deny its existence from any other source. The disease most often mistaken for anthrax is swine plague.

Symptoms.—Anthrax nearly always occurs as a result of inoculation through the mouth or throat. We usually find great swelling at this

point, which extends along the trachea. The fever is intense, respiration is difficult and loud, there is great restlessness and death from suffocation.

Burn the carcass.

HOG CHOLERA AND SWINE PLAGUE.

When and where hog cholera had its orogin no one will ever be able to positively determine. It is not an old disease in the sense of having been known and described for a long time, like glanders or anthrax. Neither is it such a new disease as some would have us believe. The oft-repeated assertion of old farmers that twenty-five or thirty years ago the disease was unknown is merely evidence that the disease was not so generally distributed throughout the country. According to earlier investigations, an outbreak of the disease occurred in Ohio in 1833, again in South Carolina in 1837, in Georgia in 1838, and in Alabama, Florida, Illinois and Indiana in 1840. As close observations were not made or records kept upon stock diseases at that time, no doubt many outbreaks escaped unrecorded.

It is not known from whence the disease came; some writers claim that it was introduced into this country by the importation of hogs from England, while others hold that the germs are native to our soil and only need a favorable opportunity to produce the disease, the same as in anthrax.

Hog cholera seems to have been introduced into this State from Ohio by the driving of hogs to the southeastern and southern counties for the purpose of fattening. At first the disease was confined to a narrow tract along the Ohio River, but the disease gradually spread northward and westward until it reached Terre Haute in 1847 and 1848. The first agricultural report, published in 1859 and 1860, contains a most interesting article upon this disease and dwells upon the heavy losses sustained in the southern part of the State. The history of the spread of this disease —following the lines of commerce—is strong evidence that it is not one indigenous to our soil. Every county has now been invaded and some of them very frequently, so that it may be said that we now have a permanent infection.

LOSSES.

The total loss to the swine industry in the United States has been variously estimated at from $10,000,000 to $25,000,000, but there can be no doubt that in some years the loss greatly exceeds the latter figure. In 1896 it is probable that the loss was between $45,000,000 and $50,000,000. The annual losses vary between $1,250,000 and $5,000,000 in our own State.

According to the Bureau of Statistics the losses in the different years have been as follows:

Year.	*Number.*
1883	288,286
1884	351,156
1885	326,555
1886	402,164
1887	512,692
1888	326,359
1889	247,114
1890	256,991
1895	278,143
1896	580,267
1897	899,457
1898	372,868
1899	553,930

The average loss for the thirteen years has been 5,395,982, having a value of more than $2,000,000. This loss will not be reduced to any appreciable degree in the near future. We know more about the cause of the disease, more about the disease itself, more about its relation to sanitary surroundings, but we do not know more about treatment nor much more about practical preventive measures than was known ten years ago. There is no doubt but that proper sanitary surroundings, pure food and water will do much to avert the losses, but these conditions will not be provided except by the few who appreciate the advantage of preventing loss. Moreover, these diseases can not be wholly prevented by the best hygienic measures that can be provided, which tends to discourage those who do try and makes others more negligent. Knowing about hog cholera is like knowing about the grip—it does not follow that we can control all the conditions that strew the germs of disease.

TWO DISEASES.

Hog cholera and swine plague have been made the subjects of special investigation by the United States Bureau of Animal Industry and the greater part of our knowledge of these diseases comes through this source. There is also much credit due to numerous individuals who have studied these affections. Hog cholera has been known for a long time and is recognized as being identical with the disease called swine fever in England. Swine plague was not recognized until about 1890. These two diseases are the cause of practically all of our great losses among swine. In some outbreaks it is easy to distinguish which is present and in others the two affections may exist in the same herd.

There is a specific germ for each of these diseases. Hog cholera is

caused by the germ or bacillus of hog cholera and swine plague by the germ or bacillus of swine plague. These germs differ in size, shape, activity, method of growth, resistance to external conditions, and in their effects upon the body. These differences are recognized by those working with the disease, but of course can not be seen without the special equipment found in laboratories. These differences may be briefly stated as follows:

The hog cholera bacillus is a small plant about 1-25,000 to 1-15,000 of an inch long.

The swine plague bacillus is only about one-half of this size.

The hog cholera bacillus is shaped like a short cylinder, rounded at each end, and has a number of delicate projections from the sides and ends like hairs.

The swine plague germ is oval and smooth.

The hog cholera germs have distinct movement.

The swine plague germs have no movement.

The hog cholera germs stain uniformly.

The swine plague germs will stain only at each end.

Hog cholera germs will live in the soil from two to three months.

Swine plague germs will live from four to six days.

Hog cholera germs will live in water from two to four months.

Swine plague germs live only from ten to fifteen days.

When hogs are fed upon cholera germs they will become diseased.

When hogs are fed upon swine plague germs they do not contract disease.

When hogs are inoculated with cholera germs the disease affects the intestines.

When hogs are inoculated with swine plague germs the lungs are affected.

There are other differences between these germs, but those enumerated should be sufficient to satisfy the general reader. The cause of hog cholera is always the bacillus of hog cholera and of swine plague the bacillus of swine plague, and no case of either of these diseases occurs without the germ being present. Other causes may produce diseases with similar symptoms and may thus be mistaken for these diseases. Other causes may so weaken the system as to make the animal easily susceptible to these diseases or external conditions may be favorable for the distribution of the germs. These are secondary causes, but are of great importance.

THE EFFECT OF THE GERMS UPON THE BODY.

The germs of hog cholera are found in the blood and in the internal organs. They grow in bunches and as they are carried along in the blood stream to the small arteries and capillaries they act as little plugs to shut

off the circulation in the part supplied by the little vessel. At each place the circulation is thus arrested we have a small red blotch, so frequently seen in the skin, meat, fat, and viscera of hogs that die of cholera. These blotches are so characteristic that meat inspectors have no difficulty in detecting cholera carcasses while hanging upon the gambrel. Another characteristic is that these blotches become redder the longer the time after death, while blotches from other causes become paler.

The spleen, or milt, as it is commonly called, becomes enlarged, softened and filled with dark blood.

The intestine is the seat of more or less inflammatory change, particularly in the Pyerian patches and along the lymph tracts. The caecum is especially liable to these changes. In all cases in which the disease continues for some days there is ulceration. The ulcers may be small like a millet seed or be as large as a dime. They may be irregular, as in cases in which they follow the lymph spaces. The edge of the ulcer projects above the surrounding mucous membrane. The appearance of the surface may be yellowish, reddish, or brownish. The edges are not clean-cut, but are granular. The ulcer may be only in the mucous coat or in the mucous and muscular, but it is rarely perforating. Hemorrhages sometimes occur as a result of invading an artery or vein. The lymphatic glands along the intestine are always red and swollen and those in other parts are enlarged. The contents of the intestine are nearly always black and tarry and have a very foul odor. In some cases the hog will have eaten clay or other earth, causing very hard, dry faeces. The stomach is not often seriously affected. The lungs are either not affected or only secondarily. They usually collapse at death.

The swine plague germs are more diffused through the circulation, but may cause the same red patches. The parts attacked are the lungs primarily and other organs as complications. The effect in the lungs is to cause bronchitis and pneumonia. The mucous membrane becomes congested and thickened, blocking certain areas, and sepsis or pus formation occurs, making abscess cavities of greater or less size. These pneumonic areas may be small and numerous or a few and quite large. If the hog should die early in the disease the appearance will be that of pneumonia, but if late these abscesses will have formed and they will contain pus or cheesy material. The other organs are involved secondarily.

It will therefore be seen that hog cholera affects the intestines primarily and that the disease may extend to the lungs and that swine plague begins with the respiratory organs and progresses toward the intestines. Both diseases may be present in the same subject and the lesions will be confusing. Furthermore, it is to be remembered that the lesions are not always typical and that a diagnosis can not be made by the eye alone. This is recognized by the inspectors of the meat inspection service and now all cases are reported as hog cholera, while formerly they divided them.

THE LIFE OF THE GERMS OUTSIDE OF THE BODY.

The general behavior and effects of the germs inside of the body are fairly well known, but the history of the germ outside of the body still remains to be determined. The experiments which have been made with the hog cholera germ have not shown it to be able to live for more than a few months in soil or water, and the results of the work with the swine plague germ have indicated that it can only live about half as long. The results of these experiments are at variance with the experience of any one who has had much field work to do. It is not an uncommon occurrence to have an outbreak of hog cholera follow the turning of hogs upon a field where others had sickened, died and been buried a year prior. Such a result often occurs after hogs have rooted out and eaten parts of carcasses that have been buried for a long time. The writer saw a typical outbreak of cholera follow the turning of hogs into an old house where others had sickened and died three years prior. After the first herd had died the doorways were blocked with rails and no stock had access to the place until three years later. The bedding had never been removed and in two weeks thirty out of thirty-six hogs were sick, and it was the only outbreak in that vicinity. People have related many cases similar to the above, the period sometimes being longer and at other times being shorter. Again we may note the turning of fresh hogs into a pen where dead hogs have just been removed and no disease follow. We can not explain all these apparently inconsistent cases upon the evidence from our experimental data.

The germs of some diseases, as glanders, can live for only a short time outside of the body, and hence can only be conveyed by close contact or by animals being placed in the stalls or pens where other cases of the disease have been. Such diseases can be stamped out by slaughter and rigid quarantine. Hog cholera and swine plague do not belong to that class of diseases. In other diseases of which anthrax is a type, the germs can live and multiply outside of the body for a long time and be able to produce the disease when a favorable opportunity arises. Anthrax has been known to occur as a result of eating the forage from the graves of former victims. There are observations which seem to show that the germs must have lived in the ground for at least seventeen years. The experiments with the hog cholera germs do not show them to possess the same resistive qualities attributed to anthrax, but there are many who do believe that they have a very similar life history in nature. If such be the case then the problem of how to control the malady becomes all the more difficult.

Our present knowledge of the germ tends to show that in many respects its life history is like that of the typhoid fever germ. No one would claim that the diseases are identical or that typhoid is as virulent or contagious as hog cholera, but there are points of resemblance. The

lesions in the intestines, lymphatic glands and spleen, in the two diseases, are so much alike that cholera is often called pig typhoid. When a drop of blood from a typhoid patient is placed in a culture of typhoid germs it causes them to cling together. When blood from a cholera hog is placed in a culture of cholera germs it causes a similar reaction. Typhoid germs are never found outside of the body and stools of a sick patient, but it is well established that all epidemics have their origin in the water supply. Epidemics of typhoid fever occur in cities, and no matter what may be the source of the water supply—river, lake or wells—it will be found that it is polluted with the discharges from people. Typhoid fever can always be arrested by securing pure water. The researches of the Indiana Experiment Station have demonstrated that the disease is also water borne. In a series of townships in this State it was found that from 33 to 200 per cent. more hogs were lost along the rivers and streams than at a distance from three to ten miles away from the stream. This could be attributed to the more general use of surface water. No such conclusion must be reached that the disease is only water borne, for we have seen the disease pass up the river as well as down and the pigs in a whole section of the country, from one to three miles wide, and from five to seven miles long, become affected simultaneously after a rain.

Less is known concerning the life history of the germs of swine plague than of those of hog cholera. It is known that the disease is more difficult to prevent than cholera; its spread is less liable to be influenced by hygienic measures and it seems to be air borne. Germs very much like the swine plague bacillus have been found in the lungs of other animals. If upon further investigation they should be found to be the same, it will add to our knowledge of the nature of the affection and make us less ready to claim that the disease can be eradicated by sanitary measures.

THE WAYS BY WHICH THE GERMS ENTER THE BODY.

Experiments have been conducted to determine how the germs find their way into the body to cause disease. Hogs fed upon the carcasses of animals affected with cholera develop a virulent form of the disease in a short time. The intestines become the seat of typical lesions, while other parts are not seriously affected. If the germs be placed upon food or in drinking water they will produce a like result. These experiments show that if the germs be ingested with the food or water they will develop and produce the disease.

The germs have been sprayed in the air and the hogs made to inhale them, also injected into the windpipe, but the disease did not develop, which may be taken to indicate that in nature the disease germs do not find a point for development in the lungs, or at any rate not as a primary focus.

The germs have been inoculated beneath the skin, but it is only when

very large numbers are used that disease occurs. This would seem to indicate that the hog does not contract the disease from inoculation as by the bite of the louse and injuries.

A similar line of experiments conducted with swine plague shows that it does not cause trouble when swallowed, but does do so easily when made to inhale air containing the germs or when germs are injected into the windpipe. The lungs are the primary seat of the affection, and thus differs from hog cholera. Inoculation experiments, both subcutaneous and intravenous, require such large numbers of germs that it would seem that natural inoculation by the louse bite could hardly prove fatal.

The conclusions from these experiments are that in nature, cholera is caused by the ingestion of the germs with the food or water, and swine plague by inhalation.

ACCESSORY CAUSES.

We consider all those factors which lower the resistance of the animal or which disseminate or propagate the germs as being accessory causes.

Among the causes which tend to lower resistence we may consider feeding, shelter and breeding. The disease is often attributed to the feeding of green corn, too much corn, etc. In 1896, the Iowa Weather Bureau published a map showing the distribution of the disease in the State. It was found that the greatest losses were sustained in those countries where corn constituted an almost exclusive diet. The lowest death rate was sustained in those countries in which dairying was an important industry and milk was largely used as a feed. This was taken as confirmatory evidence of the bad influence of a corn diet. In 1897, the statistics showed that the losses were just the reverse from those in 1896; that the pigs fed upon corn suffered least. This disproved the conclusion of the previous year. As farmers feed in essentially the same way each year, it would be but rational to expect that the losses would be about the same if the feed was a causative factor. Neither is the sudden changing of feed a causative factor, as we have not yet had a single report of an outbreak of cholera at any experiment station as a result of a sudden and radical change of feed. The feeding of green corn or all corn can not be considered a wise health measure. When green corn is fed it should be with the same precautions as in the feeding of cattle—beginning gradually with old corn and increasing the quantity as the pig is able to stand it. This will avoid the diarrhea and intestinal irritation which prepares the way for the cholera germ. Any injudicious management in any kind of feeding will have the same effect. The hog needs a variety of food for strength, and health and those best prepared to furnish it will probably fare best.

The hog needs some shelter; it need not be elaborate, something to break the scorching sun or beating storm, to have dry quarters in which

to sleep and a clean floor from which to eat. The strawstack is the poorest shelter that can be provided, as it furnishes a place in which to pile up and be buried, overheated when lying down and makes a fit victim to cold. The hog does not need much bedding. A tight wooden floor upon which to feed is rapidly growing in favor from economical considerations, and will become equally as popular from the health standpoint when its value becomes better understood.

The breed of the hog makes no difference to the cholera germ. The objection often made by the farmer that pure-bred hogs are less resistive to disease is not well founded in fact. The razor-back, with digestive powers equal to any task that may be imposed upon them will succumb to the diseases the same as the finely bred Berkshire or Poland-China No breed of hogs is immune to the disease, and the advice to cross our better bred swine with the southern hog is ill founded. All the advantage which they possess is in the fact that they are not so fat and all the vigor that will prevail against the disease can be obtained by using care in the handling of the improved breeds.

Among the agencies which may carry the germs are streams, wind, birds, dogs, people passing from one farm to another, buying hogs from infected herds, shipping hogs in unclean cars, exhibiting at fairs, etc. Some of these means are not within our control, but many of them are and a proper understanding of them should lead us to prevent thousands of cases.

Undoubtedly the most important agency in the distribution of the disease are the streams and surface water supplies. I have emphasized this point often but it will bear repetition. It has been known for some time that there was a relationship between the water supply and the disease, but it is only since the investigations by this station were undertaken that the real facts have been ascertained. In 1895 the 60 townships bordering upon the Wabash, from Cass County to its mouth, show a loss of 150 head out of every 1,000 produced; 47 townships in the second tier removed from the river show a loss of 100 head per 1,000, or 50 per cent. more loss in the first tier than in the second tier. In 1896 the bordering townships lost 294 hogs per 1,000, the second tier 205 and the third tier 160. In other words, the loss was 43.4 per cent. more in the first tier than in the second tier, and 83.8 per cent. more than in the third tier.

In 1895, 44 townships bordering upon the north fork of the White River lost 138 hogs per 1,000, and 42 townships in the second tier 65 hogs per 1,000, or 112 per cent. greater loss in the townships bordering upon the river than in those a few miles removed. In 1896, the loss in the first tier was 231 per 1,000, in the second tier 156, and in the third tier 75, or 48 per cent. greater loss in the first than in the second, and 208 per cent. greater than in the third. In 1896, 44 townships bordering upon the south fork of the White River lost 200 hogs per 1,000; 58 townships in the second tier lost 150, and 42 townships in the third tier lost 109; thus mak

ing 33 per cent. more loss in the first than in the second, and 83 per cent. more loss than in the third. In 1897, the first tier of townships bordering upon the river lost 321 hogs per 1,000, the second tier 182, and the third tier 145; 76 per cent. greater loss in the first than in the second, and 121 per cent. more than in the third.

In every general epidemic of the disease of which I have record in this State the disease has spread from the rivers to the higher land. The evidence furnished by the large number of townships and for successive years should leave no doubt as to the important role which streams and surface water play in the spreading of this disease. If the larger streams are such important factors we can reason that the smaller streams have a like effect. Drs. Salmon and Smith made the following statement in their investigations of the disease. It is pertinent and should be remembered by all swine breeders: "Perhaps the most potent agents in the distribution of hog cholera are streams. They may become infected with the specific germ when sick animals are permitted to go into them, or when dead animals or any part of them are thrown into the water. They may even multiply when the water is contaminated with fecal discharges or other organic matter. Experiments in the laboratory have demonstrated that the hog cholera bacilli may remain alive in water four months. Making all due allowance for external influences and competition with the bacteria in natural water, we are forced to assume that they may live at least a month in streams. This would be long enough to infect every herd along its course."

It is a common practice throughout this State to give the hogs surface water in which to wallow and to drink. Small streams are dammed, drinking places are built into the rivers, a basin is scooped out to receive the water from a barnyard, open ditch, tile drain or spring. All of these afford the best conditions for introducing the germs into the herd. It is not uncommon to go along a public ditch or a stream during an epidemic and find the carcasses of hogs in every stage of decomposition, thus acting as the bearer of infection to new herds. The conditions are better now than ever before, but there are unscrupulous men who will take that means of disposing of their dead, and some one else must suffer.

Some springs afford pure water but many have only a surface origin and are no better than a tile drain. The worst feature connected with the use of a spring as a water supply is the fact that no provision is made for keeping the water clean and pure. The water usually collects in a pool and receives the surface drainage from all the land around and serves as a wallow. Under such circumstances it becomes little better than a pond.

In 1895, the station made an inquiry as to the source of the water supply used by the breeders of pure-bred swine. It was found that in nearly all instances in which they escaped disease they used well water. Hogs receiving well water do become affected, but when we consider the numerous ways by which the infection can be carried we are not at

all surprised. A good well, however, must always be considered as furnishing the maximum protection.

A study was also made of the relation of rainfall to the disease. No relationship could be traced to the total rainfall for the year or to the total rainfall for any set of months. In general, a season with sufficient rainfall to keep a constant supply of fresh water in the streams or one of sufficient drought so that the small streams, ponds, etc., become completely dry, are productive of least cholera. A year in which there is much stagnant water is productive of the greatest death rate.

The argument is advanced that the greater loss occurs along the rivers because more corn is raised, more hogs are fattened, and hence they are more crowded. In order to determine this point we divided the counties in the State into groups according to the number of hogs raised per square mile and determined the per cent. of loss for these groups. This is presented in the following tables:

1883-1890.

Number of Hogs Per Square Mile.	*Number of Counties.*	*Per cent. of Loss.*
1- 24	1	8.1
25- 49	7	4.5
50- 74	20	5.9
75- 99	12	9.1
100-124	16	8.3
125-149	11	7.9
150-174	7	8.1
175-199	10	8.8
200-224	8	10.

1895-1897.

1- 24	2	7.7
25- 49	22	9.1
50- 74	18	11.1
75- 99	16	17.9
100-124	12	19.2
125-149	8	17.3
150-174	7	21.6
175-199	4	22.2
200-224	3	26.

During a period of eight years there is comparatively little difference in the losses, but during the period of three years when the disease raged with unusual violence the percentage was much higher in the counties having a large number of hogs per square mile. It is not possible to tell

how much of this increase in loss is due to the greater number of hogs, as it so happens that the counties having a very large number of hogs per square mile and large percentage of loss also have one or more rivers passing through them. From a comparison of counties about equally situated but the number of hogs per square mile very different, I am of the opinion that the number raised is not a very important factor in determining the per cent. of loss.

The season of the year when cholera is most prevalent is always in the late summer and fall. It occurs at all times of the year, but like all the intestinal diseases, as dysentery, typhoid fever, etc., in people, the conditions are more favorable for germ development in the fall.

The germs of the disease may be carried from one place to another by birds of carrion. It is a common experience with farmers that hogs can not be raised upon a farm where there is a buzzard roost. I have learned of isolated outbreaks of the disease occurring from buzzards alighting to eat the carcass of a colt or other animal and soon after the hogs gain access to the same place and contract the disease.

Dogs prowling about at night carry pieces of dead animals for a mile or more, across pasture fields, feed lots, leaving pieces here and there to be devoured by some unfortunate animal.

Men may carry the disease from place to place upon their boots, or particles of dirt remain upon the wagon wheel and when dry drop off in another lot. It should be a general rule never to allow agents for hog cholera cures to come near a pig lot where there are healthy hogs. They go about diseased hogs and do not use the precautions necessary to prevent the spread of infection.

Under some circumstances I believe the wind may be the bearer of germs. If the germs be distributed along a public highway by the rendering wagon and become mixed with the dust it is possible and altogether probable that they may be blown on the pasture or on the feed lot and thus convey disease. I have seen a few outbreaks continue in one direction for several days after a constant prevailing wind from the southwest. The evidence in this case seemed to point to the wind as the distributing agent. In such cases the germs fall in the water or are taken in with the food.

Hog cholera is often contracted as a result of buying hogs from stockyards for feeding purposes. This is such a common experience that only the strong-headed or uninitiated will be likely to take the risk. The large stockyards and the majority of shipping cars are permanently infected with disease and no matter how healthy the hogs may have been when they started from home they come in contact with infection and should never be withdrawn from the yards for feeding purposes. We have recorded many outbreaks caused in this way. It has been claimed that the shipping of diseased hogs over the railroad may be the means of causing new outbreaks of disease. I made this a particular object of

research in 1895 and 1896, but in no case have I been able to find more cholera along railroad lines than at a distance of a mile or two upon either side. Under the present method of having the right of way fenced I feel certain that the infection from this source is over-rated.

It would be useless to try to go into detail concerning all the methods by which the disease is distributed. Any means by which the germs are carried from one place to another can be considered an accessory cause. All of these means are not under our control but many are and we will succeed in prevention in the same measure as we eliminate them.

SYMPTOMS.

The diagnosis of the different swine diseases is attended with greater difficulties than the diagnosing of diseases in horses or cattle. Except upon very careful examination the general symptoms of swine diseases seem to be very much the same. Cholera assumes several different forms and therefore can not be recognized by any specific set of symptoms.

The symptoms vary greatly with the virulence of the outbreak. It may be said to assume an acute form which may run a course in from a few hours to two or three days, a subacute form which runs its course in from three days to a week, and a chronic form which may last from one week to more than a month. These are only relative terms and merely used for convenience in describing the disease. The symptoms as here described are for the more common cases that live for three to seven days. About the first symptom to be observed is a general droopy condition, the eyes more or less closed and dimmed, the ears drop more than usual, that there is a certain amount of sluggishness and although the hog eats, it is not with that greediness that is customary. The appetite becomes depraved and he will eat the droppings from other hogs or chickens, eat clay and earthy substances. The hog lies about more than usual, hiding in fence corners, under litter, and in out of the way places. If he should have access to a manure pile, that will be a favorite place. During the hottest days he will prefer to lie in the scorching sun rather than in the shade. At first he will respond to calling for feed but later he will not get up unless urged to do so. During the progress of the disease and sometimes from the very beginning there will be pronounced rheumatic symptoms. The hog will be lame first in one leg and then in another. The back will be arched. Diarrhea usually makes its appearance with the onset and is almost always present at some time during the course. The discharges at first are thinner than normal, but they rapidly become tarry and have a characteristic offensive odor. Constipation may occur and is almost sure to do so in those animals that eat earth. In some of the animals the contents make casts that perfectly occlude the passage and when struck with a board give the sensation of baked clay. Vomiting is also present. There is rapid emaciation. The fever is high and the breathing rapid but not labored.

In the very acute cases the toxins cause such rapid poisoning of the system that death is so sudden that the symptoms may not be developed. A pig that will be eating at the trough at one hour may be dead the next.

In the chronic type we are especially prone to have the swelling of the ears and cracking of the tail. Both may drop off. The eruption is more pronounced upon the skin. Ulcers may form from the size of a grain of wheat to the size of the hand. The hair is lost. There is frequently hemorrhage from the nose and sometimes sore mouth and feet. There is coughing as a result of lung involvement.

In hog cholera the great fatality is among the pigs, the older hogs often making a recovery or not being attacked.

In swine plague a cough is probably the first symptom observed. It is paroxysmal at first but is deep seated. This is more noticeable when the animal first gets up or after exercise. Later the cough is more persistent. The breathing is short and rapid with little movement to the ribs and a double hitch in the flanks, like a horse with heaves. The breathing becomes more labored, the throat swells and there is nose bleed. If the hands are pressed over the ribs there will be evidence of pain, often due to pleurisy. The animal will not move more than necessary, the appetite remains better than in cholera, there is much thirst and much less tendency to diarrhea. Constipation is more frequently present than in cholera. The eyes are more inflamed and watery and there is less tendency to skin eruption. Swine plague is particularly liable to attack and be fatal to old hogs. Both diseases may be present in the same herd and even in the same animal at one time, thus complicating the symptoms. In nearly all cases where there is doubt and a number of hogs are similarly affected in the same neighborhood it is safe to conclude that one or both of these diseases are present. We have no other wide-spread diseases of hogs causing such loss.

Hog cholera is sometimes mistaken for other diseases, as worms, diarrhea, or scours, septicemia or blood poisoning, etc. Swine plague is frequently mistaken for pneumonia, pleurisy and bronchitis.

In some places the intestinal worms become so numerous as to cause all the intestinal symptoms ascribed to cholera, vomiting, diarrhea, depraved appetite and emaciation. The onset of the trouble is not so sudden; there is not the same temperature, usually no lameness, and no skin eruption. The worms causing the trouble may be the large intestinal worms, the size of a lead pencil or larger, or the small fellows from one-half to three inches in length. A post-mortem will show the presence of the parasites in great numbers and the intestines will be more or less irritated. The presence of the parasites causes so much loss that some of the cholera cures are nothing but vermifuge powders. The lung worm may also produce symptoms that will be mistaken for swine plague.

Diarrhea, or scours, may also be mistaken for cholera as it is so often induced by a change of feed as turning upon new corn, feeding city slops

that contains soap and sour feed. The discharges are usually more fluid and of lighter color than in cholera. The diseases can not be distinguished in the early stages, but a change to a limited dry diet will usually be all that is necessary to bring about the desired result in the diarrheal trouble.

A form of septicemia, or blood poisoning, sometimes attacks a bunch of pigs and being contagious, spreads from one to another. The mouth, nose, lips, tongue, feet or other parts of the body become gangrenous. While the disease presents some of the symptoms of cholera, the localization of the trouble is sufficient to make a diagnosis.

Hogs will pile up in bunches when not properly divided and protected during the cold weather, and as a result catch more or less severe colds, resulting in bronchitis, pneumonia and pleurisy, giving rise to symptoms like those of swine plague. The same troubles may also appear as a result of turning hogs upon a stubble or pasture field during very hot weather and then permitting them to have access to cold springs or brooks in which to wallow. These same troubles sometimes arise from the inhalation of dust. A study of the conditions will usually suffice to differentiate the troubles.

NUMBER OF ANIMALS AFFECTED, AND IMMUNITY.

When an outbreak of cholera occurs in a neighborhood we can not judge what per cent. of the hogs will be affected and die. Some outbreaks have a virulent type of the disease on the outset and gradually the virulence diminishes so that while from eighty to one hundred per cent. of the hogs affected at the outset may have died only ten per cent. may be affected and die out of herds attacked later. As a rule the disease is more virulent in type when it makes its first appearance. The reverse of this is true in some instances. Out of a large herd of mixed hogs it is always safe to predict that the younger ones will die and that from ten to thirty per cent. of the older ones will escape. Here is where hundreds of farmers are duped into believing that certain hog cholera cures accomplished great good, as they lose the susceptible ones before a remedy is tried and then succeed in saving those that would have lived anyhow.

One attack usually confers immunity against subsequent attacks, but there are exceptions. An animal then that passes through the disease becomes valuable as a breeder. Ofter sows loose the litter of pigs which they may be carrying at the time, but it has no influence upon subsequent litters. No immunity is conferred upon the offspring, as they are as susceptible as any to the disease.

TREATMENT.

The treatment naturally divides itself into medicinal, hygienic and preventive. The medicinal is the least important as we have no spe-

cific for the disease. Veterinarians who have made a careful study of the action of drugs and of the character of the disease have tried everything that would seem to be a rational treatment, but have failed. Pathologists have recognized the apparently hopeless condition to be treated and have been unable to suggest a remedy. Experimenters have tried everything which science and empiricism has claimed would cure but they have found nothing which they could endorse. Notwithstanding all the futile efforts that have been made by careful and conscientious workers, backed by large sums of money and every facility for investigation, we have more than one hundred sure-cure cholera remedies upon the market in this State. According to the manufacturer (and the claims are all alike), the prevention and cure of hog cholera is a very simple things and depends wholly upon whether the farmer is willing to buy a few packages of their remedy and use as directed. It is impossible to make a close estimate of the amount paid for such preparations, but it is safe to say that in this State it amounts to more than $100,000 annually.

In 1897 and 1898 the writer devoted considerable time to the investigation of the merits of the various preparations upon the market. Many of these preparations are the product of misguided men, wholly ignorant of the pathology of the disease and equally as ignorant of the action of the ingredients in their concoctions. From a very limited trial they had drawn conclusions and sincerely believed they had discovered a sure cure and were willing to part with it for a large compensation.

A much larger number of the remedies are prepared by men and companies who know the value of a well-worded advertisement and who are in the business for revenue only. They take the government formula, alter it in some slight particulars, call it by another name and increase the price probably ten times. Another favorite scheme is to take the formulae of some of the patented preparations and sell the remedy under a new name, well knowing that if it failed under one name that it would act no better under a new. I was informed that Brown County clay sold for seventy cents per pound.

A third class of remedies are prepared by men who make a study of the disease. They constitute a very small minority.

There is no better evidence that we have no sure remedy than the fact that we have so many upon the market. In these experiments one hundred and fifty-six remedies were tried and nearly 4,200 pounds of drugs. All the formulae given in the patent office reports were filled. A large number of formulae were obtained from the owners and manufacturers, a few by analysis and several hundred pounds of the proprietary remedies were used.

The plan was to test each remedy upon at least five herds in as many places and at different times during the season, in order to work over all the conditions. Without going into details, it may be said that none of them fulfilled their claims. Some were positively injurious. Many

of them seemingly did good upon some herds and if a hurried conclusion had been reached it would have been favorable. This is an error too often made and no test can be considered satisfactory that is not used upon a large number of hogs in different herds, in different localities and at different times during the season. The good effects often reported are frequently due to the better care and better hygienic conditions in following the directions. Some manufacturers accompany their goods with carefully compiled directions upon care and management, and as they cost considerable it insures their being carried out. It must be confessed, however, that directions come high at fifty cents per pound.

Very few remedies find a place upon the market for more than five years. The great majority of them run their course in two years, and the writer is cognizant of but three that have been sold for a period of more than ten years. This is the test of their efficiency. In every instance in which an attempt has been made to take infected hogs from the stockyards, treat them and fatten them for the market the result has been a failure.

In 1897 Mr. John Cowie, of Iowa, tested a number of the more widely advertised remedies and the results were unfavorable. Dr. Reynolds, State Veterinarian for Minnesota, after examining the matter carefully, issued a circular advising the farmers not to purchase the remedies.

In mild outbreaks and in very many cases much good can be accomplished by such remedies as will keep the bowels clear and act as an alterative and tonic. For this purpose we have a prescription generally known as the government formula, and is as follows:

Wood charcoal, 1 pound.
Sulphur, 2 pounds.
Sodium chloride (salt), 2 pounds.
Sodium bicarbonate (baking soda), 2 pounds.
Sodium hyposulphite, 2 pounds.
Sodium sulphate (Glauber salts), 1 pound.
Antimony sulphide, 1 pound.

The dose is a tablespoonful for each 200 pounds once or twice a day. It is best given in slop. This costs about ten cents per pound and is the one so much imitated and sold under different names at from twenty to fifty cents per pound.

Our best results in the treatment of mild cases were obtained by using the following:

Chlorate of potash, 1 pound.
Bicarbonate of soda, 1 pound.
Nitrate of potash, 2 pounds.

The dose is the same as in the former prescription. In the early stages and when constipation is present five grains of calomel are admin-

tered once a day to each 200 pounds of weight, or oil meal is added to the slop.

Another treatment which found considerable favor was a tablespoonful of a saturated solution of chlorate of potash and a like quantity of tincture of muriate of iron once or twice a day for each 300 pounds.

A half gallon of kerosene to a barrel of slop mixed thoroughly gave better results than three-fourths of the remedies tried.

Quinine and salol were also of service.

Carbolic acid and like preparations are disinfectants and not cures.

The treatment of inoculating worn-out horses with cholera germs, killing the horse and feeding it to the hogs was not a success. The feeding of the carcasses of hogs that had died of the disease and been buried is to be condemned. The boiling of the carcasses of cholera hogs and feeding them has likewise disappointed those who have tried it. A final method of prying open the hog's mouth and cutting off the papillae inside of the jaw only abstracts blood.

PREVENTION BY VACCINATION.

The attempt to prevent hog holera by vaccination is dependent upon the fact that one attack confers immunity against subsequent attacks. Vaccination has been used against smallpox in the human subject with the most marked success. In this case the pox germ is obtained from the cow and when vaccination takes place it induces a very mild disease. Vaccination is also used against anthrax in sheep and cattle. Here the disease germs have had their vitality reduced by artificial means and only a mild attack follows. The results are highly satisfactory and sheep and cattle are now raised where it was impossible to do so before.

The attempts to vaccinate against cholera have not been successful. In the first place, we know of no animal having a similar disease, the germs of which when inoculated into the hog will confer immunity, and no method of attenuating the germs so that they can be inoculated with safety has yet been discovered. Some years ago Billings and Detmers each thought they had discovered successful means of vaccination and the work was carried on on a large scale. The results were unsatisfactory and had to be given up, as it had the effect at times of starting the disease where it did not previously exist. The work is being revived at the Kansas Experiment Station and again being reported favorably. The matter needs to be more fully demonstrated before advising the stockman to try it.

THE ANTI-HOG CHOLERA SERUM.

The serum treatment of hog cholera was probably first demonstrated by Dr. Peters in 1896, and the same work undertaken at almost the same time by the Bureau of Animal Industry. The serum treatment is based upon the same principles as are involved in the anti-toxin for diphtheria.

It is a well established fact that in some bacterial diseases a strong resistance to the growth of bacteria is developed by the formation in the blood of a substance known as anti-toxin. The germs form a toxin or poison and the body forms the anti-toxin to counteract the growth of the germs. If the formation of the anti-toxin is in excess the patient recovers, and it has been found that blood from such a patient can be drawn, the anti-toxin separated, and if added to the blood of a patient that is exposed or affected it will prevent the disease or bring about a recovery. In order to secure anti-toxin in medicinal quantities it is usual to inoculate animals that do not have the particular disease and produce a slight attack and after recovery reinoculate and repeat until the animal can stand an enormous quantity at one time. A quantity of blood is drawn and the serum separated and this is ready for use.

The government has experimented upon a large scale with this treatment and in the main the reports have been very favorable. A number of private firms have attempted the same thing, but up to the present they have not been very successful. This treatment does not promise nearly so much, in the estimation of the writer, as the public has been led to suppose. The serum can not be produced at low cost and its administration requires the services of a veterinarian, two conditions which militate against its general usage.

IMMUNIZATION IN UTERO.

Just at the present time a new preventive is being pushed upon the public under the above caption. The proof of the efficacy of the method has not yet been demonstrated. Reasoning from analogy with other diseases in the human or in animals, we have very little reason to believe that such can be accomplished. The method is to induce the disease in the sow by feeding from the carcass of a cholera subject. The disease is supposed to develop in a mild form in the mother and the immunity to be extended to the unborn pigs. The writer has seen pigs, from sows that suffered from the cholera prior to farrowing, die of the disease. It is the general experience that pigs from an immune sow do not possess immunity. This method needs to be tested scientifically before we can endorse it and this will require some time.

PREVENTION.

As we have no specific for the disease nor any line of medication that is fairly successful, we must rely upon prevention. This can not be done to the same extent as in many other diseases, and this is especially true of swine plague. To enumerate all of the steps would necessitate repetition of points already made, so that only the more prominent will be considered.

First, the water supply should be from deep tubular wells. Water

from a tubular well must come in from the bottom, which means that it has been filtered through the soil and the possibilities of pathogenic organisms being present is reduced to the minimum. Treat all surface water, whether pond, creek, spring or river, as unfit for man or beast. The feed should be pure and wholesome. Slops that have stood and fermented are not better suited to the stomach of the hog than that of some other animal. The dishwater contains so little nutrition that it would be more economical to throw it away than to feed it. Corn is undoubtedly our cheapest fattening food, but should not be given alone to sows and pigs. The addition of a little oil meal or other by-product will be most advantageous, and pasture in season. Hogs are fond of chacoal, ashes and salt, and these seem to furnish something to the body that is decidedly beneficial. The cobs from the feed floor should be raked into a shallow pit and burned to a char and salt added at least once a week. Nearly all prominent breeders follow the practice of supplying charcoal, salt and ashes in some form and many attribute to it the power of preventing disease. A feeding floor should be provided. The bedding for hogs should be like that for other stock—a little at a time and removed often. There is no better reason for compelling a fine sow to lie in her own filth than there would be in the case of a good horse. The bedding of both will become foul and should be removed. It can not be kept pure by disinfectants. Hogs should have no bedding during the warm season, only a dry place in which to sleep.

In case of an outbreak of disease upon the premises, separate the well hogs from the sick and confine all in small lots upon one part of the farm. Separate the well hogs from the sick, as the contagion is spread by the droppings and excreta and the well hogs would be subject to the contagion if kept upon the ground where the sick had been. Formerly the recommendation was made to give the hogs the benefit of a large pasture and keep constantly dividing the herd. Experience has shown that this has the disadvantage of getting the germs scattered all over the farm, prolonging the outbreak, and has no advantage over placing them in two or three small lots. By the latter method the business of hog-raising can again be started as soon as the outbreak is over, using some other part of the farm. Use plenty of disinfectants about the place. Air slaked lime, whitewash, chloride of lime, carbolic acid, etc., are all good. If possible have one man to feed the diseased and another to feed the well hogs. Take advantage of all the sunlight that it is possible to get, as that is the cheapest disinfector.

No rule can be laid down for guidance as to the time when pens, etc., may be used after an outbreak of disease. We have observed instances in which this was done immediately and disease did not follow, and in other cases weeks and months have elapsed and a fresh outbreak would be started. If the place is thoroughly cleaned and disinfected and is well lighted a few weeks will be sufficient, but when it is feasible it is better

not to attempt it again during the same season. Experience has shown that a wise precaution is not to permit the hogs to graze or be in pens alongside a public highway. Hogs having the disease and driven to market will leave droppings that become mixed with dust and blown upon the premises. It is the observation of the writer that this is a precaution not sufficiently emphasized.

Hogs may be disposed of in two ways, by burial and burning. If by burial it should be well done, upon a dry place at least three feet deep and in a woods or field to which hogs will not have access for a long time. If it be true that the disease germs live for a long time in the soil then burial only favors the development of some subsequent and unexplained outbreak. Where burial is practical the addition of a quantity of quicklime will be effectual in destroying the germs.

Burning is not difficult when properly done. The essential point is to get at least a foot of wood under the carcass. A very much smaller amount of wood will be required where the fire is under rather than at the side. All carcasses should be disposed of at once and it is far more economical to kill badly infected hogs than to have them linger around for a week or two.

If a herd be in marketable condition when exposed to cholera they should be disposed of at once. Those that are affected will be condemned and those fit for food will pass inspection. Such a recommendation may be open to criticism from a strictly scientific standpoint, but it is the only practical method that can be followed at present. Under no circumstances should hogs be purchased for fattening purposes that have passed through stockyards or been shipped by rail. Stockyards and cars should be regarded as permanently infected places. Breeding stock should always be kept in quarantine for three weeks before admitting to the herd, particularly so if they have followed the fair circuit. These are measures that may be followed in practice by the individual.

STATE CONTROL

The argument is often made that the State should exercise some control over hog cholera and swine plague. The precedent is cited that the government stamped out pleuro-pneumonia in cattle and has saved millions of dollars to the cattle interests. The different States take cognizance of glanders and practically have that malady under control. Southern cattle fever is now confined to restricted areas and sheep are being dipped for scab. The diseases which have been stamped out or brought under control have been of such character as to require close contact to spread them. Hog cholera is a disease of different character and therefore is not amenable to the same methods. Typhoid fever in people sometimes assumes an epidemic character in cities, but by condemning wells and compelling the use of wholesome water the disease can be stamped

out. Hog cholera is a water-borne disease and can be prevented in part by securing pure water, but there are other means of spreading the infection. We have little to guide us in what may be accomplished by State control. England has tried to stamp out the disease by preventing the shipment of pigs unless inspected, no hogs to be shipped from a swine fever district, and none to be moved within sixty days from the time of an outbreak. In the shipment of pigs all cars must be disinfected and it becomes the duty of the owner to report every case of the disease as soon as it appears and the animal is slaughtered.

Prior to 1896, the regulations were not so rigid and the effect of the attempt at control may be seen from the following table:

Year.	*Outbreaks.*	*Hogs Slaughtered.*
1894	5,682	56,296
1895	6,305	69,931
1896	5,166	79,286
1897	2,155	40,764
1898	2,514	43,756
1899	2,243	30,386

The effect has been to greatly reduce the number of outbreaks and also the number of animals slaughtered. For a time the reduction in the number of outbreaks and also of pigs slaughtered was so marked that much hope was entertained that it might be possible to completely control the disease. The very serious restriction to trade and the heavy expense has brought many protests from the producers and the restrictions are again becoming less rigid. It will take more time before a conclusion may be drawn as to the possibilities of this method.

In 1897 the government undertook an experiment in Page County, Iowa, to determine what might be accomplished by county police measures. The plan was to canvass a part of the county and determine the number of pigs raised the year before, the number that died and the number now on hand. Upon receipt of notice of an outbreak the veterinarian called and killed all the sick and paid the owner at market rates. Disinfection and general cleaning of the premises followed. It is believed by some that the saving more than paid the expenses.

Several of the States have laws upon hog cholera, but they usually define the manner in which the carcass shall be disposed of. Minnesota probably undertakes more than any other State and there the matter is in the hands of the State Board of Health. Canada demands a certificate of a clean bill of health from the State Veterinarian before they can be shipped in. The tendency is toward making transportation companies disinfect cars, yards, etc.

In our own State the law requires burning or burial of the carcass; it requires a certificate of health to exhibit at the fairs and the disinfec-

tion of pens, etc., at fairs. It is an imperfect law but has been the means of saving many thousands of dollars.

The Bureau of Animal Industry requires the disinfection of cars at stockyards which have brought in cholera hogs. From the observations of six years the writer can not agree with those who advocate the disinfection of all cars. There arrive at the stockyards 20,000 cars annually. The cost of disinfecting would be about $12,000. The writer believes that for all practical purposes the same results would come from preventing any hogs being withdrawn from the stockyards for feeding purposes. The outbreaks of cholera traceable to transportation in ninety-nine cases out of every 100 are due to the shipment of hogs. The railway companies receive little freight for the stock hogs that go out of the yards compared with the loss of freight upon the hogs that die of disease as a result of such shipment. The loss then would be upon the proper party—the one who sent the diseased hogs.

The problem of State control is of great importance and will not be settled soon. In the meantime this State should not be content to sacrifice $2,000,000 worth of stock annually without making some effort to determine new facts concerning this disease.

SURGERY UPON THE PIG.

CASTRATION.

The objects of castration are to prevent reproduction, to increase the fattening propensity, to better the quality of meat and to secure docility. Nearly every farmer considers himself competent to castrate pigs and, although the general losses are not very heavy, that could easily be reduced one-half or three-fourths by the exercise of a little more care and attention.

Pigs may be castrated at any time, but it is wise to avoid the extremes of heat and cold. In very cold weather the parts may become frosted and a great slough follow. In very hot weather sepsis is almost sure to follow and there is some danger from flies and maggots. In nearly all cases the owner can exercise some judgment and either castrate a little earlier or a little later than he might otherwise desire, and thus avoid these extremes in season.

The age at which castration can be performed to the best advantage is not fully agreed upon by different breeders. Some prefer to castrate while the pigs are still nursing, but the majority prefer to wait until after they are weaned. The younger the pig the less the shock and possibly the less the check in growth. The older the easier the operation. It is better however that the operation be not done at the time of weaning.

The pigs should be prepared for the operation by receiving a light supper in the evening and no breakfast in the morning prior to the

operation. This will prevent vomiting and the inhalation of vomited matter, causing pneumonia. After castration they should be turned upon grass and receive slops for a few days to keep the bowels open and prevent a feverish condition. Under no circumstances, however, should the pig be allowed access to a wallow. If the wound can be kept clean it will heal in from four to six days, but if it becomes infected with mud it will take much longer.

There are different methods of operating, but the essential points of the technique are about as follows: The pig is caught and laid on the side with the head a little lower than the hips. It should be held by one or two men and the back should be turned away from the operator. The scrotum should be mopped over with a strong carbolic acid or creolin solution for cleanliness. The lower testicle is seized between the thumb and middle finger of the left hand and an incision made over the most prominent part parallel with the middle line of the scrotum and a half inch to the side of it. The incision should be deep enough to liberate the testicle at one pass and should be sure to go to the most dependent part. The upper testicle is then liberated in the same manner. In young pigs the testicle may be seized and by a quick jerk the cord and all may be drawn away. In the older pigs this is not feasible. No hemorrhage follows the tearing of the cord, but it not infrequently happens that a rupture is made which may appear at the time or a little later. A better plan is to draw the testicle well down and cut the cord. This operation is applicable at all ages. Hemorrhage will follow in a few instances, but this may be checked by a ligature. By far the best method of taking off the testicle is by the use of the emasculator, as this effectually checks all bleeding and avoids any possibility of danger. It is the method above all others for old animals. It will not pay a man if he has only a few hogs to castrate to invest in an instrument, but it will soon pay for itself if there are several each year.

No application should be made to the wound and no stitches taken, as it will heal more readily without interference. In warm weather carbolic acid or creolin may be used to prevent flies attacking it.

The castration of the ruptured pig is accomplished in much the same way as the ordinary. The pig is held in the upright position first to return the intestine and omentum. The castration is then performed in the usual manner and after the testicle is removed about three stitches are taken with silk thread or catgut across the opening of the canal into the scrotum. This is easily accomplished with a half-curved needle. As a matter of safety, stitches are then placed in the skin opening.

In the cryptorchid, or boar with the testicles in the abdomen, the operation is performed the same as for spaying the sow, using the method to be described.

SPAYING.

Spaying is performed for the same reason as castration, and, while it was practiced quite generally twenty years ago, it is seldom done now. The necessity for the operation has passed away. It is an operation that is profitable where sows are to be kept until a year or more of age. Under the present method of marketing at eight and nine months it is more profitable to permit the sows to advance to one or two months' pregnancy rather than spay and lose a short time in checked growth and run the risk of a little loss.

When it is decided to spay the pigs are prepared for the operation as for castration. They should weigh from fifty to eighty pounds. The pig is caught and held by two men, upon an inclined board, the head being lowest. The operator stands at the back and clips the hair from the flank over a space about two inches wide and three inches long. An incision is made about midway between the point of the hip and last rib and an inch below the points of the lumbar vertebrae. The incision should be just sufficiently large to admit the finger. The forefinger of the left hand is introduced and follows the back. The ovaries will be found almost directly downward, suspended by a short ligament. They will feel like a raspberry or blackberry and can be mistaken for nothing else. If the ovary can not be found at once, pass the finger backward toward the bladder and search for the uterus (pig bed) and follow it forward to its termination at the ovary. Remove the ovary by tearing it off with the finger or cutting it off with dull scissors. The lower ovary may be removed through the same opening. Close the outside wound with two stitches, using silk thread or silk fishing line.

The operation may be performed through the middle line of the belly the same as in spaying the bitch. The method is to hang the pig up by a gambrel with a loop for each hock, make the incision about two inches in front of the pubis and remove the ovaries as already indicated. This opening is closed by two sets of stitches, one in the deep muscles and a second in the skin. One of the objections to this method is the danger of small hernias.

In either method the part should be prepared by washing with carbolic acid and the hands and instruments should be clean. The loss from operating is slight.

RUPTURE OR HERNIA.

Rupture or hernia is almost always umbilical or scrotal and is due to the omentum or intestines passing through an opening in the abdominal wall into a sack just beneath the skin. A rupture may occur anywhere about the abdomen as a result of an accident, but occurs at the above

mentioned points because there is a natural weakness and oftentimes incomplete development at those points. In case of the umbilical hernia the two abdominal muscles remain apart and in the case of the scrotal hernia the intestines follow the cord through an open canal into the scrotum.

The treatment of hernia is simple. In case of umbilical hernia turn the pig upon the back and gently return the contents of the sack into the abdomen. The point of the finger will easily detect and determine the size of the hole. Cut down upon the sack and take as many stitches from muscle to muscle as may be necessary to close the opening. There are other methods of closing the opening of this sack, but this I consider the surest. Afterward stitch the skin.

In the treatment of the scrotal hernia hang the pig up by the hind feet, return the intestines and omentum and proceed as described under castration of a ruptured pig. In case the intestines can not be returned by simply turning the pig over or holding it up and manipulation, then the openings may be enlarged with the knife, using care not to injure the intestines, and proceed as before. The operation must be done with care, wash the parts thoroughly with carbolized water, have the instruments clean and the hands clean. When carefully done, using such precautions, the loss is very low.

ENLARGED PREPUCE.

A condition often seen in the male is the enlarged prepuce. It is more prone to come on after four months than before and very much resembles a hernia. This is due to a collection of secretions and dirt in the side folds of the prepuce, afterwards becoming infected, and forming pus. The pus may become cheesy and remain there indefinitely. Sometimes the enlargement becomes so great as to cause difficulty in urination.

This condition is readily relieved by incising both sides of the prepuce and evacuating the contents. Recovery is prompt, but a recurrence may take place at a later date.

INJURIES.

Pigs are especially liable to injuries—such as fractures of the legs and crushed feet as a result of being stepped upon by the mother. All injuries should be treated the same as in other animals and the outcome will be surprisingly good. In the majority of cases of broken legs all that is necessary is to return the limb to a normal position, keep the pig in a pen where it can not be disturbed and it will unite promptly. There will be some deformity, but the leg will be serviceable. If there is such separation that a splint is required this may be made of sole leather. Take a piece of sole leather and soften it by soaking in warm water,

mould it to the limb and then allow it to dry. When dry it will become stiff and if lightly bound on will make an excellent support. Another excellent material for splinting is the veneer butter and meat plates, obtainable at all groceries. These are soaked until soft and moulded and bound on. A good splint can also be made by taking pieces of muslin a couple of inches wide and as many yards long and soaking in laundry starch and rolling on and allowing to set. A dry bandage is applied before the wet bandage is rolled on. All these matrials are always available, and if the owner has any ingenuity he can make a neat-fitting, light splint that will serve the purpose in almost any condition that may arise. Injuries to the feet should be treated by occasional applications of creolin or carbolic acid and keeping the pig in a dry pen. Other injuries should be treated as they would be in the human subject.

Statistics Showing the Number of Hogs Produced, the Number Lost, and Percentage of Loss.

COUNTY.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1895.	1896.	1897.	1898.	1899.	Aver-age.	No. per Sq. Mile.
Adams—Total number	41,723	44,198	57,035	53,448	47,234	47,102	49,881	56,510	36,727	40,918	44,183	51,154	42,858	47,151	131
Total died	2,955	4,040	2,461	3,664	4,448	4,513	3,030	4,183	2,704	3,714	4,530	10,484	11,127	4,758	
Per cent. died	7.1	9.1	4.3	6.9	9.9	9.5	6.1	7.4	7.0	9.1	10.2	20.5	25.9	10.0	
Allen—Total number	67,915	69,773	.....	74,514	69,992	63,212	68,180	69,897	39,642	47,857	59,164	60,169	57,898	57,531	86
Total died	3,561	5,352	3,225	19,168	14,913	4,600	3,768	3,030	2,619	4,092	6,216	7,369	17,028	7,303	
Per cent. died	5.2	7.7	.....	25.7	21.3	7.3	5 5	4.3	7.0	8.6	10.5	12 2	29.4	12.7	
Bartholomew—Total number	37,594	39,473	44,377	50,624	55,401	49,196	43,018	45,301	30,351	38,648	41,252	42,046	38,625	42,765	91
Total died	8,242	3,536	4,088	4,103	4,180	4,396	2,232	2,175	4,709	4,014	13,168	7,862	7,652	5,412	
Per cent. died	21.9	9.0	9.2	8.1	7.6	8.9	5.2	4.8	15.5	10.4	31.9	18.7	19.8	12.6	
Benton—Total number	31,578	53,439	44,862	56,412	52,887	49,653	29,887	31,942	23,255	22,301	23,085	29,169	24,645	36,394	97
Total died	3,210	2,510	2,718	7,214	3,880	2,884	1,423	2,480	3,258	8,342	6,411	2,598	3,091	3,848	
Per cent. died	10.2	4.7	6.1	12.7	7.3	5.8	4.8	7.7	.14	37.2	27.7	8.9	10.3	10.6	
Blackford—Total number	19,547	20,564	23,151	27,081	29,595	26,639	.....	26,077	18,669	19,681	18,179	23,727	20,003	20,995	117
Total died	1,025	1,552	1,023	1,667	4,229	3,582	.....	537	2,804	1,839	1,699	4,405	4,014	2,190	
Per cent. died	5.2	7.5	4.4	6.2	14.3	13.4	.....	2.1	15.0	9.4	9.3	18.6	20.0	10.4	
Brown—Total number	10,287	13,243	14,677	10,678	12,299	15,712	10,360	11,113	8,622	9,657	13,413	11,679	10,939	11,745	37
Total died	357	305	109	564	649	538	163	118	616	376	929	1,647	426	531	
Per cent. died	3.5	2.3	0.8	5.9	5.3	3.4	1.6	1.1	7.0	3.9	6.9	14.1	3.9	4.5	
Boone—Total number	73,360	79,710	82,039	77,954	96,885	83,390	79,340	81,509	71,968	83,293	104,071	88,500	78,129	83,081	198
Total died	5,333	4,405	4,253	7,304	11,156	9,531	6,231	4,976	6,130	19,984	43,733	2,408	5,507	10,073	
Per cent. died	7.3	5.5	5.2	9.4	11.5	11.4	7.8	6.1	8.5	23.9	41.7	2.7	7.0	12.0	
Carroll—Total number	78,913	55,864	54,051	69,354	63,523	56,613	62,691	62,983	42,373	59,473	66,099	56,633	66,121	61,130	163
Total died	5,076	6,286	3,119	7,163	10,129	4,848	4,799	4,516	4,480	7,170	27,205	3,254	3,321	6,799	
Per cent. died	6.4	11.1	5.8	10.3	15.9	8.5	7.7	7.2	10.5	12.1	41.1	5.7	5 0	11.1	
Cass—Total number	39,985	53,134	53,372	50,586	64,173	56,013	57,946	58,136	32,555	38,511	47,396	48,260	64,821	51,145	122
Total died	2,918	4,674	6,206	7,690	5,786	3,735	3,716	3,860	1,464	3,332	12,235	5,284	5,753	5,127	
Per cent. died	7.1	9.0	11.6	15.2	9.1	6.7	6.4	6.6	4.4	8.7	25.8	10.9	9.0	10.0	

Clark—Total number	25,229	25,171	25,436	23,042	21,929	22,489	20,985	23,323	13,935	28,955	18,707	18,067	18,578	21,988	60
Total died	1,110	2,279	2,092	1,647	1,922	1,920	1,341	1,213	1,070	1,037	1,200	932	2,236	1,538	
Per cent. died	4.4	9.0	8.2	10.9	8.8	8.5	6.4	5.2	8.0	3.4	6.4	5.1	8.0	7.0	
Clay—Total number	21,677	32,485	30,262	28,797	30,257	31,004	36,145	32,182	17,337	33,489	35,200	29,270	27,887	29,922	82
Total died	2,012	2,113	3,677	3,547	1,994	1,822	1,555	1,608	2,101	4,230	6,042	2,868	2,236	2,754	
Per cent. died	8.1	6.5	12.2	12.3	6.6	5.9	4.3	5.0	7.0	[illegible]	17.1	9.9	8.0	9.0	
Clinton—Total number	57,125	65,855	66,813	74,245	85,669	78,954	81,826	83,255	70,260	64,118	79,357	75,783	73,740	75,156	184
Total died	6,825	4,255	4,327	[illegible]	11,126	3,345	3,380	2,150	5,793	16,476	33,414	4,877	6,951	5,560	
Per cent. died	11.9	6.4	[illegible]	7.8	12.9	4.2	4.1	2.6	8.0	[illegible]	42.1	6.4	9.4	7.4	
Crawford—Total number	13,146	17,787	12,456	[illegible]	9,828	9,399	7,730	9,475	6,144	[illegible]	8,873	7,626	6,391	9,847	2
Total died	975	2,151	[illegible]	177	268	390	86	120	301	234	395	314	275	565	
Per cent. died	7.4	12.1	10.9	3.5	2.8	4.2	1.1	1.3	5.0	2.8	4.4	4.1	4.3	5.7	
Daviess—Total number	37,249	44,047	43,820	[illegible]	47,490	47,144	42,566	46,185	37,208	42,574	64,288	45,412	37,608	44,512	[illegible]
Total died	3,917	4,820	4,598	4,598	4,600	3,149	1,493	1,680	[illegible]	7,411	19,039	5,241	2,113	5,236	
Per cent. died	10.5	10.9	10.5	9.7	9.7	6.7	3.5	3.6	14.8	17.2	41.1	11.5	5.6	11.8	
Dearborn—Total number	26,938	[illegible]	[illegible]	17,797	15,519	15,330	18,984	23,470	11,453	8,148	8,878	[illegible]	9,131	15,859	75
Total died	[illegible]	2,040	698	1,648	647	922	863	583	1,274	620	609	599	511	897	
Per cent. died	2.4	9.0	3.8	8.6	4.2	6.0	4.0	2.5	11.1	7.6	6.7	5.7	5.6	5.6	
Decatur—Total number	48,029	52,684	51,248	50,813	56,999	52,507	54,792	51,761	26,224	30,187	42,036	48,682	47,028	47,277	127
Total died	5,369	6,480	3,706	4,789	9,567	3,220	8,392	7,638	1,148	[illegible]	12,028	4,714	10,856	6,243	
Per cent. died	11.2	12.3	7.2	9.5	16.8	6.1	15.2	14.7	4.0	8.1	28.7	9.7	[illegible]	13.2	
Dekalb—Total number	[illegible]	44,279	43,750	45,393	[illegible]	45,586	46,944	50,081	27,878	[illegible]	[illegible]	[illegible]	31,763	46,218	[illegible]
Total died	1,292	1,782	[illegible]	2,120	2,451	1,320	1,162	1,216	[illegible]	[illegible]	1,261	1,287	1,493	1,566	
Per cent. died	2.8	4.0	2.9	4.4	[illegible]	2.9	2.5	2.4	4.0	7.2	3.8	3.7	4.7	3.3	
Delaware—Total number	73,417	91,619	[illegible]	81,952	77,261	65,286	74,727	84,858	52,761	77,139	64,411	76,394	[illegible]	72,291	[illegible]
Total died	[illegible]	6,290	[illegible]	4,995	14,599	7,145	5,488	[illegible]	2,200	[illegible]	[illegible]	4,901	8,250	6,716	
Per cent. died	4.7	6.1	6.2	5.7	18.9	11.6	7.4	[illegible]	4.0	[illegible]	20.9	[illegible]	[illegible]	9.3	
Dubois—Total number	21,983	30,264	[illegible]	24,727	29,512	[illegible]	26,670	31,793	[illegible]	24,176	27,288	26,702	25,599	[illegible]	62
Total died	3,298	5,726	4,475	3,789	2,723	2,691	3,566	2,599	[illegible]	[illegible]	6,761	4,782	5,877	4,010	
Per cent. died	13.2	18.1	[illegible]	13.3	9.2	10.0	13.4	8.1	[illegible]	[illegible]	24.7	18.0	23.0	15.0	
Elkhart—Total number	39,669	42,008	48,701	47,962	46,291	49,397	46,035	51,927	26,400	26,724	28,971	33,125	[illegible]	[illegible]	83
Total died	4,354	1,502	1,397	1,223	2,138	5,102	1,841	1,682	[illegible]	1,910	1,872	1,607	[illegible]	2,273	
Per cent. died	10.9	3.6	2.9	2.5	4.6	10.3	4.0	3.3	6.0	7.1	6.4	4.8	13.2	5.7	
Fayette—Total number	37,867	43,715	48,991	30,841	30,740	28,403	31,210	34,259	26,886	26,874	30,342	31,658	28,445	35,110	156
Total died	2,910	4,035	7,227	7,527	7,642	2,919	2,245	2,115	3,113	4,698	12,922	4,590	6,576	5,273	
Per cent. died	7.7	9.2	14.5	19.6	24.9	10.3	7.2	6.1	11.6	[illegible]	[illegible]	14.5	23.1	13.6	

Statistics Showing the Number of Hogs Produced, the Number Lost, and Percentage of Loss—Continued.

COUNTY.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1895.	1896.	1897.	1898.	1899.	Average.	No. per Sq. Mile.
Floyd—Total number	7,390	9,328	6,607	6,142	7,061	6,968	7,677	12,476	3,654	4,774	5,027	4,330	3,633	6,697	46
Total died	347	427	375	766	191	125	133	71	252	343	372	297	251	304	
Per cent. died	4.7	4.1	5.7	11.1	2.7	1.8	1.7	.6	7.0	7.2	7.4	6.9	6.9	4.6	
Fountain—Total number	47,688	67,573	54,551	54,392	62,906	60,621	56,959	58,710	43,465	44,881	52,182	47,366	44,802	53,546	134
Total died	5,911	3,068	3,051	7,039	11,963	3,570	1,451	1,603	7,573	8,761	18,957	4,459	5,992	6,415	
Per cent. died	12.4	4.5	5.6	11.5	19.2	6.0	2.5	2.7	17.4	19.5	36.3	9.4	13.4	12.0	
Franklin—Total number	40,258	41,655	40,316	34,871	43,696	39,842	38,598	36,218	25,793	25,197	30,019	31,443	27,820	35,056	88
Total died	4,853	6,257	3,698	2,824	9,201	5,387	9,159	3,250	2,616	2,317	7,883	7,087	5,599	5,395	
Per cent. died	12.1	15.0	9.2	7.5	21.1	14.0	23.7	9.0	10.1	8.1	26.2	22.5	20.1	15.4	
Fulton—Total number	36,910	35,071	33,032	31,731	39,877	39,072	40,729	42,528	23,896	24,519	32,803	39,153	36,938	35,097	95
Total died	2,426	4,408	2,483	2,048	6,926	4,231	4,227	2,680	1,166	1,371	3,098	4,938	17,117	4,394	
Per cent. died	6.6	12.6	7.5	6.1	17.4	10.8	10.3	6.3	5.0	5.6	9.4	12.6	46.3	12.5	
Gibson—Total number	47,710	49,897	58,739	48,941	66,521	66,973	58,461	56,308	48,861	54,200	57,541	42,962	39,001	53,547	113
Total died	6,742	7,548	10,549	22,191	10,471	10,073	5,816	6,730	12,839	14,345	17,183	6,503	4,815	10,446	
Per cent. died	14.1	15.1	17.9	31.2	15.8	14.9	10.0	12.0	26.2	26.5	29.3	15.1	12.3	19.5	
Grant—Total number	79,797	95,137	91,507	86,463	96,249	86,070	82,475	85,256	57,549	59,004	75,208	67,488	69,146	79,350	190
Total died	5,837	6,149	5,875	12,158	18,518	8,456	2,245	2,875	3,389	7,743	26,594	6,107	13,578	9,233	
Per cent. died	7.4	6.5	6.4	12.3	19.3	9.9	2.7	3.4	6.0	13.8	35.4	9.0	19.0	11.6	
Greene—Total number	37,277	47,073	44,738	45,719	47,916	45,942	51,377	56,403	35,062	46,239	49,890	36,952	38,640	44,864	83
Total died	2,129	5,482	8,599	5,635	4,738	2,530	2,064	3,255	2,858	5,816	23,315	2,911	3,044	5,567	
Per cent. died	5.7	11.6	19.2	11.0	9.9	5.5	4.0	5.7	8.1	12.5	46.7	7.9	7.8	10.7	
Hamilton—Total number	71,769	88,610	87,908	79,317	95,323	88,845	86,793	85,942	61,377	70,893	80,195	77,596	72,912	80,575	201
Total died	5,684	5,251	9,740	9,593	11,177	4,820	3,644	3,180	8,512	17,866	27,232	5,046	11,930	9,513	
Per cent. died	7.9	5.9	11.1	12.1	11.7	5.4	4.1	3.7	13.8	25.2	34.0	6.4	16.3	11.8	
Hancock—Total number	56,696	65,261	68,985	67,986	58,191	52,109	62,605	65,143	47,482	46,872	61,579	61,031	89,790	61,825	201
Total died	2,703	3,559	2,305	4,560	11,549	3,386	4,331	4,122	3,643	10,666	27,595	8,195	18,063	8,052	
Per cent. died	4.8	5.5	3.3	6.3	19.7	6.5	6.8	6.3	8.0	22.8	44.8	13.4	20.1	13.0	

Harrison—Total number	31,135	37,560	39,694	29,538	30,799	30,710	30,994	35,491	22,854	24,522	24,873	22,380	18,199	28,443	60
Total died	2,741	3,190	2,518	3,434	1,633	1,453	1,049	1,130	1,701	1,220	2,013	1,954	1,630	1,974	
Per cent. died	8.8	8.0	8.2	10.4	5.3	4.7	3.4	3.2	7.4	5.0	8.0	8.8	9.0	7.0	
Hendricks—Total number	60,216	77,453	66,642	60,145	52,881	78,585	88,839	87,817	57,041	67,069	76,151	72,729	70,460	72,764	186
Total died	2,513	5,808	6,947	6,780	10,354	4,598	2,973	3,110	5,678	11,058	26,562	8,436	6,397	7,786	
Per cent. died	4.2	7.5	10.4	10.1	12.5	5.9	3.3	3.5	9.7	16.5	34.9	11.6	9.0	10.7	
Henry—Total number	88,722	94,373	97 799	86,119	66,736	62,887	87,341	82,785	61,032	77,766	70,140	74,219	80,759	79,283	198
Total died	10,831	5,357	6,347	6,015	10,527	8,570	6,667	6,940	3,593	28,260	19,478	6,873	9,415	9,913	
Per cent. died	12.2	9.9	6.5	6.5	15.8	13.6	7.6	8.4	6.0	36.3	27.8	9.2	11.8	12.5	
Howard—Total number	50 705	54,552	.....	56,122	61 974	60 004	61,717	62,886	50,087	53,216	65,782	68,112	63,481	54,534	185
Total died	5,564	7,699	.....	4,952	9,240	6,871	3,664	2,870	10,467	10,312	16,607	6,873	7,756	7,144	
Per cent. died	11.0	14.1	.....	8.1	14.7	11.3	5.9	4.6	20.8	19.4	25.2	9.0	12.2	11.6	
Huntington—Total number	60,689	61,364	61,483	59,344	64,205	60,275	65,137	70,817	49,170	44,328	49,126	52,894	49,605	57,572	150
Total died	2,462	6 994	3,112	4,139	12,694	6,385	4,777	3,866	3,101	6,343	9,387	5,486	11,875	6,202	
Per cent. died	4.6	11.2	5.1	6.5	19.8	10.6	7.2	5.5	6.3	14.3	18.9	10.4	24.0	10.8	
Jackson—Total number	35,334	40,224	43,017	45,411	42,837	38,794	38,113	43,626	26,273	35,795	35,785	33,578	30,378	37,619	77
Total died	936	4,128	5,497	4,412	6,347	2,682	1,804	2,108	1,113	2,199	9,699	6,258	6,315	4,141	
Per cent. died	2.7	10.3	12.8	8.8	14.8	6.9	5.0	4.8	4.4	6.1	27.9	18.6	20.8	11.0	
Jasper—Total number	.....	21,237	23,538	22,248	34,435	29,222	24,616	27,372	13,123	18,936	24,289	27,681	29,429	24,702	45
Total died	936	948	1,899	616	862	677	472	651	5,656	5,176	1,470	1,321	5,812	2,068	
Per cent. died	.....	4.5	8.1	2.7	2.2	2.3	1.9	2.4	19.7	27.3	6.1	4.8	19.8	8.9	
Jay—Total number	52,616	56,405	49,465	51,893	67,409	68,514	79,786	74,645	38,800	40,164	49,926	52,143	52,175	56,457	150
Total died	1,969	7,087	3,196	3,635	2,835	3,592	2,780	2,269	3,107	2,843	8,288	4,748	15,500	4,758	
Per cent. died	3.7	10.8	6.5	6.6	4.2	5.2	3.5	2.9	8.0	7.0	16.6	9.1	29.7	8.4	
Jefferson—Total number	12,187	26,275	23,395	18,915	12,645	17,246	15,897	19,188	18,175	17,291	17,292	19,829	16,108	18,034	47
Total died	1,036	1,099	1,662	944	684	664	341	421	873	913	1,353	981	1,377	950	
Per cent. died	8.5	4.2	7.1	4.8	5.4	3.8	2.1	2.2	5.0	5.0	7.8	5.0	8.5	5.3	
Jennings—Total number	.....	22,131	23,099	21,744	24,891	23,909	23,780	24,198	12,394	17,006	19,570	21,087	19,721	21,126	56
Total died	2,630	1,103	964	1,176	1,684	1,136	1,010	897	795	852	1,589	1,576	2,165	1,353	
Per cent. died	.....	5.0	4.2	5.4	6.8	4.8	4.2	3.7	6.4	5.0	8.1	7.0	11.0	7.0	
Johnson—Total number	73,414	68,204	72,800	71,766	54,165	50,832	60,468	64,725	47,494	54,152	61,651	66,879	55,719	61,251	196
Total died	2,447	3,677	4,237	10,726	10,096	3,695	3,107	4,116	5,904	14,126	18,568	6,448	10,697	8,296	
Per cent. died	3.3	5.4	5.8	14.9	18.7	7.3	5.1	6.4	12.4	26.1	30.5	9.6	19.2	13.5	
Knox—Total number	39,310	46,692	55,113	57,269	66,433	62,458	69,754	61,319	53,292	54,087	51,888	49,978	40,928	54,501	100
Total died	5,469	5,785	9,313	8,589	10,126	9,611	7,915	8,803	21,287	22,800	11,789	4,338	7,169	10,253	
Per cent. died	14.0	12.4	16.9	15.0	15.3	15.4	11.3	14.0	39.9	42.1	22.7	9.0	17.5	18.9	

Statistics Showing the Number of Hogs Produced, the Number Lost, and Percentage of Loss—Continued.

COUNTY.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1895.	1896.	1897.	1898.	1899.	Average.	No. per Sq. Mile.
Kosciusko—Total number	57,341	59,443	55,784	57,420	57,379	63,334	83,265	80,419	32,632	38,364	45,704	60,676	44,233	56,615	101
Total died	2,236	1,303	1,004	1,329	439	2,679	7,915	2,255	2,842	2,033	1,982	3,840	9,637	3,038	
Per cent. died	3.9	2.2	1.8	2.3	0.8	4.2	9.5	2.8	9.0	5.0	4.3	6.3	21.8	5.3	
Lagrange—Total number	42,348	48,330	39,948	41,916	43,040	43,500	43,402	45,844	21,219	26,968	31,480	34,700	27,708	37,723	97
Total died	2,191	3,196	1,286	999	896	1,017	1,288	1,457	957	1,026	1,292	1,932	1,284	1,448	
Per cent. died	5.2	6.6	3.2	2.4	2.1	2.3	3.0	3.2	5.0	4.0	4.6	5.5	4.6	3.9	
Lake—Total number	28,853	24,824	25,559	25,482	22,197	20,841	23,555	23,238	11,838	15,090	16,398	16,425	15,607	10,762	21
Total died	2,191	1,606	635	858	706	713	683	690	1,312	2,051	1,197	1,961	2,194	1,307	
Per cent. died	7.6	6.5	2.5	3.4	3.2	3.4	2.9	3.8	11.0	13.5	7.3	12.0	14.0	6.3	
Laporte—Total number	51,035	43,645	56,062	41,789	48,932	37,263	37,743	40,551	20,453	24,102	25,322	29,582	23,888	36,951	68
Total died	3,105	5,968	5,853	2,543	11,686	4,811	1,573	1,820	1,386	3,770	5,104	3,604	5,012	4,326	
Per cent. died	6.1	13.7	10.4	6.1	23.9	12.9	4.2	4.5	7.0	15.6	20.1	12.2	21.0	11.1	
Lawrence—Total number	23,663	32,831	32,357	25,549	26,655	25,460	27,594	29,085	19,696	21,598	24,188	18,400	27,237	25,793	59
Total died	1,391	2,131	1,627	1,243	1,969	1,798	2,023	974	959	1,510	6,647	2,636	1,451	2,028	
Per cent. died	5.9	6.5	5.0	4.9	7.4	7.0	7.3	34.0	5.0	7.0	27.5	14.3	5.3	7.9	
Madison—Total number	65,944	.....	68,445	83,844	66,367	64,415	77,418	88,604	53,890	59,820	74,845	67,953	72,685	70,352	158
Total died	3,220	.....	4,052	9,112	10,789	5,371	4,017	6,294	3,529	7,787	30,774	5,811	11,366	8,510	
Per cent. died	4.7	.....	5.9	10.3	16.3	8.3	5.2	7.1	7.0	13.0	41.1	8.6	15.5	12.2	
Marion—Total number	42,300	66,309	.....	41,920	60,270	59,640	52,208	57,301	30,244	33,470	40,030	38,166	40,782	49,390	118
Total died	2,579	2,873	.....	2,058	8,710	7,540	2,049	2,625	5,578	6,624	15,336	2,791	8,501	5,605	
Per cent. died	6.1	4.5	.....	4.9	14.3	12.6	4.9	4.6	18.4	19.8	38.3	7.3	20.8	11.3	
Marshall—Total number	43,980	42,177	40,243	41,920	60,115	59,603	58,753	54,794	31,869	35,790	40,223	43,293	33,191	44,936	102
Total died	5,732	4,163	2,986	2,058	3,636	4,458	4,717	5,628	1,784	2,876	5,391	6,097	8,297	4,525	
Per cent. died	13.0	9.9	7.4	4.9	6.4	7.5	8.0	10.3	6.0	8.0	13.4	14.1	25.0	9.9	
Martin—Total number	18,437	25,451	20,859	20,696	25,114	27,102	17,848	17,854	12,883	15,650	18,840	15,929	15,991	19,435	60
Total died	1,138	4,105	2,269	1,024	940	1,996	1,236	1,376	911	1,185	4,712	2,724	1,198	1,909	
Per cent. died	6.2	16.1	10.9	4.9	3.7	7.4	7.0	7.7	7.0	7.5	25.0	17.1	7.5	9.8	

Miami—Total number	60,313	67,167	66,413	69,528	79,177	74,153	74,293	75,071	41,539	42,682	53,847	46,792	50,784	61,669	161
Total died	4,543	7,588	6,606	4,717	17,619	9,973	4,704	2,718	3,404	3,649	17,245	4,704	5,877	7,183	
Per cent. died	7.5	11.1	9.9	6.8	22.3	13.4	6.3	3.7	8.1	8.0	32.0	10 0	11.8	11.6	
Monroe—Total number	21,364	25,832	20,632	18,502	20,744	16,166	19,048	18,452	12,872	19,351	19,833	21,692	15,482	19,233	46
Total died	1,130	1,161	1,061	1,098	755	930	347	371	1,109	1,780	3,766	2,131	1,155	1,292	
Per cent. died	5.3	4.5	5.1	5.9	3.6	5.7	1.8	2.0	9.0	10.0	18.9	10.0	7.5	6.7	
Montgomery—Total number	48,950	56,917	104,306	108,209	113,819	106,369	101,261	97,728	82,863	96,287	95,077	100,652	88,114	91,583	182
Total died	2,119	339	1,461	5,842	15,195	11,950	5,851	5,948	13,313	37,853	27,218	10,506	14,049	11,665	
Per cent. died	1.3	.6	1.4	5.4	13.3	11.2	5.8	6.1	16.0	40.3	28.6	10.4	15.9	12.7	
Morgan—Total number	35,151	52,039	52,067	49,495	44,785	38,659	41,041	47,212	39,858	45,354	51,919	51,797	43,812	45,861	112
Total died	3,441	3,595	4,838	5,235	7,547	2,332	1,768	1,885	3,008	9,142	16,018	5,607	5,691	5,393	
Per cent. died	9.8	6.9	9.3	10.6	16.9	6.0	4.0	4.0	8.0	20.0	30.8	10.8	13.0	11.9	
Newton—Total number	21,306	22,903	24,297	23,267	20,790	19,910	28,612	29,234	13,724	16,777	18,021	22,586	19,316	21,596	57
Total died	986	766	861	1,065	576	373	1,056	970	1,717	7,032	1,101	547	3,616	1,590	
Per cent. died	4.6	3.3	3.5	4.1	2.8	1.9	3.7	3.3	12.5	37.4	6.1	2.4	18.7	7.4	
Noble—Total number	49,033	47,230	45,823	47,639	51,011	54,089	55,115	52,172	28,320	32,614	39,525	42,321	35,868	44,466	106
Total died	2,350	1,846	1,195	962	2,057	2,801	2,767	3,001	1,429	1,269	1,380	2,921	3,399	2,106	
Per cent. died	4.8	3.9	2.6	2.2	4.0	5.2	5.0	5.7	5.0	4.0	3.5	6.9	9.5	4.8	
Ohio—Total number	7,709	8,616	7,096	6,297	7,593	7,176	6,762	6,735	3,181	3,430	3,620	4,423	4,046	5,999	62
Total died	254	437	269	121	144	118	79	83	186	201	107	147	123	174	
Per cent. died	3.3	5.1	3.8	1.9	1.9	1.6	1.2	1.2	6.0	6.0	2.9	3.3	3.0	2.9	
Orange—Total number	20,515	30,825	27,150	25,336	27,238	26,083	24,514	29,012	17,175	20,231	18,581	21,295	14,811	23,297	58
Total died	1,007	2,738	2,071	1,079	904	1,649	396	656	644	615	1,494	2,867	1,675	1,368	
Per cent. died	4.9	8.9	7.6	4.3	3.3	6.3	1.6	2.3	4.0	2.0	8.4	13.5	11.3	5.9	
Owen—Total number	26,561	28,017	26,596	31,418	28,870	28,421	29,533	33,585	24,962	24,911	25,753	23,898	19,991	27,147	70
Total died	1,242	1,266	1,590	1,820	2,231	2,099	1,281	1,509	1,978	3,852	6,100	3,239	2,217	2,340	
Per cent. died	4.7	4.5	6.0	5.8	7.7	7.4	4.4	4.4	8.0	15.4	23.7	13.6	11.1	8.6	
Parke—Total number	11,295	49,212	19,966	49,535	48,156	41,499	38,024	13,784	39,398	44,184	52,239	48,190	44,231	45,363	104
Total died	1,285	3,832	3,652	5,575	9,003	2,483	1,427	1,080	4,392	8,104	15,658	4,253	3,939	5,206	
Per cent. died	10.3	7.8	7.3	11.2	18.9	6.0	3.8	2.4	11.1	18.3	29.9	8.8	9.0	11.5	
Perry—Total number	11,773	17,003	15,170	14,942	14,020	16,537	20,021	17,929	10,871	12,867	15,300	11,758	9,718	14,455	36
Total died	1,500	1,731	1,026	981	822	1,401	816	714	633	934	1,073	870	843	1,029	
Per cent. died	12.7	10.2	6.7	6.6	5.8	8.5	4.8	4.0	6.0	7.3	7.0	7.6	8.7	7.1	
Pike—Total number	29,410	40,396	40,604	36,248	42,544	38,280	37,312	37,273	25,920	33,314	32,843	30,163	23,135	31,418	105
Total died	2,054	3,137	1,659	4,514	3,672	3,124	1,822	1,950	3,050	8,759	6,376	3,337	2,902	3,797	
Per cent. died	7.0	7.8	11.5	12.4	8.6	8.2	4.9	5.2	11.7	26.3	19.4	11.0	12.5	11.0	

Statistics Showing the Number of Hogs Produced, the Number Lost, and Percentage of Loss—Continued.

COUNTY.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1895.	1896.	1897.	1898.	1899.	Average.	No. per Sq. Mile.
Porter—Total number	29,101	34,242	27,364	27,378	21,646	23,544	23,536	25,299	14,302	17,039	20,644	23,616	21,074	23,753	57
Total died	2,322	249	1,487	1,899	530	519	246	217	848	1,697	1,811	1,733	6,439	1,538	
Per cent. died	8.0	.7	5.4	6.9	2.5	2.2	1.0	.8	6.0	10.0	8.7	7.3	30.5	6.5	
Posey—Total number	29,881	24,333	35,060	37,475	35,946	34,214	31,646	33,909	32,787	32,753	31,793	38,455	23,537	32,445	77
Total died	3,319	3,640	7,738	4,072	5,070	3,502	2,539	4,560	12,777	11,000	10,140	5,933	3,735	6,002	
Per cent. died	11.1	15.0	22.1	10.9	14.1	10.5	8.0	13.4	38.9	33.5	31.9	20.9	15.9	10.8	
Pulaski—Total number	23,550	18,127	22,764	21,521	22,570	23,981	21,487	18,370	11,536	17,870	22,259	32,540	19,917	21,269	50
Total died	1,090	996	795	830	1,073	512	1,020	425	866	1,642	1,111	2,803	3,570	1,287	
Per cent. died	4.6	5.5	3.5	3.9	4.7	2.1	4.7	2.3	8.0	9.2	5.0	8.6	18.0	6.0	
Putnam—Total number	51,238	52,748	51,879	54,448	64,410	62,372	57,718	56,226	53,784	62,604	65,778	65,910	82,180	63,176	130
Total died	2,253	1,673	2,694	3,198	3,394	3,762	1,722	1,890	4,186	7,922	19,879	6,600	5,821	4,500	
Per cent. died	4.4	3.2	5.2	5.8	5.1	6.0	3.0	3.4	8.0	12.6	30.2	10.0	9.1	7.9	
Randolph—Total number	84,858	96,432	78,287	77,743	93,301	84,541	93,467	95,882	56,203	66,655	71,032	75,647	65,475	79,963	180
Total died	7,634	19,531	10,022	7,507	10,190	7,510	11,702	10,970	3,262	4,614	8,977	12,294	15,466	9,975	
Per cent. died	9.0	20.3	12.8	9.7	10.9	8.3	12.5	11.4	5.3	6.9	12.6	16.2	23.6	12.5	
Ripley—Total number	23,189	33,976	25,366	22,818	24,438	23,580	23,525	26,367	16,573	17,688	21,350	28,082	24,234	23,937	53
Total died	1,143	1,578	1,109	792	658	669	674	633	966	1,039	1,816	4,664	2,483	1,402	
Per cent. died	4.9	4.6	4.4	3.5	2.7	2.8	2.9	2.4	6.0	5.8	8.5	16.3	10.0	6.0	
Rush—Total number	100,281	114,007	90,513	88,565	94,337	84,050	84,129	81,795	71,474	84,197	92,479	87,972	81,769	88,890	214
Total died	8,492	20,294	8,418	9,637	17,053	7,450	5,459	4,860	2,661	36,717	32,153	8,076	18,016	9,074	
Per cent. died	8.0	17.8	9.3	10.9	17.1	8.9	6.5	5.9	4.0	43.6	35.8	9.0	22.0	10.2	
Scott—Total number	10,567	12,065	10,769	10,272	10,273	9,861	9,459	10,759	7,227	9,028	7,217	17,701	9,869	9,697	45
Total died	981	667	395	395	462	316	308	384	485	466	767	511	486	510	
Per cent. died	9.3	5.1	3.7	3.8	4.5	3.2	3.3	3 6	8.0	5.1	10.6	3.0	5.0	5.3	
Shelby—Total number	52,669	56,580	66,052	65,800	55,338	52,860	58,634	68,820	45,885	55,660	59,570	54,034	59,855	57,848	141
Total died	6,491	6,162	5,360	7,366	8,295	3,748	2,556	4,552	3,038	19,378	23,482	5,519	16,777	8,671	
Per cent. died	12.3	10.8	8.1	11.2	15.0	7.1	4.0	6.6	7.0	38.8	40.0	10.2	28.0	15.0	

Spencer—Total number	25,578	31,606	29,791	29,263	26,765	27,132	29,996	29,424	18,218	21,169	24,417	22,455	25,458	26,251	53
Total died	2,098	2,524	2,411	1,820	1,489	1,687	2,215	2,580	1,233	1,312	1,911	2,365	2,817	1,036	
Per cent. died	8.2	8.0	8.0	6.2	5.6	6.2	7.4	8.8	6.2	6.2	7.8	10.5	11.0	7.7	
Starke—Total number	5,409	4,387	6,157	6,320	6,486	7,298	6,664	6,218	3,637	5,674	7,120	8,575	7,245	6,245	20
Total died	628	542	360	377	467	944	416	243	148	981	856	884	653	577	
Per cent. died	11.6	12.4	5.8	6.0	7.2	12.9	6.2	4.0	4.0	17.3	12.0	10.3	9.0	9.2	
Steuben—Total number	39,849	39,974	39,885	39,571	42,347	41,952	42,856	40,303	20,539	22,040	26,879	30,112	24,876	34,706	104
Total died	1,292	1,472	1,009	640	599	709	2,367	2,550	558	435	449	856	3,106	1,234	
Per cent. died	3.2	3.7	2.5	1.6	1.4	1.7	5.5	6.3	3.0	2.0	1.7	2.8	12.9	3.5	
St. Joseph—Total number	37,610	41,314	46,347	36,782	40,017	31,112	36,924	39,313	19,577	18,369	20,196	22,116	22,133	31,293	70
Total died	3,197	3,902	2,567	1,914	5,845	3,592	1,550	1,670	1,328	1,886	2,181	1,813	1,626	2,544	
Per cent. died	8.6	9.4	6.2	5.2	14.6	11.5	4.2	4.3	7.0	10.2	10.8	8.2	7.3	8.1	
Sullivan—Total number	42,338	54,045	61,721	60,187	60,028	60,625	59,242	59,411	42,392	60,867	48,938	50,070	38,900	45,946	116
Total died	2,942	2,829	12,042	11,116	5,698	4,670	3,857	4,160	3,382	26,169	6,728	4,500	6,583	7,283	
Per cent. died	6.9	5.2	19.5	18.5	9.5	7.7	6.5	7.0	8.0	43.0	13.8	9.0	17.0	15.9	
Switzerland—Total number	13,066	14,634	13,505	12,145	12,528	12,502	10,687	12,688	7,316	7,356	6,967	10,523	8,018	10,920	49
Total died	409	342	248	113	317	235	116	117	606	249	314	444	304	293	
Per cent. died	3.1	2.3	1.8	.9	2.5	1.8	1.1	.9	8.2	3.0	4.5	4.1	3.8	2.7	
Tippecanoe—Total number	46,041	61,639	61,689	64,030	63,546	62,617	60,647	65,995	38,655	41,794	59,478	68,963	52,842	56,765	113
Total died	3,824	6,161	9,216	9,978	5,556	4,302	3,373	4,070	3,289	6,797	23,447	4,286	7,995	7,100	
Per cent. died	8.3	10.0	14.9	15.9	8.8	6.9	5.6	6.2	9.0	16.2	39.4	7.1	15.1	12.5	
Tipton—Total number	38,312	41,185	45 887	50,214	61,201	50,718	57,040	63,393	45,188	53,615	60,697	51,150	46,830	51,187	197
Total died	3,905	3,902	5,661	7,329	5,451	2,806	2,367	4,080	1,423	9,151	21,859	5,928	9,118	6,386	
Per cent. died	10.2	9.5	12.1	14.6	8.9	5.5	4.1	6.4	3.1	17.6	36.0	11.6	19.5	12.5	
Union—Total number	29,686	32,848	33,532	33,743	30,845	27,901	24,757	27,850	20,171	25,412	30,720	33,667	27,645	29,137	172
Total died	2,013	4,390	1,765	2,887	5,995	3,859	2,446	1,920	1,217	2,615	7,214	6,142	7,476	3,841	
Per cent. died	6.8	13.4	5.3	8.6	19.4	13.8	9.1	7.0	6.0	10.2	23.5	18.0	27.0	13.2	
Vanderburgh—Total number	13,972	16,750	16,681	15,840	16,006	16,973	16,877	18,293	11,544	10,828	11,309	10,741	9,759	14,272	59
Total died	1,088	1,282	1,357	1,563	1,384	1,362	2,528	3,020	1,268	1,683	2,177	1,181	1,098	1,615	
Per cent. died	7.8	7.6	8.1	9.9	8.7	7.1	14.9	16.5	10.9	15.5	19.2	11.0	11.2	11.3	
Vermillion—Total number	24,614	31,782	30,304	33,627	34,741	30,413	33,810	36,187	21,587	23,154	22,881	25,311	22,767	28,553	115
Total died	2,910	3,277	3,818	6,438	4,948	1,893	1,284	2,018	1,971	6,840	5,032	2,927	2,593	3,534	
Per cent. died	11.8	10 3	12.6	19.1	14.0	6.2	3.8	5.6	9.1	29.5	22.0	11.6	11.4	12.4	
Vigo—Total number	24,005	35,793	38,079	41,240	39,614	35,488	38,997	39,039	24,571	30,890	31,314	29,056	23,749	32,986	83
Total died	1,872	2,879	4,464	10,228	4,576	2,491	1,982	3,456	1,905	6,191	4,616	3,389	2,253	3,869	
Per cent. died	7.8	8.1	11.7	24.8	12.2	7.0	5.1	8.8	8.0	20.0	14.8	11.7	9.5	11.7	

Statistics Showing the Number of Hogs Produced, the Number Lost, and Percentage of Loss—Continued.

COUNTY.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1895.	1896.	1897.	1898.	1899.	Average.	No. per Sq. Mile.
Wabash—Total number	73,666	74,621	71,228	73,896	73,108	68,495	75,423	74,690	41,401	38,851	41,449	55,017	48,628	62,321	146
Total died	4,864	4,196	3,294	5,961	8,857	7,152	6,554	5,890	5,660	4,146	4,824	7,797	7,633	5,911	
Per cent. died	6.6	5.6	4.6	8.5	12.1	10.4	8.7	7.9	13.6	10.6	11.2	14.2	15.7	9.5	
Warren—Total number	41,171	44,882	34,067	34,962	47,908	35,478	38,777	41,144	25,191	41,085	33,908	37,681	42,546	38,370	105
Total died	6,225	2,750	2,728	3,623	5,188	3,440	1,109	832	2,893	16,727	7,615	3,252	3,849	3,236	
Per cent. died	15.1	6.1	8.0	10.4	10.8	9.7	3.0	2.0	8.2	41.0	22.5	8.6	9.0	8.8	
Warrick—Total number	28,928	30,042	31,909	29,821	28,472	28,136	34,272	38,721	21,376	26,238	25,051	27,168	25,829	28,920	59
Total died	2,467	2,448	3,407	2,214	3,209	1,874	1,386	6,513	1,653	1,906	2,133	2,813	1,439	2,574	
Per cent. died	9.2	8.1	10.7	7.4	11.3	6.6	4.1	16.9	8.0	7.0	8.5	10.3	5.5	9.0	
Washington- Total number	32,912	40,135	33,530	33,950	32,919	34,182	41,140	39,062	25,803	30,422	36,018	33,459	34,811	34,488	67
Total died	1,443	1,195	2,336	2,756	1,649	953	828	1,880	1,025	1,485	3,947	1,634	1,549	1,745	
Per cent. died	4.4	3.0	7.0	8.1	5.0	2.7	2.0	4.8	4.0	5.0	11.0	4.9	4.4	5.6	
Wayne—Total number	91,027	86,161	70,920	78,742	80,842	80,900	74,948	78,105	49,100	44,675	57,165	59,461	60,280	70,179	176
Total died	9,253	11,647	9,808	7,730	11,479	10,801	11,598	11,074	3,541	4,313	16,125	6,795	14,788	9,920	
Per cent. died	10.2	13.5	13.8	9.9	14.2	13.3	15.5	14.5	7.2	9.0	28.2	11.1	24.5	14.1	
Wells—Total number	58,509	59,490	59,160	67,000	67,200	67,120	73,235	73,934	43,540	50,302	56,167	63,085	67,933	62,052	362
Total died	2,774	6,098	2,114	4,032	6,402	6,141	3,858	5,184	1,733	2,792	4,100	8,143	27,693	6,205	
Per cent. died	4.7	10.3	3.6	6.0	9.5	9.1	5.2	7.0	4.0	5.5	7.3	13.0	40.8	10.0	
White—Total number	32,247	28,982	28,064	25,098	33,866	35,286	38,836	41,717	23,193	30,316	38,448	43,997	38,809	33,805	67
Total died	1,128	977	694	796	2,838	1,517	973	1,024	2,743	3,220	7,255	2,777	5,112	2,404	
Per cent. died	3.5	3.4	2.5	3.1	8.3	4.3	2.5	2 4	11.8	10.6	18.8	6.3	13.2	7.1	
Whitley—Total number	41,591	42,341	40,135	41,152	44,634	44,511	45,273	47,265	22,683	26,720	31,166	32,019	29,271	39,141	116
Total died	1,883	2,271	1,805	1,861	2,778	2,751	2,832	2,801	1,962	2,267	2,160	2,145	3,476	2,384	
Per cent. died	4.5	5.4	4.5	4.5	6.2	6.2	6.2	5.9	9.0	8.5	6.9	6.7	11.8	6.9	

"PIG GROWING"—SUGGESTIONS TO BEGINNERS.

BY JNO. M. JAMISON, ROXABELL, OHIO.

Every year, from various causes, men abandon pig growing. Consequently there must constantly be new beginners taking their place to meet the constantly increasing demand for this product of the corn belt. The beginner can rest assured of one fact, he can always get his share of this work, for hog growing can not be monopolized by a few men. As a living creature, trusts have not been able to control his number or the period of his existence. Nor are politicians able to legislate him out of existence. Dread disease is the only breaker that confronts the beginner, as well as the experienced grower.

High prices of the product are an increasing stimulus to cause men to start in the business. Many start under this encouragement that would not otherwise give the matter any attention, hence many of them fail because they have no pleasure in caring for the pigs.

The beginners, under low prices, are more apt to be successful, because they select this branch of stock farming on account of their tastes running in that direction. For the beginner to succeed and stick to the pig through thick and thin, he should have some liking for him, should take pleasure in seeing the little fellows as soon as they are born turn their attention to the business of their lives, that of hunting something to eat, and to such an one there should be much music in the first cracking of corn by the little beauties.

And while they are as alike as two peas to the stranger, to the pig lover every one should have an individuality and be to some extent different from his fellows.

The beginner should start with good stock. Good pure breed stock can be had at living prices, and at these prices are as good for growing pork pigs as the "Crackerjacks and Jim Dandies" that must be bought at a long price.

Or, if the beginner is uncertain what breed he fancies, let him select good native sows of mixed breeding and a pure-bred boar of good quality. No difference how cheap a cross-bred boar may be bought, or how promising an animal he may be, we can not advise a beginner to start with such. Using a boar of uncertain or mixed breeding is like putting a bad, soft stone in a foundation. It is well to remember that the male gives the form, and the purer his breeding the more certain he is to reproduce himself.

It is natural for the beginner to spend much time in building air castles. Now we will not condemn this, for there is much pleasure in it, but we would advise that when these castles go to pieces, the pleasure

had in building them be remembered and no time wasted in contemplating the ruins. A common error with the beginner is to start with too many. Much better begin in a small way than to start with more than can be handled. It is not always safe to assume that because two or three sows do remarkably well a dozen or more with the same surroundings and territory will do equally so. Some men in this, as in other matters, have greater capability than their fellows, and can do more from the start. But no one can know his capability or ability at the beginning, for it is not altogether measured by the opportunity they have to give the pig a chance.

Say we have the stock and feed, then we come to the care. A finely bred pig will degenerate more rapidly under mean treatment than a scalawag. It is unwise to assume that because a pig is finely bred that it will take less to feed him than it will one of poor quality in form and blood. Rather, it will take more and better feeding, but he will return more for what he eats. At farrowing time the sows should have comfortable, warm quarters, where the temperature can be kept below freezing, if it is zero or below on the outside.

This can be done easily on any well-appointed farm, and there the sow should be so tame that when her owner goes to see how she is getting on, there will be no show of fight, but rather a welcome in her way of talking, calling attention to her nice family and inviting inspection. Only yesterday we went into a six-foot square house and counted a litter of nine, and by the mother's actions it could not have been told that she noticed us.

A few days ago we went into a pen with a sow weighing about 400 pounds and thought she was lying a little too close to side of nest for the comfort of the pigs. We put one hand under her in front of her hind quarters, and the other over, pulling on her and moving her as fas as we wished, and this without causing her to get up. Under these conditions a beginner is able to get along much better than to be compelled to reach the pigs with a ten-foot pole.

Then when the pigs are counted don't rush to feed the sow corn or anything else. About all she wants for twenty-four hours is a good drink or two of pure water and the society of her family. Give attention to her and she will show by her actions when she begins to crave food. Then feed lightly of rich food, and try to give such other food as will allay hunger and not heat her system too much. Feed foods from which the sow can make milk rich in protein. Bran and middlings, clover pasture or clover hay, blue grass, in season, pumpkins and roots in their season. The latter should be in store for all winter use. Another point: sows and pigs should have plenty of exercise. Hogs being fitted for the market should be allowed to take such exercise as they desire when properly fed, and don't get the idea that an extensive and costly hog house is a necessary part of successful hog growing. Considering the vast number of hogs

grown, comparatively few costly houses are in use. As a rule, when tried, they have proved objectionable, because of difficulty in keeping them clean and disinfecting them when once disease germs have found lodgment in them. The most a pig requires is comfort in the way of house and shelter. The points to be observed to secure this are warmth, cleanliness and dryness. It makes no difference to the pig whether he finds them in a strawstack, rail pen covered with straw or fodder, or in costly houses. He is not concerned as to profits he brings his owner; this latter is the owner's part of the deal.

Another matter we would emphasize. Every beginner should be a close and diligent student of all that pertains to the pig. Not alone to all found in papers or books, but also the practical study in the lots in feeding and handling them. There is oftentimes much profit in spending a little, or even much, time in watching the pigs eat and noting carefully their habits. At feeding time know that all eat and appear thrifty; and always remember there is more in prevention than in cure. Avoid nostrums and highly lauded cures. If misfortune comes, don't give up the pig but give him another trial. However, it is not advisable to run all to pig in farm management. There is a saying that he will root his owner out of debt. Much better if he lifts the mortgage without rooting. Give the pig good care and credit for his good qualities and he will do to tie to, for he never goes back on his owner (barring disease) when well fed and housed.

WHERE AND HOW TO SELECT BREEDING ANIMALS.

BY W. ARTHUR AYRES, OAKVILLE, KY.

This is a question often asked by those that are contemplating not only going into the business of breeding swine as a specialty, but by every man that contemplates buying a hog for breeding purposes. Of course, breeders will always tell you to go to a good breeder, and they are right. First, select the kind of swine you want to breed, then consult the advertising columns of some good, reliable stock paper, for men who are engaged in the business, provided always there are no breeders of your favorite breed in your vicinity, or if such do not have what you want. But right here let me say first, and say emphatically, try home first, for your home men will always save you money.

If a man advertises pigs the year around way down low, let him alone; he has an inferior article and therefore has to sell below his brother breeder. He and the man who rarely, if ever, advertises are the men we always skip when we have to add new blood to our herd. Now, with these out of the way, you need have no fear, for breeders, as a class,

do not try to beat any man. We seldom see a hog we buy until after he gets to our place. We trust the breeder to ship what we order and pay for, and he has always done so for us, and we have been buying and selling for the last ten years. We never buy a cheap animal, for they are dear to us at any money. We never order from the men who always have "five-thousand-dollar hogs" either. We do not think this kind of an animal is produced often enough to justify us in paying over $4,999 for one of them, for we have noticed that their fame dies with them, and for that reason do not advocate such stuff. A farmer does not want to pay over $15 or $25 for a pig three or four months old. We have tried to make it clear as to where to buy—from the breeder; let us look at how to buy.

Here is how we do. First, we write some good Poland-China man (of whom there are hundreds) describing what blood lines we need, asking a description and prices of stuff. We get this, make out order from it, describe minutely the animal we want, and in the end he sends us just what we want. We often think when the animal comes, "Well, that fellow did a better job than we could have done had we picked our own pig out of the herd."

If you want a boar, go to some family noted for being prolific and able to produce themselves in their offspring. He must have a short head for the breed, broad nose, broad between the eyes, heavy jowl, good hams and shoulders, a broad, strong back and loins, and above all, good room for lungs and good heart, compact build and nice finish. If he does not have good feet and legs, no matter how good everywhere else, we would not have him as a precious gift. So much for the male, which is "truly half the herd."

The sow should be of a prolific family and in fact the same description as the male will fit her, except she should be lengthier and looser build than the male in order to enable her to carry a large litter.

We have tried in our humble way to give you our idea of "How and Where to Buy Breeding Animals," and hope we may have dropped some idea that may help you along, and if you happen to be a farmer and haven't thoroughbred hogs, let us insist that you get a nice thoroughbred male and use on your grade sows and notice the result.

If you get a nice boar and use him a couple of years and think at the end of that time you are not more than repaid, we will refund the money if you buy from us, and believe every other breeder in the United States would do the same thing.

STARTING A HERD OF THOROUGHBRED SWINE.

BY JAS. RILEY, THORNTOWN, IND.

Ever and anon there is some one starting into the business of breeding thoroughbred swine. A mistake made in the beginning makes success so much more difficult to attain, so we should feel our way very carefully and not take too many risks or try to start out on too large a scale. There are some things in every business we undertake that can only be learned by experience, and it isn't advisable to take on too much experience at first, or failures will overtake us so rapidly that we will become disgusted in the venture and get out of it just as rapidly as we started in.

To one who contemplates embarking in the business of breeding and rearing thoroughbred swine, I would recommend that the market be very carefully looked into the first thing. See what kind of an animal, and where the surplus can be disposed of to the best advantage.

We need not expect to do much in the way of selling stock for breeding purposes at fancy prices until we have established a reputation, so we should figure on the regular stock market.

We should next decide what breed would suit us best, or what would come nearest filling the demand we intended to supply. To this end we should visit and carefully examine the herds of some of the most reliable breeders of the country, and carefully examine and note the different characteristics of these different breeds. There are several things we should take into consideration in determining what breed should be invested in. First, look into constitutional vigor or stamina of the breed that would enable them to resist disease. To determine this we should examine the chest, especially the chest bone between the fore legs. An animal should stand very wide between the fore legs and be full around the chest. The next important point is back and loin. A wide, strong back and loin with ribs well sprung indicates strong constitutional vigor. Next in importance are feet and legs. A strong bone in leg and foot is absolutely essential as indicating vigor. Get also a wide, deep ham. Then it is very important to have a good head, a short face with a wide, full forehead. A short neck indicates docility and great feeding quality. The next thing is prolificness. The sows should have large, full litters and be good sucklers. These traits are largely hereditary, and are very desirable, as it enables the breeder to keep a less number of brood sows to raise a given number of hogs, and if good sucklers they give their pigs a better start. Then the rustling quality of the hog should be considered. The hog that is the best grass hog, and can shift around and gather up part of his feed that would otherwise go to waste, is to be preferred to the hog that is more lazy in its habits.

One of the most important things in swine raising is quick growth. The hog that gets to 200 pounds at the youngest age and on the least feed is at this time the standard hog. Not the hog that matures the quickest, as the market does not demand the mature hog, but rather the pig pork. Some of the smaller breeds that mature so quickly will not reach the 200-pound mark nearly so quick as some of the large breeds. At the present time many of the largest breeds can be fatted at any age, and the pigs can be made to reach 200 or 300 pounds very quickly and make the very best quality of pig pork.

When the young breeder has found the breed that comes most nearly filling all these requirements he should make his selections very carefully. Never select a runt because you can get them cheap. Don't get the color craze, and reject an extra good pig because it has a black foot or a black tail, or if a Chester White, because it has a dark spot on the skin, but select the pig that comes most nearly filling the requirements given above, no matter if you have to pay a long price. It will soon come back with interest. You should then become a student of your business. You should love your pigs and stay with them.

If one expects to become an expert in the breeding line he should attend breeders' meetings and in every way try to become posted in every line of detail work. If you want to become an exhibitor you must visit the shows, carefully observe how animals are handled and note particularly how they are fed. Much of the business of successfully breeding swine must be learned by seeing how others do the work and leaving nothing undone that is necessary to bring the greatest success. Those seeking information can always get what they want by applying to any experienced breeder who will always be found as ready to impart the same as the novice is to receive.

RATION FOR THE PIGS.

When the pigs show a disposition to eat from the trough one to which the sow can not have access should be provided. Now is the critical period in the pig's life. If we over-feed we impair digestion. If we stint in feed we retard growth. If the feed is too constipating disease is ready to enter. If it is too laxative scours is produced. These ills may result from careless feeding of the sow.

No iron-clad rule can be given as to quality and quantity of food for the pigs at this time, as conditions vary and much depends upon what the sow is receiving. If she has an abundance of succulent food or pasture pure skim milk is excellent for the pigs; otherwise it is too constipating, unless some bran and oil meal are added.

IS THE SWINE BUSINESS LIABLE TO BE OVERDONE?

BY J. A. MEISSNER, REINBECK, IOWA.

If our business is overdone we are on the road to ruin; if not we are on the road to prosperity. The way I understand the word "overdone," it may mean raising too much pork, or raising too many thoroughbreds of the present quality and excellence. I will try to touch on both these topics. Can anyone name any enterprising line of business, private or public, be it in the line of improved machinery, or of manufactured articles, where the greatest efficiency possible to attain has been reached? Perry's fleet, in 1812, was undoubtedly considered magnificent. Naval science had been exhausted in its construction, yet a single shot from one of our modern battleships would have sunk the combined fleet of Perry and Barclay, if they had been placed in a line. Three or four men with Gatling guns would have indefinitely defied the millions of Persians in forcing the pass of Thermopylae. The genius and science of man has not only been applied in one, but in every line. Mechanically speaking, the hog of fifty or seventy-five years ago was very crude; its engines were imperfect, wasting all but a small per cent. of its energy and fuel. Still, I have no doubt the razor-back of those days, though it required from two to three years to mature him, and he was almost as fleet as the swiftest horse, and could clear any rail fence constructed by man, was nevertheless pointed to with pride by his owner, who might justly be proud, for they were the best the times afforded. The hog of to-day in form has almost reached the standard of perfection. Its machinery for converting corn into pork is of the latest design; the science of breeding knows none better. Can we raise more pork than the world is able to consume? I do not think we ever can. While our hogs were the lowest in price, there were plenty of our own people, and many more in foreign countries, who did not taste pork once a week. Increase your facilities for transportation and get the foreigner to lower his tariff, then you will not only extend and widen our market, but you will feed the millions of Europe, Asia and Africa who practically get along without the hog product. I do not think we ever could raise more than the demand would consume, but, supposing we could, which class of hogs would suffer first? Those with the best or those with the poorest machinery? Be it governments, corporations, merchants, farmers or hog raisers, it is always a question of the survival of the fittest. Those equipped with the best machinery will drive the poorer from the field.

To say that the hog of to-day is no better than the hog of half a century ago is a slur on the ability of hog breeders. It would mean that their

work of the last fifty years was a waste of energy. Hogs have been cheap; so has corn. Corn is the principal factor in the product called lard. Increase the price of corn and an increase in the price of lard will follow. Corn will be 50 cents a bushel again, and it may not be long. As soon as corn goes up, lard will follow, reaching its old-time price. It is possible the product from cotton seed will permanently depress the price of lard to some extent, but it will never drive it from the market. When we feed less corn to our improved breeds of swine we will produce more lean meat. The well-bred hog will not only make more pounds of pork from a bushel of corn, but will also produce more from an acre of blue grass and clover. To stop and consider for one moment the advisability of going back to the rail-splitter type is absurd. We have passed the age of razor-backs and Tamworths. They are back numbers. We are in the era of improved breeds.

The improvement in hog breeding has been scientific and is permanent; it will progress, not retrograde. The cheapness of hogs the last few years has led some of our intelligent type of "I-told-you-so" citizens to cry: "You breeders are breeding too fine; you produce too much lard and not enough bacon. You will have to go back seventy-five years and try it over. Your improved breeds are out of date. We have just what you want; we possess the bacon hog in the rail-splitter and his consorts." Ah, my friend, we are living in an age of advancement; we take no backward steps. If you want more bacon, we have the ideal bacon hog in our Poland-Chinas, Berkshires and other improved breeds. If they produce too much lard, we will feed less corn, more grass, and produce all the bacon you want of a much nicer and sweeter quality than your hog of ancient design ever dreamed of.

GENERAL PRINCIPLES OBSERVED IN FEEDING.

BY W. A. HART, PORTLAND, IND.

The nutrients of the feed to which we need give especial attention, are protein, an element of nitrogenous formation, carbohydrates, elements of sugar or starch formation, and fat. The only proper sense in which to study the domestic animal is as a machine calculated for some special purpose, and the feed consumed by such animal as crude material to be manufactured by such machine into meat, milk or wool. If it were true that when you feed the animal a given amount of protein in every case a given amount of lean meat would be produced, or if a certain amount of fat or carbohydrates were fed, a given quantity of fat would result, but little study would be required to make successful feeders of us all. Feed-

ing is as much a business proposition as the management of a factory or railroad, and the success or profit that may obtained from feeding is as much dependent upon intelligent care and housing, upon intelligent feeding and upon intelligent and economical production of feeds as is the success of any other business undertaking upon the intelligence of its management.

Experimenting with the feeding of protein, we find that so long as the amount of protein fed remains below the requirements of the animal fed for any increase of protein there is a corresponding increase of protein stored up in the body, but as soon as that limit is reached not only is there no increase in the amount stored, but an actual decrease in the amount stored. The same is also true of carbohydrates and fat. However, when all are fed together, rightly proportioned, a greater per cent. of each is stored by the animal. Whether money is made or lost in feeding depends entirely upon the relative cost of producing the feed, to the amount of meat, milk or wool produced from the feed.

HOW TO PRODUCE MOST FROM FEED CONSUMED.

Methods for producing the most from the feed consumed will first be discussed. To illustrate: The market demands a hog weighing 200 to 250 pounds, a beef weighing 1,200 to 1,300 pounds, or a 75-pound lamb. Our first impulse would be to select a small or medium type of animal, but experiments show that a very young animal may produce a pound of meat to each pound of dry matter in the food consumed, and that as the animal approaches maturity more and more feed is required for each additional pound of gain, until, in the case of the four-year-old steer, it takes twelve or fourteen times as much feed to make a pound of gain as when the same steer was a calf. At maturity gain entirely ceases. Experiments further show that the rough animal, whether large or small, often requires twice as much feed to make the same gain made by the finished type of the same age and size, and that in the market, for the reason that at slaughter the rough type shows greater waste and a smaller per cent. of choicest cuts to the weight of dressed carcass, the coarser type commands a much less price per pound. Under the most favorable circumstances it requires eighteen pounds of dry matter in the feed per 1,000 pounds live weight each day for the steer; about two pounds per 100 pounds live weight of feed as good as middlings each day for the hog, and practically in the same proportion to the other farm animals to maintain them with neither gain nor loss. It is only on the excess fed above this amount from which any profit may be derived.

The successful feeder must mature his animal as rapidly as possible from birth to market, and sell his beeves at yearlings, weighing 1,200 pounds; his pigs at six or eight months of age, weighing 200 to 250 pounds, and his lambs at from three to five months of age, weighing from sixty

to ninety pounds. From the foregoing one can better comprehend why he selects 2,500 to 3,000 pounds finished cattle to raise the 1,200 to 1,300-pound baby beef, or the 800 or 900-pound hog to raise the 200 to 250-pound pig. Bear in mind, however, that it is only under the most favorable surroundings that the maintenance ration falls as low as the amount stated. Where animals are not properly housed, regularly fed, sufficiently supplied with water, or otherwise receive improper attention, the maintenance ration has to be double or triple the amount stated.

The successful feeder knows also that the dairy cow, properly sheltered, pays an extra profit of about ten cents per day for shelter; that the pig requires about one-fourth less feed for the same growth than the pig not sheltered and that the same proportion of gain from shelter is shown by the other domestic animals. That soaked corn to pigs is worth about one-fourth more than corn not soaked; that soaked corn to cattle makes a gain of one-fifth more than corn not soaked, but that with pigs following the cattle the saving is only about five bushels to each 100 bushels so fed. That the mixture in winter of cut clover hay with corn meal for pig feeding effects a saving of 30 per cent. of grain to amount of gain, and materially benefits the health of the pig. That the feeding value of wheat, pound for pound, is no greater than of corn. That cooked feed, except potatoes, not only makes less gain for feed consumed, but impairs the health of the animals. That salt fed daily greatly increases the gain from the feed consumed. That the feeding of about two ounces of wood ashes or a couple of spoonfuls of bone meal each day to a hog on full ration of corn will make the same growth with a fourth less corn. That ground corn only shows a saving of 8 per cent. when fed to pigs, which scarcely pays for grinding. That ground feed fed wet to pigs shows a gain of 7 per cent. more than the same feed fed dry. That feed fed to the dam while suckling her young gives as much growth on the young as though fed direct to the young animals, hence the false economy of not maintaining the dam on full feed as soon as practicable after the birth of the offspring. That the self-feeder for lambs requires one-fifth more grain for a given amount of gain than when fed in the regular manner. That lambs shorn and dipped in hot water will make a rapid gain under conditions in which the unshorn lamb will show a loss.

That corn not mixed with other grain is the cheapest ration that can be fed to the lamb that is intended for the market, and will, pound for pound, make as much gain either before or after weaning as the same number of pounds of a mixture of oil meal, oats, middlings or of the costlier feeds. That corn cut when fully ripe contains very much more nutrients than when cut when only glazed as is the custom.

That two-fifths of the feeding value of the corn crop is in the fodder and three-fifths in the ear. That the grasses carry the most nutrients when fully matured, and lose from 12½ to 40 per cent. of nutrients from getting wet in curing. The successful feeder not only knows these facts,

but profits by his knowledge of them. He is constantly on the alert to take any advantage he may of the market or of the method of feeding to realize the largest profit from the feed consumed. In short, the most successful feeder, as I take it, is the man who is able to realize the largest profit from the feed used, rather than he who makes a more rapid gain at a loss. It is especially important that those engaged either in feeding or breeding hogs on a large scale should fully realize that the margin of profit in every kind of business of to-day has been reduced to a system by which one can only derive a profit by the most economical method of feeding, and there is a very large per cent. of the feed necessarily produced in producing feed for the hog that must be fed to other farm animals to realize a profit from its production. Most of us, in some degree, realize the advantage of having a properly balanced ration for the farm animal and of having a succulent feed for him as nearly as possible during the entire year. It is on this line, especially, that I regard the result of my experiments of especial value to the general public.

Of the hundreds of breeders of shorthorns of their day, the names of those, other than Mr. Bates and Mr. Cruikshank, have nearly all been forgotten. Of the thousands of breeders of live stock to-day, the names of those as deserving in their line as were Mr. Bates and Mr. Cruikshank in theirs, will, in future ages for the same reasons, be held in that same high esteem. Few fully realize the advantage of selecting for the feed lot animals from the large, finished, properly developed parentage, rather than from the little, gouty, dyspeptic, misshapen kind. It is discreditable to be a breeder of blooded stock without earnest effort to produce the best, and equally the height of folly to attempt to produce the best without resorting to the kinds of feed and care by which this result can only be attained.

SUCCULENT WINTER FEEDS.

In the cold climate of the northern States, one can not rely upon pasture to furnish the necessary amount of succulent feed for the domestic animals during the long winter and spring. While the silo may supply this need for some of the domestic animals, the only crop that my experiments have shown perfectly adapted to this purpose, for the hog, is the beet crop. For this crop one must select rich soil, containing plenty of humus, that is well drained with deep tile drain. Plow very deep, as early as possible in the spring, harrow the ground every few days until the latter part of May or first of June. This should make a perfect seed bed, free from weeds. About this date, the temperature will be such that seed will come up very soon after planting. Drill the seed very thick in the row, with some good standard make of garden seed drill that presses the fine dirt to the seed, as the beet seed otherwise germinates slowly. Let the rows be about twenty-eight inches apart, that the beets may be cultivated with the ordinary small shoveled two-horse cultivator. When

the beets are about five or six inches high, thin to a beet every six inches in the row. Late planting, care in selecting, the variety grown and growing the beets thick in the row, prevents them from being so large and woody. Some variety of sugar beet or the improved, long, red mangels are preferable. The mangels produce a much larger crop and are much easier harvested but are not quite so rich in nutrients. Late in the fall harvest the crop and store it either in long pits or in a root cellar for use during the winter and spring. If stored in a long pit, every five or six feet along the top of the ridge of beets place a small bunch of straw. Set a tile upon end on each pile of straw, so placed to give the pile of beets ventilation to prevent heating. Cover the beets with dirt, using no straw next to the beets except as mentioned above. From twenty to fifty tons of beets can readily be produced to each acre so cultivated at a cost of from fifty cents to one dollar per ton, harvested. The beets are simply thrown whole, without cooking, to the hog and are eaten with great relish.

TANKAGE AS A SUBSTITUTE FOR MILK.

Especially with young pigs one finds some feed of great advantage that is rich in all the nutrients required, that is easily digested and especially palatable. Slops from the best hotels and restaurants may be valuable, but are usually not accessible to but few and require too much time and labor to gather and feed fresh. Whole milk, fresh, is too valuable for this purpose. Skimmed milk or butter milk can seldom be had by the feeder without too much expense or loss of time and labor in getting them from the creamery. The same objection may be urged against meat scraps from the butcher shops or fish markets. Besides, one is almost certain to occasionally get a bad batch of these feeds that will greatly derange the digestion of the animal.

A year's experience with feeding tankage shows it to be an ideal feed for this purpose. Blood, lungs, etc., are cooked together in large tanks at the large packing houses. The fat is drawn off and the residue dried and ground for hog feed. It costs about $23 per ton, laid down at home, and contains about double the protein found in oil meal, and is a very much better feed for pigs. It seems to be a perfect substitute for milk. A pound of the tankage, costing less than a cent and a quarter, having a feeding value equivalent to about three gallons of skimmed milk, for pigs. A mixture of thirty pounds of corn to ten pounds each of wheat middlings and tankage makes a very well balanced ration for pigs up to four months of age. A very good ration for older pigs or hogs may be made by reducing the middlings and tankage fully half in proportion to amount of corn. Tankage dissolves almost instantly when put in water. It should be fed in slop. Pigs fed upon tankage show great muscular and bone developments, have ravenous appetites, and are especially free from gout and rheumatic troubles. It apparently outclasses milk in these par-

ticulars. Tankage is so dry that there is no danger from worms or from decomposition, and has been so thoroughly cooked that one takes no risk of contracting disease in his herd from feeding it.

OLD METHODS CONTRASTED WITH NEW METHODS OF FEEDING.

It is of especial interest to note the evolution of our method of feeding. The tendency of our time is to eliminate the smaller man. Some look longingly to the past, others confidently to the present and future with perfect faith that in every case a more useful man will spring up in his stead. One capable of giving more of peace and more of plenty to himself and to mankind generally. But a few centuries ago the best stock raisers of their day depended wholly upon pasture, without shelter for their stock, not only in summer but throughout the entire year. If the season was such that their stock could find sufficient feed to sustain life, all was well; if they died from starvation, it was simply "an act of God." This class of feeders have been crowded out, and in their stead we have those who prepare not only an abundance of feed, but also the best of shelter for their flocks and herds throughout the entire winter. To the feeder of little more than a generation ago this would have seemed the end of perfection in feeding; to-day we clamor for something yet better than we have. The feeder of to-day has better pasture grasses than were enjoyed in any preceding generation, yet he notes that even with these, there are seasons of ripening and of drought in which they fail to furnish the best of feed for his stock. While soiling crops, in a degree, may tide him over at these times, yet so much labor is required to cut and feed them, that the margin of profit is materially reduced, beside most soiling crops are not sufficiently succulent to be the most satisfactory feed, especially for pigs and lambs. The need of to-day is a plant that can be grown on almost any kind of soil, that produces a rank growth of succulent feed, especially in dry weather, that can be planted at any time of the year, that can be planted on any tract of land, for the time, not occupied by other crops, and thus be made to not only shade and conserve the fertility of the soil, but also to furnish a thick growth of succulent pasture greatly relished by all farm animals.

DWARF ESSEX RAPE AS A FORAGE CROP.

Largely through the efforts of our worthy secretary of agriculture the attention of feeders has been called to such a plant. It is the Dwarf Essex Rape plant. Only four or five years ago but a few acres of rape were grown in the United States; to-day we grow millions of acres, yet many farmers do not know what it is, and of those who do raise it but few conceive its many possibilities. Its possibilities are due to its rapid growth, to its palatability, to the fact that it will grow well on land with almost any manner of preparation and for the reason that it matures a

great quantity of feed planted long after the season has passed for planting any other feed crop. It resembles cabbage, except that it fails to head. The seed resembles the cabbage seed. This crop grows especially well in dry weather on our heavy, cold soils, that will not mature corn. The land for early spring pasture should be plowed as early as possible and harrowed until a fine compact seed bed is made. Sow from three to five pounds of the seed to the acre with some kind of broadcast grass-seed sower, and cover with a light drag, or by dragging brush over the land. Five pounds of seed per acre should be used where weeds are liable to spring up. Rape sown in early spring will be ready for pasture when from eight to twelve inches high, which should be in about six to eight weeks after sowing. It will produce luxuriant pasture, sown at any time from early spring until late in August, in this climate. Rape sown in hot weather may be ready for pasture within a month after sowing. Rape sown in the corn in advance of the cultivator at the time of laying the corn by may produce from ten to twenty dollars worth of feed per acre for lambs without interfering in the least with the corn crop.

Lambs may be pastured in the corn long before it is ripe without injury to the corn. It has an equal value sown as a catch crop in oats or wheat stubble after the crop has been harvested. The stubble land should be sufficiently prepared with a disc harrow, to make a good seed bed. Rape furnishes succulent pasture, relished by all domestic animals from May until steady cold weather sets in for the winter.

When our pasture grasses are dry and parched, and fail to collect moisture from the atmosphere, heavy dew is found on the rape plant. It is of the cabbage family and is as easily gotten out of the soil as is the cabbage. This crop will readily make five hundred pounds or more of meat per acre. An acre of rape furnishes fully as much pasture as four or five acres of our pasture grasses, and is much more relished by the stock. Experiments show that stock will put on 50 per cent. more gain in a given time pastured on rape than on the best of our pasture grasses, but when allowed to feed upon rape and grasses, they show a better gain than when feeding upon rape alone. Rape occasionally bloats some of the domestic animals, but hogs do not bloat from feeding upon it.

The requirements of to-day are beautiful symmetry and early maturity. We often find farmers, and even breeders, who mate a very fine, small-boned animal with one of exactly opposite characteristics, expecting to produce a medium hog of uniform appearance. Disappointment awaits them. The more diverse the ancestry, the more diverse will be the offspring. The only way to secure increased size, without the sacrifice of neatness, is by constant graduation.

MANUFACTURING HOGS.

BY WILLIAM JACK, MARTINSBURGH, IND.

Indiana is supposed to have about three million head of hogs on foot. In raising and marketing them four things are necessary to make the work profitable: First, the right kind of stock; second, being prepared to take care of them; third, knowing how, and fourth, doing it. The latter is the one that is most commonly lacking. The average hog raiser guesses at the best way, and then guesses whether or not it pays him.

What I shall give will be as I have found it by actually weighing hogs and feed so far as it was possible, and making estimate of what else that could be reached in no other more exact way. The same kind of experiment with different kinds of hogs may make the difference between profit and loss. The profitable hog is the quick maturing one, and the right way is to push from start to finish and put on the market at once. The profitable size to make them varies with the different breeds. With the Polands it is reached at about 170 pounds, and in age from six to eight months. Our experience shows that a pig from the time it is weaned until it reaches about 170 pounds will make a gain of twenty-six to thirty-one pounds of flesh to the 100 pounds of grain feed eaten. After that weight is reached it takes more feed to make a pound of pork. Three hundred and fifty pounds of shipstuff and six bushels of corn will make one pig weigh 170 pounds, including the feed that dam eats in a year. One sow with two litters a year, say fifteen pigs, which is a fair average, will eat 4,250 pounds of shipstuff, at say $14 per ton, $29.75; ninety bushels of corn at thirty-three cents per pushel, $29.70; a total of about $60.

The pigs weighing 170, equal 2,550, at $4.00 per hundred, would sell for $102. Taking out $60 it leaves $42. If the droppings are not wasted, they are worth about $30 for fertilizer.

Fourteen shoats, weighing 1,426 pounds, an average of 102 pounds each, were put in a fairly warm house on a floor January 1. Previously they had range and were fed shipstuff and corn. On January 16 they weighed 1,737 pounds, eating nineteen bushels of corn in sixteen days, and making a gain of 311 pounds. This was sixteen pounds of gain to one bushel of corn. February 9 they weighed 2,110 pounds, eating thirty-four bushels of corn in twenty-four days, gaining 373 pounds. This was eleven pounds to one bushel of corn. March 10 they weighed 2,370 pounds, eating 29 bushels in twenty-seven days, gaining 260 pounds. This was nine pounds of gain to one bushel of corn. They were then put on the market, this being sixty-nine days in confinement. The hogs showed signs of weakness in legs two or three weeks before the end. They were provided with plenty of water, a good bed and fed nothing but corn. In December,

1897, I weighed sixty-one shoats that averaged sixty-seven pounds; they were fed shipstuff and soaked shelled corn. In nineteen days they had eaten forty-one pounds of shipstuff and 36 pounds of corn each, and gained twenty-six pounds. In thirty-seven days they ate on an average three bushels of corn and 110 pounds of shipstuff, and gained sixty-nine pounds. This brought them to 162 pounds and they were marketed. They had the range of a field and large woods, with house to sleep in. They showed no signs of weakness. We breed our sows in May and June for fall litters; December and January for spring littters. This brings the pigs in September, October, March and April. Young sows are bred so that they will farrow about the time they are one year old. We try to have the sows in good healthy condition by feeding shipstuff and running on some kind of pasture, clover preferred. A few days before the arrival of the pigs we put the sow to herself with a comfortable bed, not too much straw. After farrowing, give only water to drink for twenty-four hours, no feed at all. Then feed sparingly of bran or shipstuff for three weeks when the sow may be eating a full feed. Provide a shallow trough out of the reach of the dam where the pigs may eat shorts wet with milk or water. A little corn may be fed the sows at the end of four weeks. The pigs may have corn by this time, or corn meal which is better. The pigs should follow the sow on nice days. They need exercise and sunshine.

Make sure they are free of lice. See to the sow before the pigs come; keep the bed dry, but not dusty. Give the sow plenty of range. The first three weeks is the critical time with the pigs; they are likely to become fat and take the thumps. Exercise is the best medicine. Regular and moderate feeding will help to keep down the scours, which is usually caused by letting the pigs or dam get real hungry and then overfeeding or allowing the bed to get damp. A teaspoon of copperas dissolved in the dam's feed is a good remedy. Wean at seven to ten weeks of age by taking the sow away from the pigs; never pen them when they can be managed without. Feed three times a day for a while, as the pigs get older they can eat coarser feed, but continue the mill feed of some kind till nearly ready for the market, increasing the corn in proportion to the mill feed as the end approaches. The idea of turning pigs on grass to grow without feeding grain feed is all wrong, but pigs will do best when they have pasture to run on. Clover hay, or better still, the leaves that shatter off is good to feed in the winter. They will pick it in the fashion of a sheep, or it may be mixed with ground feed. Ashes with one-fourth salt mixed and kept dry in their reach is almost indispensable. Charcoal and lime will also be eaten. Small lots running together will do best, especially if they are of different sizes. Hogs properly fed will not root. When you see them rooting it is a good warning that your part is neglected. Don't feed too long. The profit is in small hogs. Better sell 500 pounds in three hogs at a profit than the same amount in two at a loss. Going back to the brood sow, after she is away from the pigs put her in

shape and breed again. Two litters a year is more profitable when we consider the cost of keeping the sow six months in idleness. In selecting a brood sow select one large in chest, fairly long in body, with good action and quiet disposition, one that is from a profitable family and a good suckler. When one has proven good qualities don't discard her on account of age; the strongest pigs come from fully matured parents, and if properly treated they will not get roguish with age nor too fat for breeding. The herd boar may be more bulky, but with a tendency to take on flesh.

In selecting stock see that they are up near the standard, especially in size, and don't breed an animal simply because it is pedigreed stock. Select one that has individual merit. Hog houses need not be expensive, but sufficient to keep dry and warm. The feed is the costly part of hog raising, and the more comfortable the house is and the better trough and feeding places that are provided the greater our success will be. A good trough is made in the ordinary V-shape pattern. Nail strips across or lengthwise of trough to keep pigs out of same. Different size pigs need different size troughs.

WHY DO HOGS GET SICK?

BY E. H. COLLINS, CARMEL, IND.

I visited a large dairy at Greenwood recently and in walking into the stables could hardly make myself feel that it was used every day to milk in. It was thoroughly cleaned and coated with slacked lime. It appeared more like a sprinkle of snow had fallen on a clean place.

I said to myself that if we could only give our hogs and poultry the same care we should have no cholera.

We have some farmers who think that nothing is known about hog cholera germs. Of late years even a famous breeder claimed that a hog dead of cholera is worth fifty dollars to bury and take up after a while to feed to the herd. He claimed that the burial gave the poison an attenuated vitality which acted like vaccination. The strangest part of it was that an intelligent man (not, however, a scholar) should insist on such a statement when he had the best authorities in voluminous records against the practice. The result of this foolish fad was that after a few years the cholera came along and nearly all his fine herd died. This wasn't so bad, if he had been the only one who suffered.

In spite of numerous similar examples of misdirected enthusiasm, we have yet with us lots of "sure cure" doctors and they give numerous references of deceived or dishonest patrons.

One of these "sure cures" is quite popular now with many and the advertiser claims that if you will buy a "farm right" to use the remedy for ten dollars, he will give you a receipt that will render the pigs unborn immune. This is contrary to all scientific teaching on contagious diseases. The mother does not bear a child that is immune, and in extensive experiments it is known that an attack of cholera, with swine, causes immunity only for a few years at best with the animal itself, and that it does not have the power to give immunity to the pigs. With this as with a number of humbug remedies there are many isolated cases where there was apparent relief, and everything that will bear it is accredited to the excellence of the remedy. If cholera in the human family passes through a community it does not kill all. Probably four-fifths will escape. They have natural immune. So with hog cholera and especially is this true of certain less fatal attacks.

The quack and the untrained empiricist notice these times of apparent immunity or less fatality, and credit it to some fancied remedy, often one that has long had a sort of superstitious jugglery associated with it, and they actually mislead some that have influence.

Yet we hear them derisively answer, "Have you ever tried it?" If many people would try it at ten dollars a farm it would make a man some money before the bottom fell out, which is sure to happen. Suppose you ask me to try growing an onion from an acorn, it is surely not necessary to try it. So all science has taught just as clearly that hogs dead of cholera are a deadly poison to well ones and also that the mother can not give immunity to unborn offspring. We don't have to try it. Those questions have been worked out for us just as certainly as have problems of astronomy that tell the coming eclipse to the second.

I write at some length on this to call a halt in expensive testing every new fad that is jumped up.

If any one wants to experiment, let him do so, and then let us wait till he allows his "sure cure" to be examined by those who know something about it.

If there is anything in it, an examination will help him. And if he proves that he has a valuable remedy he can get any price he can hold his breath long enough to name.

One thing is sure, that hog cholera and swine plague are both caused by bacteria. And that no animal can have these diseases without it arising from those causes. It is not so sure that the hog cholera microbe is not identical with the typhoid fever germ in man.

We have the enemy discovered and surrounded, but he is intrenched, so that we can not kill him. Perhaps the best that can be done at present is to protect as much as possible from his raids, from his hiding place in the soil or upon some animal in our herds.

The microbe of these two swine diseases is carried about on the litter

and dust, by wind and animals, till it is common to find some of the germs in the systems of almost every individual where the disease prevails.

It is well known that a 5 per cent solution of lime or carbolic acid will kill these germs. Formalin is also a deadly enemy.

If we can't keep our herds in a close barn, we can do many things that are equally helpful as far as they go. We can separate all ailing hogs. We can burn all dead ones. We can feed a fairly well balanced ration. It is also very helpful to allow hogs access to plenty of ashes and charcoal. Theodore Louis burns cobs by digging a hole in the ground five feet across at the top and tapering to one foot at the depth of five feet. You start a fire in the bottom and slowly fill with cobs till the whole mass is getting hot. Then cover with a tight cover and leave a day or two and it will be a mass of charcoal. He then recommends the following mixture: Take six bushels of this cob-charcoal, or three bushels of common charcoal, eight pounds of salt, two quarts of air-slaked lime, one bushel of wood ashes. Break the charcoal with a shovel and thoroughly mix. Then take one and one-fourth pounds of copperas and dissolve in hot water and sprinkle over the entire mass and mix carefully. Place this mixture in a self-feeder.

Many readers are familiar with Professor Henry's experiments in feeding ashes to hogs. Here is one table of great interest:

	When Bone Meal Was Fed.	When Ashes Were Fed.	When Neither Was Fed.
Cornmeal required to produce 100 pounds of gain, in pounds	487	491	629
Average breaking strength of thigh bones, pounds	680	581	301
Average ash in thigh bone, grams	166	150	107

By the table we learn that feeding bone meal or hard wood ashes to pigs otherwise confined to a corn-meal diet effected a saving in feed of 23 per cent. And we also learn that the strength of the thigh bone was just about double that of pigs not allowed bone meal or ashes. It was also found that when the bones were burned, those of the pigs fed ashes contained 50 per cent. more lime ash than the others.

It is evident that it will not do to confine any kind of stock and feed on corn alone for a great length of time.

Some good farmers are feeding on piles of wood ashes. After a few rains they will eat on ashes well. Thus they get a little lime in the mouth which will likely kill any microbes of disease that are entering the system. The stomach content being acid will prevent the lime from having much destroying effect in the intestine. It may, however, furnish lime for the bony framework of the animal.

We can give our pigs comfortable quarters and clean beds. Some recommend in case of sows in little houses to themselves, we should move the house often. We can also clean the troughs and purify them with lime. The trough may be moved about and sometimes an old one burned. I despise an old sour trough and treat it as I treat an old slop bucket—burn it. I do not think men are careful enough to change about often when feeding on the ground. They feed in one place till it is sour and stinking.

Wallows are dangerous things. A hog does not need one if he have shade. But since swine do not sweat they must have shade or mud. The wallow may be made safe by pouring a gill of carbolic acid on top every day. This is also good to kill lice as the oil will float and cover the animal as he lies in it.

All causes that enfeeble the vitality, pave the way for disease. Breeding gilts too young; inbreeding; stunting; starvation of parents or pigs; a corn diet, or a sudden change from short pasture or from a hungry trip on the cars to flush feeding. Also exposure to severe weather or sleeping piled up in wet straw from which they come out smoking. All these artificial, unsanitary conditions tend to prostrate the vitality and open the door for disease.

Some of the most inexpensive feeds with which to give the hog a natural diet are clover pasture in summer, and a chance to follow cattle in winter. For pigs especially, many use roots in winter or bran. Artichokes and boiled potatoes are very much enjoyed. Silage is sometimes fed. Perhaps the cheapest boughten food to balance corn at present is tankage. This is a nitrogenous waste at the great slaughter houses, and sells at about $23 a ton, with freight extra.

SWINE A SPECIALTY.

BY H. L. NOWLIN, GUILFORD, IND.

It is not necessary that a man making a business of the swine industry shall be a breeder of swine for breeding purposes. He may breed for the feed lot and be a specialist, and what is said in this article is intended to be as applicable to one as the other.

The most important fact in determining the success of this enterprise is the adaptability of the manager to the business. His qualifications must be such that he is able to select the most suitable location and arrange pastures and lots so that the work in caring for the stock will be reduced to the minimum. He must be able to select the breed that will yield him the most profit, and the most profitable individuals of this breed.

This means that the business must be studied from various standpoints. It means that the manager must spend much time among his swine; that he must know each individual animal and its needs, that he must know just what form of animal will produce the most pounds of meat with the least feed, or, in other words, he must be a good judge of a perfect hog. If he has these qualifications he will likely be a successful feeder or breeder, but if he stops here his labor is in vain because he must know where to find the best market and how to successfully reach that market. It is also necessary to know just what style animal will bring the best price according to time, and feed necessary to fit the animal.

At present no other person can make as much of a success feeding hogs for market as the man who makes his hogs weigh 200 pounds in the shortest time with the least feed, and the short time with proper care are two very essential points, because it must be remembered that it takes a certain part of the feed given an animal to sustain what is already there, and the gain in weight is made by what is fed in excess of what is required for maintenance. This is a fact too often overlooked. Just try an experiment on two pigs by feeding one enough to keep him at his present weight, and give another one all he will eat, and you will be surprised what a small difference it takes in feed to make a profit or a loss.

The location of the farm must be such that it is at least reasonably easy of access to market and must lie so that it is either naturally well drained or easily artificially drained, and should never lie close to a small stream coming through other men's farms. Swine should never be allowed to drink surface water. This may seem to be putting it a little strong, and it is something that can not be absolutely controlled, but it is necessary to do the best possible to avoid it. If hogs are allowed to wallow in the water and mud, their wallows very soon become disease breeders, and if hogs have access to a stream coming through another man's farm and his hogs get diseased your hogs are almost bound to. Shade is necessary, but wallows are not, and the best shade is not made by trees, but by setting posts in the ground and covering over with a little straw or old hay. Do not put on too much covering or it will hold water too long after a rain, but put on just sufficient to make shade (about six or eight inches deep). These shades should be at least twenty feet square and five feet high and no sides of any description, so that the air can circulate freely.

If a permanent feeding place is desired it can be a house with a number of pens in it in which to feed, and lanes leading from these to small lots in which the hogs run, and where there should be other houses for sleeping quarters, as sleeping and eating quarters should not be in the same building. If it is convenient to change locations it is certainly desirable, and while it is not so convenient a way to feed, it is, in many respects, preferable to a permanent place. When the latter plan is used

portable houses can be used, and there are various styles of these, many of which are good and easily moved from place to place. While portable houses are necessarily small, they are large enough, because not so many hogs can be kept in one lot, and they always do better with a few in a lot than with a great number (ten should be the limit).

All pens and feeding places must be kept clean and neat as possible. Swine are not dirty animals if given an opportunity to keep clean. Sleeping and eating quarters must be disinfected at least once a week for best results, and while disinfecting pens, etc., use some disinfectant that will kill lice and not injure the hogs, and sprinkle them good. It is wonderful how many millions of lice are fed to maturity every year.

Every man must make his own selection of breed. He will make the best success with his favorite breed, although some other may have advantages over it. Whatever breed it is, let it be a pure breed. There are no cross-bred swine that are as good, or at least any better, than one of the pure breeds used in making the cross, and invariably if these cross-bred animals are used for breeders, each generation will be inferior to its predecessor unless crossed with a full-blood, and if continually crossed with a full-blood you are continually coming nearer the type of the full-blood. Then, why not keep the full-blood from the start? Or, if it is necessary to keep the animals with only one cross to get the results desired, then it will be necessary to buy all the breeding animals used, which makes it much more expensive than raising full-bloods and buying only males. Then, the best plan, certainly, is to select the breed best suited to your location and ideas of a perfect hog and the one on which you can put the maximum number of pounds with the minimum feed, and stay with the same breed all the time. This answers for breeders as well as feeders, because the aim that should always be kept in view is to fill the pork barrel as cheaply as possible.

For swine to do their best it is necessary that they have a variety of feed. Milk is undoubtedly the best food for hogs of all ages, but it is not usually possible to get a sufficient supply of this. Middlings make a fairly good substitute but are frequently too high to be fed with profit. Soy beans, cow peas, etc., will surely answer the purpose, and from experiments these can be successfully raised at small cost. Artichokes and mangel wurtzels furnish good and cheap green feed for winter, and clover can not be improved for summer pasture. Pasture in summer and green feed of some variety in winter are absolutely necessary for the best success, and a variety is desirable at all seasons.

Swine should have access to water for drinking purposes at all times. Drinking fountains are all right if kept clean and sweet, but if a good spring is accessible it is preferable if properly prepared. To do this requires that the spring be so enclosed that the hogs do not have access to it, and the water should be piped to a trough so arranged that they can

drink out of it but can not get into it. From this trough there must be a waste pipe leading to a tile drain or sink, so no mud hole will be made at the watering place.

Many of the items mentioned may seem of little or no importance and it may seem that there are lots of details, but the man who makes a success with swine must look after the little things if he succeeds.

THE HOG AND ITS MANAGEMENT.

BY MONROE CRUMRINE, SOMERSET, IND.

The hog is a native of the eastern continent and has been known from early times. The domestic hog is believed by naturalists to be derived from the wild boar, although what nation first domesticated it is not known .

The wild hog was nearly omnivorous in its appetite and was ferocious when attacked. The ancients surely were acquainted with its uses. We learn from sacred history that the flesh of the swine was forbidden as food by the Levitical law. This prohibition was probably due to some dietetical reason, also the animal not being a cloven footed ruminant. There were no wild hogs found on the western continent at the time of its discovery. Hogs were brought from all other countries sending emigrants to the New World, so that it was not long until hogs became so numerous that they bred in the woods and became wild. The greatest variety came from England. Each district or county in England succeeded in producing a distinct variety. This was brought about by crossing with breeds from other nations, especially China, and each variety took its name from the section of country reared in. Likewise intelligent Americans have in recent times succeeded in producing some distinct breeds that possess superior qualities.

The chief characteristics of the old English stock were coarse, rough hair, long legs and body, narrow back, flat sides, long nose and large, thick ears.

The farmer should choose the breed that possesses large bone and frame, straight and broad back, round sides, short head, heavy jowls, smooth, straight hair, square hams, and rather small, thin ears. The best results are obtained by breeding from unrelated stock. It is better to cross the breeds rather than to breed in and in. Do not sacrifice size in any instance to get fineness, because such stock are too slow to grow, and therefore will not be so profitable.

Another point I wish to speak of regarding breeding is the selection of

stock as to sex. I presume that most farmers have only grades on their farms. And they are not objectionable if they possess good qualities. Grades are more preferable for dams than for sires, for the grade sows usually have larger litters than fine stock, and pigs generally take after the sire in form and structure and the dam determines the other qualities. You will discover this natural law by carefully observing the progeny of animals. By having a good sire better feeders will be the result, and it is the quickest way of improving stock. Select the best females out of the herd for dams, thereby saving the expense of paying fancy prices for them.

The swine, like all other domestic animals, are subject to disease, and the disease of the swine can, in a great measure, be prevented, mitigated and eliminated, as well as the diseases of other kinds of flesh. While caring for hogs, the old maxim, "An ounce of prevention is worth a pound of cure," should be heeded, especially in those districts where there is a tendency to some inflammatory disease. Our favorite remedy is the infusion of peach leaves. If the leaves are not procurable use the twigs or the bark of the roots; they possess the same medical properties and will have the same effect. Our plan is to dry some leaves in the fall so that we may have them for winter use in case of necessity. We have found the peach leaf tea beneficial in loss of appetite, vomiting, torpidity of the liver, inactivity of the kidneys, diarrhea, costiveness, etc.

Diarrhea is sometimes caused by biliousness or the presence of too much bile; this is known by the excrement being thin and of a greenish, yellow color. The same remedy is indicated. It will remove the unnatural tendency of the liver, so that it can perform its functions. When there is indigestion and loss of appetite, accompanied with vomiting, the stomach has become foul. This is usually caused by the absence of bile in the alimentary canal, the food not being moist enough to pass away from the stomach as nature demands. The above mentioned remedy will correct all the derangements of this kind. When diarrhea is not dependent on the biliary secretions, then nature demands an astringent tonic. A decoction of strong tea of blackberry roots, or the inner bark of white oak, or the two combined is indicated. The dose is one-half teacupful of the tea in slop at each meal for a grown hog. When suckling pigs are not thriving well and they require a restorative they must receive the remedial agent through their dam. A good condition powder is made as follows:

Blood-root	1 oz.
Sassafras	3 oz.
Licorice root	3 oz.
Gentian	1 oz.
Ginger	2 oz.
Fenngreek seed	4 oz.
Senna	2 oz.

Each finely powdered and mixed. The dose is one teaspoonful in slop or water, thickened with bran. These powders will tone and stimulate all the functions, aid the recuperative powers of nature, purify the blood and increase the mammary supply.

We have very little faith in any of the so-called hog cholera remedies, and have no suggestions to make along this line.

I would say that success in hog raising and fattening does not depend solely on the judicious management of any one part of swine husbandry, but is due to foresight, proper care and judicious management of all parts.

PREPARING HOGS FOR THE SHOW RING.

BY I. N. BARKER, THORNTOWN, IND.

The first requisite in preparing hogs for the show ring is to be sure we have the right kind of breeding stock. Then arrange to have the fall litters come as near the last days of September or first days of October as possible. And the spring litters last of March or first ten days of April. By doing this we have the fall litters just the right age to select our show stuff for class "over six months and under one year," and the spring litters will be the right age to select show pigs for class "under six months."

While the dam that is carrying these litters before birth should not be fed highly on corn, as corn is too heating and has not sufficient bone and muscle elements in it to produce the strongest and best pigs, feed her on quite a variety of feed, such as mill feed made into a thick slop, together with a very moderate amount of corn, sugar beets, very early cut, sweet clover hay, ground oats, green rye, and also charcoal, ashes and salt once or twice per week. The above I consider the first preparation. But never neglecting to give the brood sows roomy lots, permitting plenty of exercise. Good comfortable houses for each sow separate from other hogs is a necessary preparation for farrowing; and when the little porkers put in an appearance extra care is necessary to save as near all the pigs as possible.

Feed the sow very sparingly for several days before farrowing and also for the first ten days after farrowing, so as to keep down fever. When these precautions are taken, the pigs will seldom be troubled very severely with scours.

By the time the pigs are three or four weeks old they should be eating quite freely in small pens near the dam, but so arranged that she can not rob them. If given such an opportunity they will learn to drink milk by

the time they are three weeks old, especially when it is placed in very shallow troughs.

As they advance in age they should have all they will eat up clean and no more, and this should be given three times per day, and if in hot weather, they should always be fed in the shade, being careful that neither pigs nor dam are fed too much corn. Sweet skimmilk with wheat shorts and ground oats, with a small amount of corn meal together with about one handful of oil cake meal to two gallons of slop, fed as thick as it will cover, is our ideal feed in preparing pigs and hogs for the show ring.

It is surprising how much charcoal, ashes and salt hogs will eat when they are being highly fed, and this should never be neglected; and a roomy, grassy lot for them is also a necessity, as well as plenty of pure water.

But there are other things to look after in preparing hogs for the show ring besides what I have mentioned.

Their sleeping places should be kept as clean as possible and disinfected twice each week. Keep the stock free from lice by free applications of crude oil as often as necessary. Keep them tame and gentle by going amongst them and being very familiar with them, so they will not be nervous and wild when driven out into the show ring. When pigs have been bred right, and prepared as above recommended, they will grow to very large size and have plenty of style or finish. When you drive out in the show ring have them clean and in as attractive form as possible, and you are in good shape to win a liberal share of the prizes.

SHAPING STOCK FOR THE SHOW RING.

BY JOHN G. GARTEN, BURNEY, IND.

The most important point connected with success is in having and keeping a good breeding herd. You should select your breeding animals from stock that has as many noted ancestors as possible, as the best do not always produce show animals. Proper care of the sire and dam is laying the foundation of success with the pigs. The sire should not be run down. He should be fed liberally but not so that he will become sluggish. I find ground oats and shorts the best ration for a breeding boar, with a little corn and plenty of shade and water. To raise a show pig, the mother should be well matured, she should be fed so as to give plenty of milk at farrowing time; then she should be fed sparingly, gradually increasing her ration until she gets about what she will eat up clean.

The first month of a pig's life I find to be the most critical. To prevent scour do not overfeed, and if you do not want to show bobtail pigs the bedding should be changed twice a week at least. As soon as the pigs show signs of eating, a place should be fixed so that they can be fed to themselves. I feed ground oats and shipstuff and bran, as it produces bone, which I think is most essential in starting a pig. Now comes the time that tries the most experienced breeder in selecting the pigs for the show ring. Every breeder has, or ought to have, a mental photograph of the perfect animal he is trying to produce—his ideal. We want a good bone structure; then you have something you can rely on to build upon. When the pigs are four to six weeks old, I think, is a good time to select them for the show ring. Once right, while they may grow away from it under the most careful management, they are always apt to return to their first form than to grow out of or cover up a faulty structure. Always demand a good head and ear, with good, strong pole, a short neck, a strong back well ribbed, with the best ham you can get, straight top and bottom lines, set on good legs and feet, with a full heart girth, well flanked.

After the pigs have been selected they should be allowed to wean themselves and should have a grass lot to run in with plenty of shade. I often commence feeding stronger so as to make as much growth as possible. When the pigs are six months old they should be fed more corn or something that will grow more fat. I usually feed when fitting animals with age, white middlings or shorts and hominy meal equal parts and a pint of oil meal to two gallons of feed. Think this kind of feeding gives more bloom to the animal, and they will have a fine coat of hair. Aged sows should always be bred before being fitted so the young can suckle the fat off without detriment to the sow. Aged boars should not be fed too much corn as it is heating and injurious to the usefulness as a sire afterward. All hogs should be washed and cleaned up before crating. Do not use too much straw in crating as it is heating.

After you have arrived at the show ground and the pens are selected, see that they have been disinfected. Bed just heavy enough to keep dry, and when show day comes see that the hogs are clean and show dry. If they get too warm, use water with a solution of chloro-naphtholeum, as it gives a good gloss to the hair. If you are successful, you will know just how to act and what to say; but if some other fellow gets the ribbon you should then have courage of mind, treating the judge with respect, and be courteous to fellow breeders; and when you have arrived home go to work preparing for the show next year.

Breeding hogs is not, as has been said, a lazy man's business, but real hard, pleasant work if you love your business, and no man should commence shaping stock for the show ring without a genuine love for it. A taste for one's business and an ambition to succeed in it, is indispensable, and a lack of such qualities is only failure.

Every swine breeder should have an ambition to be successful. It takes knowledge, persistence, patience and constant attention to prepare stock for the show ring; it requires work, and no hog breeder can expect to be successful without it.

DO PUBLIC SALES BENEFIT THE BREEDER?

BY JNO M. VANCE, SPRINGPORT, IND.

As to whether public sales do benefit the breeder depends upon his surroundings. It is a well-known fact that all breeders do not succeed in the sale business. I have attended sales where the farmers of the neighborhood seemed to care but little for the stock they were offered. They either could not or would not distinguish between a good animal and a poor one. The idea of improving their stock seemed to never enter their heads, and the breeder would be forced to sell at a loss and eventually abandon the business. But I am glad to say all farmers are not inclined that way. The spirit of improvement has taken possession of some neighborhoods, and the farmers will attend the annual sales. All seem to strive to get the best hogs; a few dollars does not stand in the way when good ones are in the ring. They know the value of good hogs and they will have them. Where a breeder has such farmers for his patrons he can make the sale business a success. I have been selling at public sale for about ten years, and I am satisfied I can do better selling my stock at public sale than any other way. It is not the question as to how to dispose of any one crop of pigs, but how to dispose of them from year to year. Then we must manage to build up a trade that will last, and as the pork barrel is the destiny of the pig, the farmer that raises him is the principal one to look to for a market for him, and we can depend on him for that where they are a live, progressive class of farmers.

It is a good plan to make a kind of a holiday of sale day. Farmers and breeders that are near enough are glad to come and visit each other. We can not make the sale business a success without the support of the farmer and the breeder also. The man who goes into the public sale business should strive to raise better pigs every year. The spirit of friendly rivalry should be cultivated among all breeders. We like to hear our neighbors say, "I want to have the best bunch of pigs that is sold in our market this year," and when the breeder can hear these same men say, "I bought my breeding boar at your sale," then we can depend on these men for regular customers. I also think it is better for breeders and farmers to see the pigs they are buying, a thing they do more at sales than buying at private sale or on mail order. Another benefit in selling

at public sale, we often get persons to come to the sale who are not in the habit of buying fine stock, and when they get there they are apt to buy something that will do them good, and we have now a regular customer. And not only that man, but his friends, will want some next year. So this thing works like the leaven in bread, it keeps on until all will want something better than they had at home. I am not in favor of "boom prices" or shady or unfair methods being used by the breeder. It is not the best way. We should avoid all unfair methods in selling at public sale, as it is sure to bring trouble in the end. With fair and honest dealing between man and man, and ever striving to raise better pigs, I know of no better way to sell them than at public sale.

WHAT BENEFITS ARE DERIVED FROM BREEDERS' MEETINGS?

BY LUCIEN ARBUCKLE, HOPE, IND.

No argument is necessary to prove that breeders' meetings benefit those interested in swine breeding.

One of the main benefits gained at swine breeders' meetings is the social advantage. There we meet breeders from all over the country, renew old acquaintances, make many new ones and in a friendly way review the business of the year.

Another benefit is the experience given by men who have grown old in the business. Their advice, if followed by the young and inexperienced breeder, places him on the high road to success, and possibly some young breeder may tell something that the older breeder had not yet learned. It is said, "There is nothing new under the sun;" but we must remember we are never too old to learn. So the men who have been in the business almost a lifetime can be benefited by attending breeders' meetings. Surely the young man just embarking in the business can not afford to miss a single meeting.

There we learn from the care of the boar down to the sucking pig; the proper feed and care of the brood sow for months before being bred up to farrowing, and from then on to the time when she weans her litter and sends them forth to root hog or die.

Then some other fellow reads a paper on handling of pigs from weaning time on, and we have a complete lesson on the breeding and caring for swine.

Again, breeders' meetings are often the means of selling stock, for we all like to tell the breeder just what we want and talk to him about what we are going to get.

We all make mistakes, and these we can have corrected when we come in contact with those who have solved the problems we are trying to learn. The breeders' meetings do more than any other one thing to put the breeding of fine stock on a higher scale as the years go by, and make the business more profitable to all who are engaged in it.

THE CARE OF PIGS.

The well-known swine breeder, Mr. W. J. Malden, of England, gives some interesting suggestions on the care and medication of young pigs, in the Country Gentleman, which should prove interesting reading to American breeders.

Little pigs can not stand against the disadvantages of a cold or wet bed. It is almost safe to state that no young pigs thrive if they are required to exist in a sty which has a cold floor; and that if, in addition to this, the floor is allowed to become wet and foul, the last hope toward profitable management is lost. At the time of pigging a small bed is found necessary, because if a large quantity of litter is provided there is a risk of the little pigs being smothered, but the bed must be placed in a dry position, and where no moisture can drain. If there is a dry place in the sty the sow will make her nest on it, but if the floor is uneven no such opportunity is given her, and she is obliged to make as good shift as she can. For a few days after the pigs are born the litter should not be changed for fear of upsetting the sow, unless she is of a very placid disposition; but when it is safe to clean out the sty the operation should be carried out daily. Little pigs will not thrive if the straw becomes wet and foul. The first signs of ill-effect are noticeable in a husky cold which frequently develops into a fatal pulmonary attack. Pig keepers know how often they notice that the "lights" are wrong when they cut open a little pig which has died somewhat suddenly. In almost all instances this is the result of being forced to lie on a damp bed; the less frequent cause is a chill brought about by the sty being draughty. Another result of a wet bed is rheumatism, a frequent malady among pigs; and no lover of animals can help feeling distress at the evident pain the little pigs suffer. They crouch about the sty and rapidly lose flesh, and if an effort is made to make them take exercise, they indicate the torture they experience by shrill squeals and long-drawn grunts. A small proportion of the attacks of rheumatism, it is true, result from injudicious feeding, which causes acidity to develop in their system; but in the majority of instances it is through the unhealthy bedding they are forced to lie in. There is a disease among pigs which, to the casual observer, is very similar to rheumatism, but which to an experienced pig breeder presents different symptoms; and it is very necessary that the difference should be

understood, because the treatment of the two varies considerably. The disease to which I refer is a kind of paralysis which causes the animals to lose their powers of locomotion, and is commonly spoken of as "going off their feet." This is due to errors in feeding, and can be distinguished from rheumatism because the pigs suffer no pain when touched, and therefore do not squeal when an attempt is made to make them move. They are usually in a listless and lethargic state, apparently caring little what is done to them, or what their surroundings are. The cause of this is that they are being fed upon food which contains a large proportion of nitrogen. When animals receive a too highly nitrogenous diet, the blood is surcharged with nitrogen, and presses so hard on the brain that ordinary symptoms of paralysis develop, showing themselves in the manner already described. The obvious method of relieving animals suffering in this way is to weaken the blood so that the pressure is lessened. There are various means of doing this, which may be followed according as the intensity of the malady shows itself. If the pigs are very bad, it is necessary to afford immediate relief by bleeding, when a rapid change generally takes place. Should the attack not be so intense, a small quantity of epsom salts should be mixed in their food, and the more nitrogenous parts of it withheld. Thus, if the pigs are receiving skim milk in addition to their mother's milk the skim milk should not be given. If food, such as bran and peas, is being given, more starchy foods, such as maize or barley meal, should be substituted for a time. In all the minor diseases of pigs which affect the digestive organs, nothing seems to exercise more beneficial effect than the herb known as betony, or, in some localities, madder. The medicinal properties of betony have long been recognized, and for a lengthy period it was largely used in ordinary medicine. An old Spanish proverb, when translated, runs as follows: "Sell your coat and buy betony," indicating in what esteem it was held before the days when a more scientific pharmacy was established. It is wonderful, almost magical, in its effect on pigs, for when they will not eat, a dose rapidly brings back and appetite, and if they are out of sorts the cause soon disappears. It may be given green or in a dried condition, and every pig keeper should grow a patch of it, so that an occasional dose of one or two tablespoonfuls may be given when required.

The use of corn in the feeding of swine has been dropped out until at present this grain is fed very little except as a finish for pork. We need nothing better than roots, milk and mill feed, in the absence of pasture, for a sow during the period of gestation and until the pigs are six weeks old, except in the coldest weather, and even then comfortable quarters are preferable to too much concentrated food for producting heat.

WEANING PIGS.

[From American Swine Herd.]

The time when pigs should be weaned, in a measure, depends upon their thrift, the season of the year, the accommodation and the feed you have for them.

We do not consider it advisable to wean pigs before they are two months old—would prefer more to less age.

Our early pigs we generally wean the first week in May, as we like to raise fall litters from a portion of the sows. Sows can ordinarily be bred within a week after the pigs are taken away. Sows that farrow in May and June will be too late to breed for fall farrow. It has been our custom to let these run with the sows until they wean themselves.

We prefer to have our sows with litters in as small bunches as possible; prefer a house and small yard with plenty of grass for each sow. If they are thus divided, and any of the pigs get out of order, you at once know what litter it is, and feed the sow accordingly. Most of the ailments of pigs before weaning will have to be reached by feed through the dam. Watch your little pigs very closely. If they look thin and hungry see that their dam is better fed and swilled—always increasing ration slowly or you will invariably scour the little fellows.

As it is next to impossible to raise a litter of pigs without some of them getting the scours, at one time or another, I will give you our treatment for their ailment. Watch the little pigs closely; if any of them are too loose, at the next feed dissolve a teaspoonful of copperas in a little warm water and feed it to the sow in her swill.

For two years I have successfully checked every case, and only four times gave a second dose, which I always give on the following day if the first was not effective. Have also seen copperas tried on cases of from three to ten days in duration, where it was not effective; therefore remember one stitch in time will save nine.

When pigs get from two to four weeks old fence off a corner in the house or in the yard, where the old sow can not get in, and give the pigs all the shelled corn they will eat. As soon as they are accustomed to coming for the corn, begin by feeding a little fresh milk diluted one-half with warm water. One cupful will be enough to begin with; then increase quantity as they learn to drink. Be careful there is no milk left in the trough from the previous feed, as it tends to sour the trough and the new milk.

If you are careless in this way you will do more harm than good. Remember the stomach of a little pig is as sensitive and delicate as that of a child. After you have them eating and drinking, so they will come when you call, and their stomach thoroughly accustomed to the feed, they are ready to wean.

Do not overlook the fact that by removing the sow you remove the sweetest and cleanest portion of its feed.

We want all the swill we feed to pigs under three months of age to be sweet, and then not too much of that; have at various times fed much soaked feed, but have discarded it entirely for dry shelled corn and dry oats fed in self feeders. We prefer dry feed for two reasons: First, in soaking corn, oats, ground or mill feed, it is next to impossible to keep the feed sweet in warm weather unless you have plenty of boiling water and rinse your barrels at each feed. Second, if feed is soaked, pigs will swallow whole or half kernels, without chewing the feed, thus being not properly mixed with saliva is hard to digest and may sour the stomach, while the dry grain is thoroughly chewed or ground. You can see this by the quantity of ground corn everywhere found where pigs have been fed dry corn.

WHOLE VS. GROUND FEED FOR HOGS.

Carefully conducted experiments are always worth a great deal to progressive breeders. The Wisconsin Experiment Station furnishes us with the results of an experiment made to determine the comparative value of whole corn and corn meal as a feed for growing pigs.

The corn used was No. 2 Western Yellow Dent, of fine quality. The corn meal used was ground fine at the regular custom flouring mills. In the experiment eighteen pigs were used, divided into two even lots of nine each, the experiment continuing twelve weeks. Lot one was fed the ration of two-thirds shelled corn and one-third wheat and middlings by weight. Lot two was fed two-thirds corn meal and one-third middlings wet with water and fed immediately after mixing. Each lot was fed one week on this diet before the proper trial began. Each animal was weighed separately and an account kept of all feed being given by weeks. The amount of shelled corn fed to lot one was 3,284 pounds; of middlings, 1,624 pounds; weight at the beginning of the trial, 1,907 pounds, and the gain 984. Lot number two consumed 3,971 pounds of corn meal and 1,985 of middlings; weight at the beginning, 1886 pounds, and gain, 1,348.

The experiment was repeated with two other lots of hogs finer in bone and less vigorous in constitution, and continued for nine weeks. Lot one consumed 1,107 pounds of shelled corn and the same amount of middlings; weighed at the beginning 1,281 pounds, and gained 522. Lot two consumed 1,383 pounds of corn meal and the same amount of middlings; at the beginning weighed 1,383 pounds and gained 576.

Analyzing these experiments it will be seen that it required in the first trial 422 pounds of feed with corn meal to make 100 pounds of gain, and 501 pounds with whole corn to secure the same results. In the second trial it required 462 pounds with corn meal and 424 pounds with whole corn.

In the trial made in 1896, of which this is a duplication, it required 443 pounds with corn meal and 481 pounds with whole corn to produce 100 pounds of gain on the first trial and 487 pounds with corn meal, and 591 pounds with whole corn on the second trial of that year.

To sum up the two seasons' work, Professor Henry remarks that the pigs made a greater gain when fed corn meal than when fed whole corn. "Taking the average of the four trials we learn that to make 100 pounds of gain the pigs were fed 456 pounds of corn meal and middlings and 499 pounds of whole corn and middlings. There is a saving of 40 pounds of corn on 499 pounds, or eight per cent. saved by grinding. This saving will barely pay for the cost of grinding corn."

Under the conditions west of the Mississippi it would certainly not pay to grind the corn at eight per cent. of its cash value when it is worth less than twenty-five cents per bushel. When corn, however, reaches forty cents and the farmer has a mill at home (which he can not very well do without) the answer would have to be very different.

The feed mill is a necessity on every well regulated farm for grinding corn, oats and inferior wheat for slop for pigs and calves, or preparing feed in short for any kind of stock requiring ground feed. It does not, however, pay, as will be seen above, to grind all grain for all purposes, and the object of this article is to point out the cases in which grinding will not pay when corn is cheap.

THE HOG DOG.

We don't know that any of our Indiana breeders stand in need of the "hog dog," as he is still found in some parts of the South, but it is interesting to know how he is used in that part of the country, where we still find the "razorback" in all his purity. Henry Wallace was down south recently and accidentally ran across a "hog dog," and this is what he writes about it:

"We called the other day at a lone house in the openings of a vast forest along the bayous, and while waiting for the appearance of the man of the house, who had gone fishing and had to be found by a messenger on horseback, we saw a hound, and asked the mistress of the home what that dog was good for.

" 'That are a hog dog,' was the reply. 'That dog is worth fifty dollars. Hog dogs are scarce in these parts.'

"We ventured to inquire whether the dog would catch razorbacks, and she said: 'Oh, no! Hog dogs don't catch razorbacks; the razorbacks chase them.'

"On asking for further explanation, she went on to say that their hogs ran in the woods the year round without feed or care, and when it was necessary to find them they hunted for them the same as deer; that when

this particular dog was put on the trail of a hog he followed it up and located the herd by baying at them. The owner then indicated the direction in which he wanted the herd driven, when the hog dog made an attack on the herd which they resisted in force, and the experienced H. D. aforesaid allowed them to chase him in the direction in which the owner wanted the hogs to go. If any of them seemed inclined to go in some other direction, he ran around and got the stragglers after him, and led in the home direction. If he got tired and turned out, he rested a bit and then made another attack, and no matter how tired the hogs were they would take after him, and he continued this masterly retreat until the hogs were brought home.

"We were curious to know how the hogs were confined for slaughtering purposes after they arrived at home, and were told that the proper way was to build a log pen in the woods with an opening below large enough for both dog and hogs to enter and low enough for the dog to jump out and save his bacon, but so high that the hogs could not. The owner then was on hand and closed up the opening and had his winter meat ready for slaughter. We had heard stories of this kind before, but always supposed there was some joke about it, and it gave us a new sensation to hear this artless, simple-minded woman describing a scene that occurred every fall of the year when a hog harvest had to be gathered.

"Through all the pine and oak forests of the South and over not a little of the prairie region where corn growing is not a pronounced success, the razorback flourishes and will flourish until conditions are changed. Say what you like about him, he is the hog for that locality. Attempts to grade him up without changing the environment are as futile as pouring water on a duck's back or King Arthur's attempt to sweep back the waves of the Atlantic with a broom. The little pigs, whether from the wild or graded up breeds, in the full flush of their mother's milk, do not differ so widely as one would imagine from those of the improved types. When this milk begins to fail and the infantile razorback has to root for himself, he begins to take on the razorback form. It is the only form under which he could survive the conditions by which he is surrounded. Nature builds him that way because it is the only way in which he could make a living. From necessity he is an enterprising hog; intelligent, suspicious, courageous, a born fighter, a good rustler,, shifty as a New England Yankee, and courageous as a confederate colonel. Nothing in the shape of food from the roots of grass and minnows in the fisherman's bucket, to watermelons or dead fish, escape him. He is hungry from the first spoonful of his mother's milk until the mast ripens in the fall; then his soul is satisfied. Whether it is the seeds of the pine cone, the acorn, or the pecan, it is all the same to the razorback. He has grown his frame under hard conditions and has developed a degree of industry, foresight, prudence, courage and energy, which, if used by his master in the prosecution of his business, would make the South the abode of rich men,

and when the harvest of mast comes in the fall he revels in a luxury which would satisfy the soul of a millionaire, and puts the streak of fat between the streaks of lean that makes his flesh, when properly cured and smoked, a fit feast for the epicure.

"Give the razorback his dues. He will hold the country until fenced pastures, tame grasses and cheap corn invade it, and then, and then only, is it worth while to grade him up."

MANAGEMENT AND FEEDING OF FALL PIGS.

The question with some farmers is what to do with the fall pigs. It is easy enough to handle the spring litter, but the fall pigs have to pass through all kinds of bad weather, which is very unfavorable for their growth and fattening. The idea of this article is to show that the fall pig, with a little extra care and management, can be made to thrive and fatten in winter as well as in summer. Dollars do not grow on bushes, fall to the ground to be gathered into baskets by man, but by great labor we are able to gather a few. During the winter months the farmer is not pushed with work, therefore it is just the time for him to look after the pigs. I find by my experience that the best time for sows to farrow for fall pigs is during the months of August and September. To have the pigs come then gives them the advantage of a little warm weather in which they can get a start before cold weather begins. The sow should be kept in good condition by the feeding of mill feed and a little corn and have the run of a clover field, so that the pigs will come strong and healthy, which is half the battle. From the time the pigs come until they are two weeks old the sows should be fed very sparingly on bran slop alone, after which increase it, gradually adding corn until you give them about all they eat. As soon as the pigs will eat they should have a run to themselves and be fed slop made by mixing mill feed with milk and kitchen slops. When they are six or eight weeks old the sows should be weaned from the pigs. Never pen the pigs. Let them have all the range possible. Feed them all the mill feed they will eat, but not much corn until they are three months old. If fed too freely on corn they will not grow fast.

When cold weather comes the pigs should be well sheltered. Have them warm, dry sleeping quarters and also a dry feed place. It should be so arranged that they will not have to go through the cold from nest to feeding place. After they are three months old give them all the corn they will eat up clean twice a day and a liberal quantity of bran slop at noon, but not all they will eat. Have them squeal sufficiently at each feeding time to let you know they will relish their feed when you give it to them. Pigs managed and fed according to the above directions

should weigh at four months old at least one hundred pounds and not be fat but good stockers. But if the feeder desires to keep them they can be made to gain, by the same care and feeding, from one and one-half to two pounds per day during the remainder of the winter. I have done this myself and am doing it this winter with thirty head of good grade Poland-Chinas, which will weigh to-day at five months old 150 pounds.

The main points to be looked after are good shelter, a warm, dry sleeping place kept free of lice by the use of coal oil, plenty of good drinking water, and feed at regular hours.

FATTENING HOGS FOR MARKET.

BY J. H. BONE, LAFAYETTE, IND.

I take it for granted that all who read this article are trying to prepare their stock for market in the most economical way. With this in mind I shall try to point out the reasonable way of feeding. In so short a paper only general facts can be stated. It goes without saying that if we want to produce anything we must use the right material in the right way. There is no need of guessing about these materials when it comes to feeding farm animals, for we have abundant information on the subject. Let us first examine the composition of the animal's body. Numerous investigations give approximately the following composition of the body of various farm animals: Bones, 9 per cent.; flesh and tendons, 40 per cent.; mechanically separable fat, 24 per cent.; blood, hide, entrails, etc., 27 per cent. To get at the problem more closely let us find out the composition of the body in terms that can be applied to foods. The pig's body has the following composition:

	Mineral Matter.	*Nitrogenous Matter.*	*Fat.*	*Water.*	*Contents of Stomach in Moist Condition.*
Store pig . .	2.67	13.7	23 3	55.1	5.22
Fat pig. . .	1.65	10.9	42.2	41.3	3.97

These percentages represent the body of the pig as it is when alive. The mineral matter mentioned in the table is composed largely of phosphoric acid, potash, lime and magnesia. This mineral matter is mostly found in the bones and is produced while the pig is getting its growth. The nitrogenous substance is found in the muscles, tendons, ligaments, hide, hair, hoofs, blood, nerves and organic matter of the bones. In the pig there is less mineral matter than in any other of our farm animals. In its body when fat there is four times as much fat as lean meat. While the average amount of water in the body of farm animals is about 49

per cent., the fat pig has but 41.3 per cent. and the store pig has 55.1 per cent. It will be noticed in a study of the table that there is a striking difference between the composition of the body of the store pig and the fat one. This difference is caused by fattening. In the fattening process the pig does little but lay on fat. There is an increase in the amount of dry matter in the body. Scarcely any mineral matter is added to the body and rarely more than 7.5 per cent. of nitrogenous substance, the fat forming about 70 per cent. of the increase. Of the gain in weight during the fattening process about 75 per cent. is dry matter and 25 per cent. is water. Keeping in mind what we have learned let us examine some of the materials used for the production of the body. All animals require a certain amount of food for maintenance. It is probably about right to say that two pounds of feed such as middlings or of their value will maintain 100 pounds of live weight. Until an animal receives more food than is required to keep up the heat of the body and supply the waste of the body, it can not gain in weight. It should be the object of every feeder to keep his stock gaining every day. All foods will not produce the same effect. Some are fat formers while others are flesh formers. While pigs are growing they should be supplied with food that will form flesh, or lean meat, and also furnish an abundant supply for the growth of bone. Unless the proper food is given, pigs will not thrive well, or they will become too fat and mature too early, after which we feed at a loss. Indian corn is a food that will form fat and contains a small amount of protein and mineral matter. As a food it is not the best for growing pigs or pregnant sows when fed exclusively. It is admirably adapted for fattening and we could wish for no better food for hogs after they have reached the proper age. Corn with good pasture will make pigs grow well. It is probable that more pigs are raised and fattened on corn and pasture than on all other foods combined. There is a part of the year in which we can not have pasture, and growing pigs should have mill feeds in addition to corn. Mill feeds furnish a high per cent. of flesh-forming materials and much mineral matter. They will also keep the pigs in a healthy condition. This paper is too short to make any adequate discussion of foods. I want only to emphasize the fact that we ought to use our judgment and knowledge even in feeding pigs.

A WORD FOR THE HOG WALLOW.

The wise breeder always consults the comfort of his stock in summer as well as in winter, if he expects to reap the best results for his labor. The hog wallow is not generally looked on with favor, but rather as a germ-producing and disease-breeding nuisance, altogether out of place on any well regulated farm. A correspondent in the Stockman and Farmer, and a successful breeder as well, gives his experience with the wallow.

"What do I think of the wallow? Well, you see I've got one, and can say that I have never lost a hog from disease, so in my case at least it has not proven such a death trap as some writers make it out to be. These writers generally have a 'Doctor' or 'Professor' to their names, and are able to bring such an array of facts and scientific reasoning to bear that one is forced to believe that he must banish the wallow or lose his entire herd of swine.

"It is one of the rules of nature that nothing thrives out of its natural element. It is the nature of a hog to take to the mud just the same as the hippopotamus or alligator, and for the same reason. We read that there is no animal more cleanly than the hog, but that is all romance. I don't say you can't keep hogs dry and clean and healthy, but I never saw it successfully done yet. The value of my wallow during the heated part of the season can not be estimated. There is little if any danger of loss from heat if the swine have a shady wallow to lie in during the hot part of the day. Without one there will be great loss of fat if not of animals.

"As to disease germs, I do not see why the wallow is condemned so much on that score. If I understand the nature of these germs they must be planted by infected animals. In this way a wallow might be the means of transmitting the infection, but the drinking troughs and feeding grounds are more liable to become impregnated, and as it is admitted that the disease reaches the system through the stomach they are far more liable to transmit the disease and should accordingly be sources of more anxiety to the hog raiser.

"The greatest danger in a wallow is that, through carelessness or indolence on the part of the feeder, the swine are forced to look to it for a supply of drinking water. No animal will thrive on impure drinking water, not even a hog. Nor will he drink it until forced to. It is my honest belief that for every case of cholera transmitted from a mud-hole you will find ninety-nine caused by impure drinking water or an exclusive corn diet. Give me the right sort of feed and pure water, and I'm willing to chance the wallow. To those about to try the dry pen and pasture, I would advise to think of the hot July and August days and use their own common sense rather than the advice of 'educated' but inexperienced individuals. I consider my wallow a necessity to successful swine raising."

CROSSING BREEDS.

It has been suggested by high authority that Tamworths be crossed upon our present popular breeds to give us a better bacon hog. Mr. W. M. Boomberger, in the Prairie Farmer, suggests that this kind of crossing is not improving, but destroying already well built foundations. Environment and what is commonly known as line-breeding that does not go too

near in-breeding is that which more nearly improves and develops healthy and vigorous organization. The Tamworth of Great Britain will, if kept a sufficient length of time under the conditions that have developed desirable types in other breeds in this country, give us what we want by selection, and the noses of that breed can be shortened. In the presence of our vast western corn cribs it is probable that bacon hogs can be developed out of the Tamworth without contaminating blood of other breeds and going into raising mongrels. There is nothing wrong at all in developing what is needed by the markets out of the breeds already so near perfection, be they Berkshire, Poland-China, or Chester White, by proper selection and feeding. If such is done, a more desirable type will at once be placed on the markets and the mixed mongrelism, that good farmers have been fighting and trying to get off farms, will not be again at hand to flood the markets. There are types in the breeds that are rangy and do not take on fat so fast, and a little less high feeding and more reliance given to getting growth of hogs on large pastures, and giving them plenty of exercise, will produce the result. If we have been nearly half a century developing a breed, as we have the Poland-China, and it is found in a high-bred form and the breed widely used, and whether it be the Berkshire or Poland-China we would feel like protesting against this work being destroyed by widespread crossing. While we believe that packers know what they want, and the demand should be satisfied, we think that the talk of there being need of more bacon hogs is largely talk, for the very reason that no special prices are offered by the markets for that kind of hog. Let the markets make 50 cents to $1 per hundred weight more for bacon hogs and the farmers will soon produce them out of the present breeds without exploiting in the crossing business that would destroy the very foundations of the swine industry. It seems exceedingly convenient for the markets to always demand just what can not be supplied, and make it a claim to bear the prices of what farmers have to sell. Breeding for breed improvement and breeding for market should be co-ordinate and we think it would not be necessary to destroy well-laid foundations to produce the bacon hog.

SURE AND QUICK RETURNS.

Every swine breeder in the country is in the business for the money there is in it, and the quicker the returns come in the larger the profits, as a rule. On this subject Mr. A. J. Lovejoy, of Illinois, suggests that the hog stands to-day, and always has, superior to any of our domestic animals as a money maker. It has been said that for big money breed horses, for sure money cattle, but for quick money hogs. Yet to-day we might combine all three sayings in the latter, as the breeding and feeding of swine most assuredly pays the general farmer better, surer and

quicker than any of our domestic animals, not even barring the dairy cow. What can a farmer find for the small amount invested in ten good brood sows, safe in farrow, of any of the improved breeds of to-day, that will bring pigs in the spring, that with proper care and liberal feed will during a twelvemonth return such a profit on the investment as will these self-same ten brood sows and their produce?

Good, well-bred pigs, farrowed in February or March, the earlier the better, by being properly cared for during the first three months while with their dams, until good grass comes, preferably the clovers, and then weaned and put on clover pasture with a good, dry place to sleep and in addition to the clover have all the shelled corn, soaked until softened, together with what wheat and middlings as a slop they will eat, can be made to weigh about one pound per day from birth, and by October 1, or any time before the large run of fall hogs are ready for market, bring ten to twelve dollars per head in the average market, and show a grand good profit for all feed consumed. The reason I speak of shelled corn soaked is that I consider it, when combined with clover pasture, a well balanced ration, and by soaking it the pigs will eat much more than they will from the ear. The liquid or water in which the corn is soaked should by all means be given to the pigs, either as a drink or mixed with good wheat middlings, for this corn juice to a hog is like beer to a Dutchman, it helps to round him out.

There is another profitable way. This is by raising late summer pigs, that may be weaned say by September, and then have the run of the pastures, though there may be but little grass at this time of the year, but what there is, together with a good feed twice daily of ground wheat, wheat middlings or ground rye, will push them along nicely. On many farms pumpkins are grown, which make a grand good fall feed for pigs or shoats, especially when a little green corn can be fed along with them. Shoats of this age with good dry shelter in which to sleep during the winter can be carried through at a small cost. If a field of fall rye sown very early, say in August or September, can be had for them, it will furnish green feed for the whole winter when not covered with snow, and this with a feed or two daily of grain will keep them growing and thriving at small expense, ready for early grass and heavy feeding to finish for a summer market, which by comparison will be found for a series of years to be the highest of the year.

FEEDING SHOW PIGS.

As one looks in upon the pens of fine pigs as they are shown at any of the leading fairs of our country, the wonder is, how have these animals been fed and cared for to bring them to such a high state of perfection. One of the most successful exhibitors in the whole country, Mr. Reuben Gentry, of Kentucky, gives his method of pig feeding as follows:

Granted that you have selected your litter from which you wish to take your show animals. You of course can not pick out any special individual at so tender an age. Hence must feed the whole litter, which at first can not be done except through the dam. After all danger of milk fever is past begin to feed her the following ration, gradually increasing to all she will clean up, avoiding an overfeed above everything else, for a setback at three weeks can not be overcome at three months. Shipstuff, bran, corn, ground oats, each one part by bulk cooked by steam, if possible. Feed to sow in slop made with greasy dish water and milk three times per day. As soon as pigs will eat (which will vary somewhat from three weeks to a month) place small trough in pen where sows can not get to it and feed in small quantities at first the same ration except leave off the ground oats, a pig's stomach at that age not being able to properly digest the oats unless ground very fine and the hull sifted out. Watch bowels closely that you do not scour them. The plan of prevention being worth all the cures, put a small quantity of powdered charcoal in slop. Do not feed much at a time, but often, cleaning out all that may be left each time before putting in a fresh feed. As they get older, say six weeks, add the ground oats and increase feed in richness by adding common flour. Let run with dam until they begin to think more of you and your bucket of warm slop than they do of her. At four months pick out two or three of what in your estimation are the best ones, place in a lot with plenty of shade and pure water to drink; you can now add a small quantity of corn meal to the previous mixture and increase the flour. Three weeks prior to show feed four ounces of molasses to each hog, at first only once per day, gradually increasing to six ounces three times a day. Leave off corn if weather is hot and double the ration of flour and oats. I have not said anything about feeding milk, knowing that you all know that it is the first thing in importance in feeding for successful exhibition. Some one may say, Oh, the cost of all this. Well, if you are going to stop and count the cost never try to prepare for the show. You are working for a reputation and your profits must come out of your future sales. Feed in this way and my word for it when you go to show if you have the individual you will get your share of the coveted blue ribbon, and when the fair is over you will have a sow that will breed without any trouble, and a boar that is active and will sire you more and better pigs than one not so fat. Do not on your return quit feeding and let them shift for themselves, but gradually decrease feed.

DO PUBLIC SALES BENEFIT THE BREEDER?

BY W. ARTHUR AYERS, OAKVILLE, KY.

Let us first look at some of the advantages that accrue to the breeder from public sales. There is nothing that brings breeders together better than a public sale of good stuff, if it is well advertised. This is a great benefit to the breeder, from the fact that he has his stuff valued from other breeders' standpoint; his mistakes in breeding are pointed out and made to show up in such a light that he will see them, no matter how narrow-minded he may be, and, if he is the man he should be, will profit thereby. Another very great advantage to be gained is, he keeps his stuff together, does his own developing until every one can see what they will make, thereby lessening his chances of putting out a pig that, when he comes to himself, would do his breeder an injustice and make him ashamed of having bred such a hog, to say nothing of the disappointment that comes to the buyer. To cite a case, a neighbor of mine bought a pig from one of our most prominent breeders—one noted for his honesty and fair dealing. This pig was bred in the "royal purple." When he came the man thought he had a fortune. I saw him a few days afterward and he insisted on me coming down to see his great (?) pig. He was nice—there was no mistaking that—but by the time he was six months old, the neighbors said, he was only tolerable, and by the time he was one year old they all said, "Well, he ain't no great shakes." You all know how an old farmer can say that, and what a great deal it seems to express. I saw this hog when he was one year and eight months old, and I thought he was a disgrace to any fattening pen on earth. A man told me this pig never did show much wrong with him until after he was six months old. Now, what would this breeder say if he was to see this hog? Would you think he would want to say, "There is some of my breeding"? Verily no. Now if he had kept this pig for a public sale it would have been old enough to have shown these defects and have been sent where it belonged —to the fattening pen. This is only one of many such instances that have come under my observation, yet I do not know of one in which the breeder is to be blamed. In this case I know no one is to be blamed at all.

Again, the men who buy at public sales are generally men that want a good hog because they need it, and will do their best to bring out everything good in their purchase, making it a lasting advertisement for the breeder; while, by selling privately, often we sell a pig to a man and he turns him out on the commons to "root, hog, or starve," and because he does not make a "stunner" he curses the breeder for it instead of his own triflingness. Our first investment in pure-bred swine was at a public sale,

and I have often thought it was our best for the money invested, although we have always gotten our money's worth whenever we bought pure-bred swine privately. Another advantage to be gained is that the purchaser sees the stuff he is buying and can not blame any one but himself if he does not think he got what he should. And often when depending on selling our hogs through the advertising medium of our stock journals, people are afraid that this thing of pure-bred stock is to be classed with some of the fakes that are so well advertised. If you have an extra nice lot of stuff that breeders want, you have them together and where purchasers can see what they are buying; and rest assured, my friend, a swine breeder knows the plums as soon as he sees them, and, being able to sympathize with you, is willing to pay for what he needs.

I think where conditions are favorable and the offering is what it should be, public sales will net a man more ready cash than private ones, and usually they are more satisfactory to the purchaser. Of course every advantage has its disadvantages, and public sales are no exception. Living, for that matter, has its drawbacks, yet how many of us are there but what want to live as long as we can? You run some risk in getting bad notes if you are not careful, and also know when to say no. You may not have a good day for your sale or your hogs may get sick, or, nearly as bad, if not quite, is your hogs may be all right, but disease breaks out in the country about you, making every one afraid to come to your sale, to say nothing of being afraid to buy. You may not have a good day for your sale, any or all of these may and can happen, and you may not live to see your sale day, or, if you do, may die before your notes are due, for that matter, and then your sale would be a failure so far as you individually are concerned. But, brother, do not let too many little ifs, buts and ands discourage you, but if you have the stock and advertise well, besides doing all other things necessary, you stand a fighting chance, at least, of proving that public sales are a benefit to the breeder—one at least.

WHAT IS THE SCORE CARD?

Questions are frequently asked about the score card—what it is, how are the points divided, and the like.

The score card is a numerical division of the hog from the standard of perfection, or 100 points, and is divided into twenty sections, a special value being placed on each division according to its importance to the general conformation of the hog, its constitutional ability and its commercial value. In addition to the detailed description, it describes a perfect condition of each point, and the detailed description also describes objectionable conditions. The successful use of the score card is the ability to place a proper and correct valuation on each point. The score

card stands in the same relation to swine breeders as a questioner to a class of students. It is continually asking the question, Why?

A hog is before you, and the card is placed in your hands. The card says the value of the head and face is four points out of a possible 100. Why will it not average that much? The detailed description tells you that the head and face and all other points must have a certain form as described to be perfect, and that such descriptions as appear under the objections, are to deduct from the general average of that head, and so it continues throughout every point.

The following score card is uniform with the revised card adopted by the National Association of Expert Judges of Swine, June, 1896:

Scale of Points.	Number Points.	Points Off.	
1. Head and face	4		
2. Eyes	2		
3. Ears	2		
4. Neck	2		
5. Jowl	2		
6. Shoulders	6		
7. Chest	12		
8. Back and loin	14		
9. Sides and ribs	10		
10. Belly and flank	4		
11. Ham and rump	10		
12. Feet and legs	10		
13. Tail	1		
14. Coat	3		
15. Color	3		
16. Size	5		
17. Action and style	3		
18. Condition	2		
19. Disposition	2		
20. Symmetry of Points	3		

Judge . . . . .

Total . . . . . *100.*

Score of Animal . . . . . .

Date . . . . . *Breed* . . . . . .

As to the advantages of regular scoring schools, Mr. J. C. Bridges says:

When we are busy looking after our little herds, admiring this one and that, and think we have something very fine, a neighbor comes on the scene and makes inquiry about your interests. You at once begin to describe this hog and that, and many others. Very natural he may take exceptions and say he don't like some parts and we at once go into a discussion over the subject. Here is where I understand are the advantages of a score school. May I ask a question? What is a score school? It should be where men of different breeds get together and unite on a maximum and minimum cut for the different imperfections.

The question is being asked why should you mark thus so and so. At a scoring meeting you are provided with a card setting forth the hog in a numerical division for a standard of perfection of 100 points. The score card, being marked off, the different parts, according to their vital value, such as, for illustration, the head, marked five points for perfection. You would mark it four or four and one-half points. Again the girth around heart, marked ten points, we will give it eight or eight and one-half, and when you have gone through all the different points and added up, your total may reach seventy or perhaps seventy-five. Some other has scored perhaps eighty, another seventy-eight, and so on through the list. As you are scoring, a committeeman is also going over the hog, as he thinks it should be. After all are through, the cards are given to the committee and the questions are discussed by the meeting. Why such and such points are marked short of perfection, which call for a continued discussion. After you have scored on several breeds and wish to be identified as an expert, a committee of three takes your case under advisement and makes a report, sometimes to the dissatisfaction of the applicant. Now this is one very good feature in the advantages of a scoring school. It prepares a person to tell the reason why you make your decisions. I know of some good hog men who have raised hogs all their lives and have good ideas what a good hog is. But put them in a position as judge at some fair and ask them why this one took the premium over the other, it frequently bothers them to give an answer. We have good hog shows at our county fairs, and the fair managers want justice done in all departments. In having a school of this kind it helps the managers out by knowing who is competent to pass on rings. And again if a person is a good judge it helps them to select their stock to keep as foundations for herds. As a rule the best judges of good stock have the best to select from.

SOME POINTS IN SWINE BREEDING.

BY JNO. M. JAMISON.

CAPACITY OF THE BROOD SOW.

One class of hog growers claims that a sow which only produces one litter of pigs a year gives a much fairer quality of pigs than if she produces two. Yet the push of the times forces upon the breeder the practical belief that he can not afford to keep a sow a whole year for one litter of pigs. While one litter costs too much to start it, more than two are unprofitable, because they tax the sow beyond her limit of endurance. The only possible way to get more than two litters a year is to breed the sow while the pigs are sucking, either when they are three days old, or when five or six weeks old. To have a sow breed when the pigs are this latter age, she must be kept in high flesh. But few men in practice do this, because they do not believe a sow should be fat when she suckles her pigs, or because they have not the skill as feeders to keep her in this high condition. Because a sow comes in heat at this time, whether in moderate condition or fat, is no true indication that she should be bred. Breeders practice breeding to some extent at that time, but they recognize that there is a limit beyond which they can not pass without loss.

The evidence bearing on this point is strong enough to establish a safe rule to follow. Sometimes we meet a farmer who thinks a sow can be profitably bred any time she comes in heat, and if bred at this time to a strong and vigorous male she will bring strong pigs. We have tried to get two litters a year by letting the pigs suck till ten weeks old, and breed the sow shortly before the pigs are weaned, or within a week after. The plan works very well for two or three times, but if continued farther we have failures. The number of pigs in a litter will be smaller and of poorer quality.

Last spring we had two strong sows that did not save as many pigs as they should at farrowing time. On this account it was easy to keep them in high flesh while suckling the pigs. When the pigs were five or six weeks old the sows came in heat. If we waited till the pigs were weaned to breed them, the fall litters would be later than desirable. On this account we concluded to breed them as an experiment with the hope that it would bring profitable results. One sow brought six strong pigs that have done well. The other farrowed thirteen and saved ten. So far as we are able to judge, the pigs are as good and have done as well for us, as if the sows had not been bred till after the pigs were weaned. The

sow farrowing thirteen pigs was fed on pumpkins and corn, and had all the clover she could eat besides. The breeding boar had the run of the same field, and other sows were being bred, and to our surprise this sow came in heat when the pigs were five or six weeks old and was bred. We hardly expected that she would stand; however, in time she proved to be in farrow. Then we were in doubt as to results, as she was slow in developing form, and slow in starting milk secretions. At farrowing time she brought eight pigs and saved seven. As we feared, the quality of the pigs was below the average. Three of them were runts and always will be; they are doing well, but will always keep about the proportionate distance behind the others that they were when farrowed. These results from crowding the sow are in accord with previous experiences of our own, and of others who have given the matter close attention. When the present litter is weaned we will give the sow time to recuperate before breeding her again. All that will be necessary will be the length of time between the first and second time she comes in heat after farrowing, which is usually about three weeks. The first time she will be in heat, in three days after the pigs are taken away from her, she will be well fed from this time till the second time, when she will be bred. Being well fed, she will be gaining, and will doubtless do well next time she farrows. In our experience, this three weeks' rest is very necessary to keep a sow up to her full working capacity. If not allowed she is soon worked beyond her powers of endurance, and no one suffers from the results more than the owner. The weakened vitality shows first in the offspring in decreased numbers and quality. This overwork in the management of many farmers sends first-class brood sows to the fattening pen, condemned as worthless, when they should be just reaching their prime. And these farmers never take a thought, or reach a just conclusion as to why the sows failed. Animals in our care that should be profitable too often have to take the blame of failure, when we alone are the cause.

BEDDING THE SOW.

All pig growers have their preferences and prejudices in this matter. Some use forest leaves and prefer them to anything else, but to have these in supply requires that they be gathered and stored when they fall from the trees in the early fall; otherwise, they are drifted, they get wet and are unfit to use. To store a large quantity requires more room than most farmers can spare for this purpose. With straw it is different. While it is best to have it under roof, still if it is well stacked dry straw can be had at any time to bed the brood sows. While we have used leaves, straw and fodder, and could have a liberal supply of leaves to store each fall, if we had storage room, and could make room if really necessary, we think straw, on account of its many

good qualities for this purpose and the ease with which it may be kept is preferable to either leaves or fodder. In using straw we have found that oftentimes the bed need not be changed more than once a week. This is governed very much by the condition of the weather outside the house, if the sow has outdoor range. We make it a rule to change the bedding when we notice particles of straw, short pieces, sticking to the sow when she leaves the nest. When it is cut up this much it is getting fine enough to cause more or less dust. While in times past we have partly changed the bedding every day, we have concluded that it is too costly an effort toward cleanliness, and besides we do not regard this daily work as necessary. The breeder will take care not to bed the sow with new straw just before farrowing. To prevent being caught, he must know when the sow is due to farrow. She should have a good clean bed of straw two or three days before farrowing, and in sufficient quantity to meet needs at that time, and allow what becomes wet and soiled to be removed, and not require the bed to be replenished for two or three days. There is a question, and diversity of opinion, as to how much straw a sow should have for a bed at that time. A sow, when allowed her liberty in the woods, will gather for her nest as much as a wagon box full of leaves, sticks and whatever she can find conveniently, and out of this incongruous pile, after a few days, bring a strong, vigorous litter. But when brought to modern requirements in the use of shelter, and supplied bedding, maternal instinct seems to have lost its force to a considerable extent, and the owner must exercise a certain amount of judgment in her management if he would have her succeed well with her pigs. Since we have been growing pigs, this is the first year that we have not had, and could not get, good straw to bed our sows. As we did not have room to store leaves in season, we have had to depend entirely on fodder. As this product is unusually abundant, we have been able to keep the sows that now (the middle of March) have pigs six weeks old, well and comfortably bedded. About a week before farrowing we put them in separate lots, and put two or three good-sized bundles of fodder in each house. Before farrowing time they had this fodder well broken and torn to pieces. A visiting farmer inquired how we got the fodder in such good shape for the beds. At farrowing time we found it as desirable as straw; at any rate the results were as satisfactory as we could hope to have with the use of straw as bedding. A number of times, after farrowing, we did not use the whole stalk, but broke—or cut—the bundles in two about the middle, giving the sows the tops for their beds. Now, we use the fodder whole, pushing the bundles into the houses at the small doorways. The houses are six feet square, and it requires some mashing or breaking of the tops, as they are pushed in, top first, to get the long bundles into the houses. Three bundles, with the ties cut, cover the floor of a house very completely, and putting them in tops first places the finer parts of the fodder where the pigs and their dams find it most comfortable to nest.

From what we know of shredded fodder, we are led to believe that it is superior to straw for beds for sows and other swine stock of the farm, that is, taking the whole season through. We have a rail pen covered with fodder adjoining our feed lot at the barn, in which our brood sows are sheltered. They keep the nest comfortable and clean, with the cornstalks they carry in from the feed lot. Usually we have a straw stack in the feed lot that the sows bed and shelter about, but we find the cheap temporary shelter, bedded with cornstalks, more to our notion than the protection they get about the straw stack. Here they keep dry, and their bed does not get dusty—two points that are hard to secure about a straw stack. In cleaning out the soiled bedding made from fodder, from the small houses, we do not find it more unpleasant or difficult than it is to clean out the soiled straw. When we do this work, we use a hoe, working from the outside.

SINGLE HOUSE SYSTEM.

No animal on the farm can be sheltered more cheaply and satisfactorily at the time of parturition than the brood sow. This statement will cover a greater part of the large swine producing area of the United States. Two important features only are to be considered as absolutely necessary—warmth and dryness. These can be had by the use of different materials, cheap or expensive, as suits the fancy and pocketbook of the builder. A single shelter or house for each sow we think much preferable to the structure that will hold several animals. It is advisable for a herd of brood sows to farrow as near the same time as possible. When this is accomplished the houses can be put two or three rods apart, and will answer the purpose as well as if a greater distance, provided there are dividing fences between them. It is hard to get a lot of sows separated so far apart but that they will hear the herdsman when he commences to feed, and all be on the alert. This expectation for a share of the feed is against the large house that will accommodate a number of sows, as the sow will often leave the nest at farrowing time to go to the feed trough, usually to the detriment of her litter.

If separated from her companions far enough for them to be fed without disturbing her it is much better. Again, if separated in this way, it is much easier to keep litters from mixing until such a time as there is no danger of the strong pigs stealing from the weak.

In a herd of sows there is often one that is not as good a milker as the others. In a case of this kind nature does not limit the number of pigs to suit the supply of milk. She is as apt to produce a numerous litter as the best milker in the herd. The result is that these little fellows are always hungry, and spend much of the time pulling at their mother. If the sow is in a house with several others with litters, these hungry, restless fellows will cause much unrest with the others. We have often

noticed that when one litter of pigs begins to trail after their dam for their feed the litters of the herd are almost sure to take up the cry, and in a short time all the sows are down and the pigs sucking. When the sows and their litters are separated until the pigs are at least one month old it is much easier to feed each sow properly and get the pigs to eating. And, more than this, it is conducive to better thrift and health.

For single houses to be used in this way we would want them portable, or of material that could be torn to pieces and removed when not in use. The latter is the least expensive, and within the reach of every farmer able to own two or more brood sows.

PIGS ON GRASS.

There is an impression with many that the pig should run on grass without grain, that he will gain all the faster when he comes to the grain ration.

Careful experiments made to show the value of grass without and with grain show that there is little gain from grass alone. Farmers must get away from the idea that there is profit in the long run from keeping pigs for a time on pasture without grain. If you want the most out of a pig he must pay for his feed all the time and a little besides. We have never seen the grass so fine but the pig would take a little grain with it, and vice versa. If the water and feeding grounds are some distance apart and good pasture intervenes the pig will hardly eat so much grain but that he will graze as he goes back and forth between the grain feed and water. When grain is fed while they are on pasture but little of it is lost to supply the wastes of the animal system or to offset the absorbing waste of cold. And then how much pleasanter to feed on grass than on frost and snow.

In feeding corn to pigs that have the run of good pasture we have no arbitrary rule as to how much they shall be fed, but are governed solely by their appetites. When they come with a rush for the feed then we feed liberally, but if they are slow to come to the feeding ground we cast out the corn with a sparing hand. If we go to the feeding place and see corn left from the time of feeding before we feel that we have blundered and overfed. If pastures are parched and scant we regard it as absolutely necessary that the pigs have a grain product that will come nearest giving them the grass properties, such as bran and middlings dampened.

When new grain is to be fed there is no better plan than to give it with grass, and in limited quantities till the pig is accustomed to his feed. The aim should be to keep the pig comfortably full but not wholly on corn, other grain or grass, but a combination. Then the growth and gain will be more even and rapid, and at a less cost. The rule should be when grass is plenty to feed what grain the pig will come to each time with a relish.

CLOVER HAY FOR SWINE.

All successful swine growers readily concede the advantages in growing clover in connection with other crops grown for their hogs. It is regarded as the best crop to grow preceding a corn crop. Pigs grown with the aid of clover pasture if properly handled always yield a good profit on the care and feed invested in them.

The plea against pigs grown in winter is the lack of growth secured. Without the muscular and bone development they cost too much. The main reason for the excessive cost is that the ration they get is improperly balanced. Usually young hogs carried over winter get a sufficient quantity of feed, but it is not the right kind. It is generally recognized that bran and middlings fed as slop will correct the error in the ration of corn, but too many farmers are slow to purchase these products; they feel that they cost too much, and as they are usually fed there is much truth in this claim. If pig growers can be brought to believe that clover is as necessary for swine in winter as in summer they will consider the possibility of carrying the summer conditions into winter as much as possible. We can not have the green, succulent growth of summer during the winter, but we can have the cured—or dry—product of the plant. Many farmers think they can not make clover hay and that it is poor feed. Such men, if they are hog growers, must learn to make good clover hay, then they will soon know its value. Not only for the horse, cow and sheep, but also for the pig.

The stumbling block in its use for the pig is how to feed it. While all know that the pig revels in green clover, eating right and left as he wades through the strong, rich growth, they are slow to believe that hay will be eaten as readily. Cut up your clover hay and make a chop feed, mixing in bran and shorts just as you would do for your horse or cow, and you will find that it is relished by the pig and that he will thrive on it just as well as other stock.

FEEDING WHEAT.

Wheat is an excellent feed for swine, if ground and mixed with other and lighter feed, the mass being made into slop. Have had no very satisfactory results from feeding whole wheat, especially when fed dry. By soaking, whole wheat can be fed to considerable extent without loss. For young pigs, where growth is the essential point, sloppy feed is superior to dry feed of any kind. For growing pigs never use pure ground wheat. Oats, or heavy bran, or both, should be added. Some succulent, or bulky, food should always be given with this concentrated food, thus aiding digestion and sustaining the appetite.

MATURE BREEDING ANIMALS.

BY THEO. LOUIS, DUNN COUNTY, WIS.

Experience leads me to say it is to the advantage of neighborhoods or districts to adopt the same breed of hogs for the reason that boars can be retained to a greater age and maturity, provided a strict record of their line of breeding is observed, in order to avoid injudicious inbreeding. There is an ever growing tendency to breed from young, immature stock, the breeders being roused by the demand of the markets for lightweights of tender age. We should bear well in mind that while the art of breeding has developed hogs of all leading strains which at the early age of from eight to ten months fill this requirement, this early maturing falls far short as to maturity for breeding. In no line of live stock is this law of maturity for breeding so much disregarded as in the breeding of swine. The frequent complaint that this or the other kind of breed does not respond properly to feed in the line of growth, and seems to be subject to difficulty in gestation, deficiency in number of pigs to the litter—these and many other complaints are seldom charged to where they properly belong, viz., to immature breeding, injudicious selection, and the indifference in the selection of food to develop them. If more mature sires and dams were retained, those that have proven themselves capable of reproduction and improvement, as to uniformity, prolificacy, good mothers and milkers, that have been perfected and developed to full size and vigor by age—only by the use of these can we expect to retain the improvements handed down to us by master breeders. When indifference is replaced by proper selection and retention of the best, improvement is the sure result. Is it not the duty of the farmer and feeder to acquaint himself with the laws of breeding which tend toward steady improvement? The above recommendation in regard to the retention of sires is most necessary to success and improvement, and carries most weight without further comment.

A BAD PRACTICE.

Another practice that has a tendency to depreciate the standard of excellence is to allow hogs liberty to serve sows ad libitum, and to be turned out with the herd or confined with a number of sows in a yard. Is excessive service less harmful to future offspring of swine than of other live stock? One service as a rule will give satisfactory results as to the number of vigorous pigs, while when the other system is followed small litters, dead pigs, deformed pigs are the result, but in swine breeding this is ascribed to bad luck, while the horse breeder would charge

it to excessive use of the sire. Build a paddock or yard four or five rods square, with a shanty-like house seven by eight feet, seven feet high in front, five feet to rear, with a door two and one-half by four feet high to permit of entrance when cleaning it, a half drop or swing door on hinges, attached to the upper part to keep out beating storms and cold, and a tight board fence, high and strong, which will prevent teasing the sows, and will also prevent fretting and irritating the boar. This often has disastrous results, the boar becoming impotent by self-abuse, especially in the case of young sires. There should also be a feeding floor in one corner of the yard, eight by eight or ten feet, so that a large boar can stand in front of the trough—a V-shaped trough of three feet in length, securely fastened to floor and wall. A plank should be securely fastened edgeways with spikes to end slippers, and stakes firmly driven home to guard against his natural propensity of root hog. At the corner a slide gate two and one-half by three feet should be placed, to permit the entrance of sows. At the further end of the floor build the pen. This may seem like extravagance, but when we take into consideration that a yard of this kind will last from fifteen to twenty years by simply reposting it, this will lose its force, and furthermore to have a boar under control and use him at will is worth a great deal. If the yard can be situated so as to give natural drainage it is an advantage, but it is essential that a hand rake, shovel and fork should frequently be used to prevent contamination. But while secure and under control, the boar should never suffer for a food ration calculated in its nature to develop him; he should not suffer for the want of green food and succulent food when the season permits, and in fall and winter squash, pumpkins and roots should not be wanting. Nor should he be deprived of charcoal, ashes and salt—in fact, no hog should.

KEEP THE GOOD BREEDERS

If it is of importance to retain the boar to a greater age and until further development, it is of equal importance in the case of the sow. Too many do not deem it essential that they should have a system of breeding; if not, why not? Why can we not have a note book, a list and a record of the sows that have proven themselves superior in all respects? Why not retain her as long as she proves satisfactory, instead of using a young, untried one that has not been selected with regard to heredity and the virtues of a mother, a breeder, and her milking qualities, but because she is pretty and she is a sow? If sows are selected yearly to replace those weeded out—those that have proved unsatisfactory—they should be selected from only the best and most profitable mothers, so that improvement will keep pace with reproduction. This selection should be deferred until the pigs are from three to four months of age, as we can then better judge their development and disposition, and they

should be fed on the very best growing and developing food available. We have found it a good practice not to breed the sow for a second litter the first season, but to give her a chance to recover from the strain so as to fully develop in size and vigor. Thereafter we breed her twice a year. We have an inflexible rule that no young sow is bred before she is eight months of age. It will also be found of practical advantage when having a list of sows in a note book either with name, mark or number; or for convenience put a ring in the right or left ear, the upper or under side, to note the time they come in heat, say in October; any farmer knows that this will occur each three weeks. In this way he will not waste time in watching when to breed the sows or be disappointed in missing her, but one who never practiced it will find to his astonishment that he is becoming master of the situation.

UNIFORM HERDS.

With the boar in the enclosure, able to regulate the service, and knowing that the gestation period takes place within 110 to 112 days, he will know that by March or April 1, as the case may be, he must be ready to accommodate ten or twelve sows with breeding pens and play midwife day and night. As a compensation for labor and system he has a lot of pigs of nearly the same age and size to feed and care for, a uniform lot to put upon the market, not to mention the advantage of being weaned at one and the same time. This is not a fine-spun theory, but has been the practice of the writer for a long series of years. The sows can then be turned out to pasture and receive a liberal allowance of feed once or twice a day, at stated time, according to their condition, in order to have them fully recover from the strain of nursing and breeding. All that have proved deficient are weeded out for fattening, and young sows are put in their place as heretofore stated. But sows having their first litter should not be condemned for having a litter of but five pigs if they are otherwise satisfactory and are uniform breeders. A twelve or fourteen teated sow, of roomy build, generally responds with sufficient numbers at her second litter, unless heredity on her dam's side is wanting in this quality. But should there be small and uneven litters with the larger number of sows the sire may be at fault.

FEEDING THE BROOD SOW.

[From the Prairie Farmer.]

Did any of our readers ever investigate the growth of a litter of pigs and learn by experience what an organized appetite the little fellows are? A Wisconsin experiment, made some years ago, showed that a litter of seven pigs, weighing eighteen pounds when farrowed, had, at

the end of the third week, increased to ninety-eight pounds, or about five and a half times. To make such an increase the pigs must have consumed a good deal of food, and it all came in the form of milk from the dam. The fact is stated to convey an idea of the importance of feeding the brood sow liberally during the nursing period, for she must not only sustain herself but must provide for this rapid growth of the young. The liberal feeding, however, should be judiciously planned with a view to other conditions of the problem. Having tapered the feed down until it is quite light as farrowing time is reached, the sow needs nothing but cool, though not chilly cold water for the first twenty-four hours. Then the feeding should begin light, and full feed should be gradually reached only at the end of about ten days. An observance of this plan is necessary to prevent those digestive disturbances in both dam and litter which carry off so many young pigs, making them wonder, if they can be supposed to wonder,

> If so soon I am done for,
> What in the world was I begun for?

The large losses that occur in litters on the average, especially among very young pigs, are in a great measure due to injudicious feeding either in quantity or kind, and it is generally overfeeding that does the mischief. The kind of food given, too, is important. The sow has to make an abundance of wholesome milk of a quality that will produce gains of the kind indicated, and these gains are growth rather than fat. The feed given to the dam must, therefore, be growth making food. This means that it should consist of bran, shorts, oat meal and feed stuffs of that class rather than of the heat and fat making kind, like corn. There is, it is generally admitted, too much corn fed to hogs in the corn belt at best, but there is no period at which the feeding of it is a greater mistake than during the suckling period. After the sow has lain quiet and undisturbed for twenty-four hours a thin bran slop should be given, and this may be gradually thickened, at first with bran, and later with bran and shorts, until after ten days good, liberal feeding is reached, consisting chiefly of the more nitrogenous kind. If methods of which what has been said is only an outline are adopted, and if, in addition, care is taken to guard the pigs against exposure and overlying, there will be a good deal larger percentage of pigs raised than is usually the case. The question of exposure is an important one, especially with litters that come during the changeable weather of early spring, and unless the swine grower is prepared to give adequate protection, it will be well not to breed for early litters at all.

HOG CHOLERA CURES.

So many "infallible" hog cholera cures have been put upon the market the past decade that swine breeders have very little faith in any new remedy that is suggested. Dr. C. D. Smead makes some very timely suggestions on this subject, and is of the opinion that the disinfecting of the pens or premises, the separating of the diseased from the healthy, and the practicing of better sanitation have done more toward effecting a cure than the remedies used. He says: In fact I do not believe that swine plague (hog cholera) can be eradicated from any herd, without a change in sanitary conditions in most places where it appears, the practicing of a vigorous quarantine and the free use of germ-destroying elements in the form of disinfectants. I also believe that it may be possible for healthy swine to be so medicated that they can be for a time kept with ailing swine and not contract the disease, and yet the medicine that was used would not be able to cure a hog that had the disease. I am glad that some discoveries have been made on the line of treating the disease, and not altogether by scientific research, but by men who are not professional scientists. Men of common sense have done and are doing as much toward finding a cure as the college professor, and while I do not think that a "sure pop" each and every time cure has as yet been discovered by any one I do think that the fellow who is on the farm among the swine, and has been practicing common sense as regards sanitary conditions and the use of such drugs as his judgment dictates him to use, is in advance of the fellow who is searching for bacteria through a microscope, and cultivating serums that he hopes will be able to render well animals immune from the disease if hypodermically injected into the system.

While thousands of dollars have been expended by commissions and by experiment stations in striving to find a cure, the result has thus far been in one sense a failure, and in another sense a success. Scientific research has found the cause to be a bacterial germ having its origin in filth, and has also found that the disease can be and has been carried from farm to farm upon the boots and clothing of people who thoughtlessly visit sick herds of swine, and then visit their own or some other fellow's herd. The lesson therefore taught is to clean up all filth and make and keep the sanitary conditions right and the food wholesome, and then keep away from diseased animals, and keep diseased animals away from healthy ones; or, if compelled to care for sick ones or help a neighbor to do so, change your boots and outer clothing before attending to other swine. It has also been discovered by scientific research that there are many germicides and disinfectants that can be safely used, viz., carbolic acid solutions, solutions of sulphate of copper, and the sulphate of iron, also slaked lime. It has also been learned that several drugs can be safely given internally to all swine when the disease is prevalent that will to some extent prevent their contracting the disease, provided

ordinary sanitary conditions are present. One of the simplest and safest that can be used by farmers is the hyposulphite of soda (so often recommended in these columns). This has long been known to have the power of destroying ferments in the blood of either man or beast, and as far as my experience goes will do as much toward rendering a pig immune from the disease as any known compound. As to the advertised specifics that are being put upon the market as sure cures they may be good. Many of them undoubtedly are, but don't invest too heavy or place too much faith in them until you are sure. But remember all the time that filthy conditions must be eradicated and good sanitation provided, or my word for it the sure cure won't cure. Farmers as a rule place too much confidence in specifics or cures for ailments of their animals, and take no heed concerning the food, water and sanitary condition of their stables and feed lots. There is work on this line for the farmer himself that no professional man or specific drugs can ever do. Especially is this the case with epidemic or infectious disease. Any building that can not be made clean and kept clean is not fit to keep a well animal in, much less a sick one. And any feed lot that can not be kept free from filth should be changed to another one. Any well, spring or stream that does not furnish water fit for man to drink should be condemned as a watering place for animals (especially milch cows). When farmers learn these things and put them in practice, then and not till then will hog cholera and many other diseases be stamped out.

In saying what I do about water I do not wish to be understood as saying that the water that man relishes the best is the ideal water for the beast. Mankind as a rule like water at a temperature of about fifty degrees, while most animals like it from ten to twenty degrees warmer. But I have reference to its purity. The old well that gets the soakage from the manure pile, or the stream that collects filth, or the spring that gets to be but a cesspool from the droppings of animals who go there to drink, these are the places that need looking after and the conditions made right. In most cases the well can be made right with but little expense by cleaning or even digging a new one. Fence off the stream or spring so as to prevent the bad conditions. You can do very much for yourselves along the line of preventing disease on your farms of all your animals, if you only will. In fact, far more than professional men with drugs ever can do for you; and while you are about it don't forget that the house well needs cleaning occasionally, and the cleaning of the privy vault and opening up the sewer drains and the free use of carbolic acid in water solution. Sulphate of iron and lime applied to the place where slops are emptied about the house, not forgetting the sink, may save you many a case of typhoid fever and diphtheria in the family. All along the line, either in the dwelling or about the barns and stables, disease germs in the filth that is allowed to accumulate, and you suffer in consequence, while we doctors and patent medicine venders are reaping a harvest.

HOW TO CARE FOR BROOD SOWS.

BY D. J. GREEN, NOBLE COUNTY, OHIO

The care of the brood sow has a great deal to do with the success that we may expect to have with the coming litter.

In the first place I should want good sows to care for. I have no time or feed to waste on such sows as I see on many farms.

If there are any in your herd that after a fair trial have not given satisfaction as breeders dispose of them, and if your business demands that others be added be very careful in their selection. But I think it is a common mistake with many of us that we try to keep too many sows, and do not give them the care that we could give to a less number, consequently do not raise as many nor as good pigs as we might from a less number.

In selecting young sows I should want to know something about their ancestors, at least as far back as their grandams and sires, for in hogs there is as much difference in different family strains as in any other kind of animals. I have noticed that young sows partake largely of the characteristics of their dams, especially in regard to disposition and prolificacy. So I should select those that were out of sows of good form, good disposition and prolific breeders.

PROLIFIC SOWS.

By prolific breeders I would not restrict them to those that produced twelve to eighteen pigs at a litter. A sow that produces eight to ten good, strong, even pigs is prolific enough for me. Those that have so many seldom raise more than half of them, and it stands to reason that a sow that has a reasonable number will have larger and stronger pigs, and such are more likely to survive. I think that the sow and not the sire is responsible for the number in litters.

I think that the condition of the sow at the time she is bred has much to do with the number of pigs conceived. She should not be too fat nor too lean, but she should be in a plump, healthy condition, if you would expect her to do her best and maintain the reputation of her particular family strain. To produce this condition she should have plenty of exercise and good, nourishing feed, of which grass or other green feed should form a considerable part.

Now we have our sows selected and ready for breeding. The next thing is, To what kind of a boar shall we breed them? After selecting sows of the breed and type typical of our ideal hog, I should select a boar as near like them as possible, but not near akin. I think that sows bred

to boars of their own type will produce pigs of more uniformity, which will add much to the attractiveness as well as profit of the herd.

After sows are bred they should be separated from other hogs, and I should prefer not more than two or three together, and they should be agreeably mated. Don't put a young, timid sow with an old, cross one if you expect good results, but put the old ones by themselves and the young ones together. Then you may at least hope for peace and harmony.

THE SOWS' QUARTERS.

The brood sows should have good, comfortable quarters. Their sleeping room should be tight and dry, and well protected from draughts. If the door is to be left open there should be a wind-break. This can be made by driving stakes in the ground and nailing boards on them, making a passage way to the door.

The bedding should be watched closely. The straw or other material used for bedding should be strictly dry, and as soon as it becomes mussed and shows signs of being damp it should all be removed and good, fresh bedding supplied. Bedding will require more attention in muddy weather than when the ground is frozen or dry. I lay a good deal of stress on bedding in the winter. I have seen so many hogs with patchy coats in the spring, large portions of the body almost destitute of hair. I never have had such when I was careful about the bedding, and I am inclined to think that damp, filthy bedding causes it.

PLENTY OF EXERCISE.

Brood sows should have plenty of exercise. They never do so well with me when confined in a small lot. I would prefer that they have the range of a large pasture field at least during fair days. They are fond of the grass and will take lots of exercise to get it, and both are good for them. I frequently let a number of them run together on a pasture after the cattle or on rye pasture, and give them separate quarters at night. They soon learn their places and will be on hands at night, and by letting the bosses in first we have but little trouble in separating them.

Brood sows should be fed a considerable variety of feed. I always feed some corn to all my hogs. I believe it is a natural feed for the hog, but brood sows should have in connection with it bran slop, roots and other green feed such as rye and grass as I have mentioned, and in long-continued, severe winter weather, when they can not get the grass they relish, early cut clover hay, I think, is of great benefit to them. They should be fed liberally, but not sufficient to produce too much flesh, and just here I would emphasize the importance of exercise. I believe that every pregnant animal is benefited by a reasonable amount of exercise. I know a man who keeps his mares in fine condition and in the winter

he keeps them confined in the stable, and in bad weather carries their water to them. The result is that he has lost more colts at foaling time than any man I know, and I believe it is from the lack of exercise.

FARROWING TIME.

This period should be looked forward to with consideration. After we have labored to have the sow produce a good, strong litter of pigs we should see that it is not our fault that she does not save all of them. Several days before farrowing time she should have separate sleeping quarters from all other hogs, and this should be the place that you expect her to occupy at farrowing time, and everything should be in readiness. The nest should be tight so that the pigs can not crawl out and away from the sow and perish, as they will frequently do if an opportunity is afforded them. It is a good plan to place a fender around the nest to prevent the sow from catching the pigs between her and the wall. I find that smooth, round poles are about the best material for this purpose. Place them about ten inches from both floor and wall, and be sure to fasten them securely or the sow will be very likely to tear them loose. She should be furnished a good supply of bedding, and for this purpose I know of nothing better than dry forest leaves. All this, as we have said, should be done several days before the sow is due to farrow, so that she will be accustomed to her quarters, and will not fret to get out at the time that she should be quiet.

She should be handled and made familiar with your presence, so that it will not disturb her for you to enter her quarters if need be at the time of farrowing. She should be entirely rid of lice before farrowing, for it is easier to clean one animal than eight or ten, and little pigs will do no good with lice on them. Carbolic acid in grease and lamp oil is the best thing I have found to destroy hog lice. After farrowing the sow should be fed lightly for several days, a little bran slop with plenty of drink at first, gradually increasing her rations until she is on full feed.

Some may say that all of this care is too much trouble, but I have found that good management is more to be depended on for success than good luck.

VALUE OF SUCCULENT FOOD FOR SWINE.

BY C. S. PLUMB, PURDUE UNIVERSITY.

In the consideration of this subject it is desired to draw attention to the different succulent foods available for feeding swine and to note their several influences on animal growth. The writer will not only give the results of his own experiments in feeding succulent foods to swine,

but will quote freely from the published statements of others, trusting that there may be information in the facts presented which will be of service to our feeders and breeders.

Succulent foods for swine may perhaps be placed in three distinct groups, as based on the character of the plants supplying the same: (1) Grasses, cereals and clovers. (2) Fleshy or thick-leaved plants. (3) Roots and vegetable fruits.

Blue grass is the commonest pasture grass in those States most given to swine raising and so perhaps first merits attention. During 1888, '89 and '90, Professor Morrow at the Illinois Station studied the feeding value of blue grass for pigs. ("Bulletin 16," Illinois Experiment Station, May, 1891.) Four trials were made. One lot was fed corn only, one a full feed of corn and grass and the third a part feed of corn and grass. The pigs receiving a half-feed of corn and pasture during the first period of eight weeks (which was then followed with four weeks of full corn feed with pigs still in pasture) gave the best results. Thus 441 pounds of corn produced 100 pounds of gain. When pigs were fed full grain on pasture it required 507 pounds of corn to make 100 pounds of gain in weight of pig. The pigs confined in yards free of vegetation required 629 pounds of corn for 100 pounds of gain. Professor Morrow reports that he did not succeed in getting pigs to make fair gains on pasture alone, and Henry states ("Feeds and Feeding," 1898, page 579) that his experience coincides with Morrow's in this respect. Writers on the summer feeding of swine usually commend blue grass for pasture, but it is not so highly regarded for swine as some other succulent foods.

When at the Utah Station Sanborn experimented with four lots, of three pigs each, from May 25 to October 14. ("Bulletin 22," Utah Experiment Station, May, 1893.) Lot 1 had pasturage; Lot 2 was confined to a yard 6x8 rods, in which the pigs were fed cut grass, while Lots 3 and 4 were confined in pens 8x16 feet, one lot receiving grass and the other not. The four lots had all the grain they would eat, a mixture of ground wheat, ground barley and bran. The grass was a mixture of eight varieties, of which alfalfa was the principal one. The results of this experiment were such as to cause Sanborn to write: "The figures show no pronounced advantage in favor of grass feeding to pigs * * * To make grazing successful it will have to occur with a limited amount of grain." Later Mills carried on similar trials at the Utah Station ("Bulletin 40," December, 1895), in which like results were secured. In experiments where pigs were fed grass only and no grain they lost in weight during the trial.

At the Ontario Agricultural College Professor Shaw conducted an experiment ("Bulletin 59," Ontario Agricultural College) on nine pigs, divided into three lots of three each. They were fed from June 7 to October 8, 1890, as follows: Lot 1, all they would eat of a grain mixture of two parts by weight of ground peas and one part each of ground

barley, ground oats and wheat middlings. Lot 2 was fed three-fourths as much grain as Lot 1 and a quantity of cut green fodder, "consisting of clover, oats and vetch, corn and millet, as these came in season." Lot 3 had one-third as much grain as Lot 1 and twice as much green food as Lot 2. At the close of the experiment Lot 1 was fat, Lot 2 was prime and Lot 3 was not improved in condition. Shaw concludes that a grain ration is best in every way.

Rye is generally recommended for late fall or early spring pasturage for pigs, and the writer has used it for this purpose when no other suitable green food was available. There is no specific data, however, that I know of which shows the feeding value of green rye for pigs. It may be fed to advantage before the stalks appear and later when the head is in the milk or dough, though brood sows in pig should not be permitted on such pasturage, owing to the danger of abortion being caused by ergot in the rye.

Common red clover is the most generally-used pasturage for swine by western farmers, and other green crops are used in a small way compared with this. Notwithstanding this fact, we have almost no figures available showing the value of this pasture. In his work on "Feeds and Feeding" Henry gives only an example of using clover hay with meal as food for pigs. Stewart, in his work on "Feeding Animals," reports on an experiment in which green clover was cut and weighed out to pigs. A litter of six pigs was weaned at five weeks old and divided into two lots of three each and of equal weight. Each lot was placed in a separate pen on June 1. Lot 1 was fed corn meal soaked twelve hours in cold water as much as the pigs would eat, while Lot 2 had a small portion of chopped green clover mixed with the corn meal. Stewart notes that the pigs fed clover and meal were always lively and always ready for their feed, while Lot 1, with meal alone, ate greedily for a time, then became mincing and dainty for a few days, indicating a feverish condition of the stomach. By fasting they appeared to recover appetite and go on eating vigorously again. This was repeated many times during the five months the experiment continued. Each lot consumed the same amount of meal. At the end of this time, the one fed on meal alone averaged 150 pounds each; those fed clover and meal 210 pounds each, or 40 per cent. more for being treated according to their nature as grass-eating animals.

Stewart recommends the soiling process with pigs ("Feeding Animals," 1886, page 469) and claims that an acre of good clover will soil four times as many pigs as it will pasture, giving them a full ration of grass, with this great advantage over pasture—that you may mingle the grain ration with it so as to produce the most rapid growth with perfect health.

At the New York State Station six Chester White pigs were divided into two lots of three each, and one fed oat and pea forage and one fresh second-crop red clover. This trial, however, covered but three weeks, in which time the oat and pea lot gained the most, consuming 7.37 pounds

dry matter for a pound of gain, while the clover lot ate 31.89 pounds per pound of gain.

An interesting comparison of the feeding value of green clover is given by Coburn. ("Swine Husbandry," 1877, page 111.) This is shown best in the following table :

	Gross Product per Acre.	Will Produce in Pork per Acre.	At Four Cents per Pound Will Be Worth.
Wheat	900 lbs. (15 bu.)	225 lbs.	$9 00
Barley	1,680 lbs. (35 bu.)	420 lbs.	16 80
Oats	1,320 lbs. (40 bu.)	320 lbs.	13 20
Corn	2,240 lbs. (40 bu.)	560 lbs.	22 40
Peas	1,500 lbs. (25 bu.)	375 lbs.	15 00
Green clover	12,000 lbs. (6 tons)	800 lbs.	32 00

This table is on the basis that four pounds of the raw material will make one pound of pork, except that of clover, for which fifteen pounds is allowed for a pound of pork. As relates to corn and wheat, in my experience, these figures are perfectly reasonable. The claims for clover, however, are, I think, somewhat excessive. Coburn says:

"If this is true in practice it is evident that an acre of clover is worth for pork making as much as three and one-half acres of average wheat, almost as much as one and one-half acres of good corn, and nearly as much as two and one-half acres of good oats."

Sullivant, in the Ohio Agricultural Report, figured that an acre of timothy and clover, green, weighed 12,000 pounds, that 7½ pounds of grass and clover will be consumed daily by one pig from May to October, or during 153 days, which is equivalent to 1,146½ pounds for one pig, which indicates that the acre of ground will support ten pigs, and that 382½ pounds of pork can be made from the acre of timothy and clover.

Alfalfa is probably one of the best green pasture crops for pigs, and in experiments at Utah, where this plant formed about one-half the basis of the green grass, pigs did very well when fed grain in addition to the pasture. Alfalfa, however, will not grow satisfactorily in the East as a rule, and consequently red clover in the Central West must be regarded as its superior under ordinary conditions.

Rape at the present time is the most favorably known of the fleshy-leaved plants for swine pasture, and while but a comparatively small number of trials have been reported showing the value of rape for this purpose, these have attracted sufficient attention to justify further trial.

At the Indiana Station for three weeks, during the summer of 1898,

we fed rape to pigs. Eighteen Chester White pigs were selected, weighing from 60 to 120 pounds, on July 5. These were divided into two lots of nine each, five sows and four barrows being in each group. Each lot was kept confined in a small lot free of vegetation. Lot 1 was fed such fresh cut rape as it would eat, in addition to a mixture of half corn meal and half shorts, with some skim milk to drink daily. Lot 2 received the same kind of feed, less the rape. During the three weeks Lot 1 gained 164½ pounds in weight, or an average of .86 pounds per day per pig, while Lot 2, which received no rape, gained 223.5 pounds in 21 days, or an average of 1.18 pounds per day per pig. During this trial Lot 1 ate 274½ pounds of corn meal, 274½ pounds of shorts, 280¾ pounds of skim milk and 395 pounds of rape, while Lot 2 ate 366½ pounds each of corn meal and shorts and 276 pounds of skim milk. If now we figure the corn meal at 80 cents per 100, shorts at 60 cents, skim milk at 15 cents and rape at 5 cents per 100 pounds each, we find that each pound of flesh in Lot 1 cost 2.65 cents and in Lot 2 2.47 cents. While these figures show that the cost of production in each case was an economical one, the balance is in favor of the pigs that received no rape.

At the Wisconsin Station two trials of feeding rape to swine have been reported, ("Bulletin 58," Wisconsin Experiment Station, April, 1897), including in all fifty-eight hogs. In both these experiments one lot of pigs was penned and fed soaked corn and also shorts in a slop, consisting of two parts corn and one part shorts by weight. The other lot had the same grain feed with a limited amount of rape in addition. In the first trial the ten hogs on rape ate, in seventy-six days, 1,386 pounds of corn, 690 pounds of shorts and .32 acre of rape, and gained 853 pounds. The other lot, penned, ate 2,096 pounds of corn, 1,042 pounds of shorts and gained 857 pounds. As the gain is essentially the same in each lot, the third of an acre of rape saved 1,062 pounds of grain, or an acre of rape would be worth 3,318 pounds of grain. In another trial of two lots of nineteen each, conducted in the same manner and fed the same rations for forty-nine days, the rape lot ate 2,220.3 pounds of corn, 1,109 pounds of shorts, .6 acre rape and gained 1,066 pounds. The penned lot ate 3,106.5 pounds of corn, 1,553 pounds of shorts and gained 1,076 pounds. The gain is practically the same in this instance also, so that it may be said that the .6 acre of rape saved 886.2 pounds of corn and 444 pounds of shorts, or that one acre of rape is worth 2,217 pounds of grain. The average of the two trials indicates that an acre of rape is worth 2,767 pounds of such grain for fattening hogs.

Prickly comfrey, another plant with rather large, succulent leaves, has been experimented with some as a green food for swine, but not with success. At the New York State Experiment Station two lots of swine were fed ("Bulletin 28," N. S. New York State Experiment Station, 1891), there being three pigs in each lot. The pigs of both lots were fed "all the prickly comfrey they would eat, and a little corn meal. The comfrey

formed over 90 per cent. of the total food consumed in both pens." There was a steady loss in weight while comfrey was fed.

Sanders Spencer, the noted English swine authority, says ("Pigs: Breeds and Management," 1897, page 66):

"Our own experience and that of many other pig keepers is not in favor of the use of prickly comfrey. The pigs are not particularly fond of it, and unless a considerable addition of good food is made they will grow big in the belly and narrow on the back, losing all muscle."

Purslane or pusley, a very succulent common weed, has not been generally used for feed, but it possesses some merits. In 1898, at the Indiana Station, for twenty-one days, purslane was fed two Chester White sows. The pigs were of about the same size and age and the purslane was well developed when fed. From September 21 to October 11 the sows were confined in a small yard or pen. They were fed a mixture of half shorts and half hominy meal, twice a day as a slop, and all the purslane they would eat. During this time the pigs consumed 61½ pounds each of hominy feed and shorts and 390 pounds of purslane. One pig weighed 162 pounds on September 20 and 182½ pounds on October 11, a gain of 20½ pounds, and the other weighed 157 pounds on September 20, and 174 pounds on October 11, a gain of 17 pounds. Rating hominy feed at 65 cents per one hundredweight and shorts at 70 cents per one hundredweight, this gain in weight would cost 2.2 cents per pound. The pigs consumed about 18½ pounds of purslane per day between them. It was not eaten with the relish that was to be expected, yet the pigs did very well while receiving it, making fair daily gains.

Roots and vegetable fruits furnish a class of succulent foods for swine that may be regarded as a most desirable sort for winter feeding when pasture is not available. Some of these may be grown at comparatively small expense.

Artichokes for many years have been known as suitable for pigs, and the live stock and agricultural press have published much relative to the value of this plant for swine. The writer's experience with artichokes has not been so encouraging as reported by others, but perhaps this is due to a somewhat limited experience. Four sows placed in a small field of artichokes that had not been disturbed made a total gain in weight between October 25 and November 8 of twenty-seven pounds. They rooted out the artichokes and were fed in addition fifty-seven and one-half pounds each of corn meal and shorts. Each pig gained much the same in weight. These pigs no doubt would have done better had there been a larger area of artichokes to feed on, so that the experiment might have been longer continued. As it was they practically cleaned the lot of all tubers.

Some very flattering reports have been made on artichokes. Coburn quotes A. C. Williams ("Swine Husbandry," 1877, page 112), a prominent

and successful Poland-China breeder in Iowa of years ago on a large scale, as writing:

"The keep of my hogs in warm weather is blue grass, clover and Brazilian artichokes. Forty head of hogs and their pigs may be kept without other food on an acre of artichokes, from the time frost is out of the ground until the first of June, and from September or October until the ground is again frozen."

At the Oregon Experiment Station six Berkshire pigs weighing from 113 to 215 pounds each were fed artichokes and grain from October 22 to December 11. They gained 244 pounds in weight, or an average daily gain of 0.81 pounds. The pigs ate 756 pounds of grain during this period, which is 3.1 pounds of grain for each pound of gain in live weight. In other experiments it was found that it required five pounds of mixed grain to produce a pound of gain, hence on this basis the artichokes consumed would represent two pounds of grain in producing each pound of gain in live weight. The pigs consumed the artichokes on one-eighth of an acre, rooting them all out. ("Bulletin 54," Oregon Experiment Station, 1898.)

Sweitzer, of the Missouri Station, reports a trial by Porter in which artichokes and wheat meal were fed pigs. It required 325 pounds of wheat meal and 820 pounds of artichokes to produce 100 pounds of increase. ("Bulletin 29," Missouri Experiment Station.) In none of the reports on feeding artichokes are results secured in gain of live weight that have not repeatedly been attained by feeding no larger amount of grain than is indicated in these trials where no artichokes were used.

Potatoes, as has already been stated, have long been used as food for pigs and usually in the boiled form. Pigs will eat raw potatoes, but not with the relish that they will boiled ones. Henry reports ("Feeds and Feeding," 1898, page 595) three experiments in which a comparative test is made of cooked potatoes and grain when both were fed in connection with skim milk or whey. Four pounds of potatoes fed against one pound of grain gave practically the same gain in live weight. The quality of the pork from the potato feeding was good.

At the Oregon Station ten pigs were divided into two lots. Lot 1 was fed one part shorts and two parts chopped oats, while Lot 2 was fed a mixture of shorts and cooked potatoes. The pigs in Lot 1 consumed 6.8 pounds each per day, and made a daily gain of 1.8 pounds, or one pound of gain to 3.8 pounds of food. The cost of producing 100 pounds of live weight in this lot was $2.18. The pigs in Lot 2 consumed 12.4 pounds of potatoes, and 2.8 pounds of shorts each per day, and gained 1.3 pounds per day. The cost of 100 pounds of gain with Lot 2 was $2.86. From this experiment, when the potatoes were reckoned at ten cents per bushel, there was no profit in feeding them. An effort was made to increase the amount of potatoes consumed, but the pigs would not eat the greater quantity.

Sugar beets, through the recent great increase in their cultivation for sugar production, are attracting attention as a food for swine. Last year at the annual meeting of the Illinois Stock Breeders' Association strong testimony was given by practical feeders in favor of feeding them to pigs. The testimony seemed to be that the pigs relished them and improved while receiving them in their rations.

In experiments at the New York State Station ("Report for 1892," page 283), in which sugar beets were compared with sorghum as food for swine, about 5½ pounds of beets and 6½ pounds of sorghum per head were fed daily as a full ration with skim milk and linseed meal, with the result that "all the rations gave profitable results." This trial covered sixteen weeks.

At the Canadian experimental farm at Ottawa, two lots of eight pigs, averaging about 60 pounds in weight per pig, were fed from December 29 to May 18 a mixture of ground peas, barley and rye, with sugar beets and silage respectively. ("Report of the Central Experimental Farm, 1891," pages 83 to 87.) To half of each lot grain was fed steamed; to half, raw. The pea silage was made from peas harvested when the pods were full, but the peas soft and the vines green and succulent. The silage kept well but the pigs refused to eat much of it. The results show no striking differences between gains on pea silage and on sugar beet rations.

Mangel wurzels furnish the farmer with a large amount of succulent winter food in the form of roots. These may be produced very cheaply. In 1898 at the Indiana Station we grew as high as 25¼ tons of mangels per acre at a total cost of only eighty-five cents per ton harvested. No other succulent winter food for swine can be produced so cheaply; consequently, if they can be profitably fed the growing of mangels should be encouraged. Beginning on February 1, 1899, a feeding experiment on pigs fed mangels was begun at the Indiana Station. Twelve Chester White pigs were selected, which were about three months old, at the beginning of the experiment. The pigs were divided into two lots of six each. Each lot was confined in a pen about 15x30 feet, with a comfortable shelter house in one end. Each lot was fed a grain mixture of one part corn meal and two parts shorts, and Lot 1 was fed cut mangels and Lot 2 was not. Lot 1 ate, up to April 19, 442¾ pounds of corn meal, while Lot 2 ate 551¾ pounds, or 109 pounds more than Lot 1. Lot 1 ate 877½ pounds of shorts, while Lot 2 ate 1,091 pounds, or 213½ pounds more. Lot 1 also ate 514 pounds of mangels, which was about as much as they could be induced to consume.

The following table shows the more important facts relative to this experiment, which is a comparison of the cost of food to cost of grain:

	Lot 1.	Lot 2.
Total pounds gain made	355.5	442.5
Average daily gain made in pounds	4.6	5.7
Pounds of meal and shorts to make pound gain	3.71	3.71
Cost of food fed	$10 19	$12 65
Cost of food for each pound of gain	028	027
Cost of food for each 100 pounds of gain	2 80	2 70

The interesting facts are brought out by these figures that it required exactly the same amount of corn meal and shorts to make a pound of gain with each lot, and the total cost of food for each pound of gain for Lot 1 was slightly in excess of the cost for Lot 2, the roots making this extra expense, which amounted to ten cents for each 100 pounds of gain live weight.

A study of the amount of digestible food consumed by these pigs shows that Lot 1 was fed 3.36 pounds dry matter for each pound of gain, and Lot 2 was fed 3.23 pounds of dry matter for each pound of gain.

In his work on "Feeds and Feeding" Henry quotes at considerable length certain Danish feeding experiments on pigs. In reference to the use of roots I wish to quote from some of the statements made. In comparing mangels and grain, all the lots received skim milk or whey in addition to grain and roots, excepting Lots E and F, to which an equivalent of additional roots was given. It is here shown that ten pounds of mangels more than equal, and eight pounds about equal, one pound of grain in trials. The quality of the pork produced by the different lots was very satisfactory. Even where one-fourth the daily feed was given in the form of mangels no ill effect was noted.

In 1890 a preliminary feeding experiment was made, using beets with different sugar contents, to ascertain their comparative feeding values. Mangels containing 12.71 per cent. dry matter and 8.93 per cent. sugar were fed against fodder beets containing 19.86 per cent. of dry matter and 13.8 per cent. of sugar, or against barley. The experiment included twenty-five pigs, averaging 79 pounds each and lasted seventy days. The indications were for pigs one pound of barley had a feeding value equal to 6 to 8 pounds of mangels or 4 to 8 pounds of fodder beets. In 1891-92 204 pigs were fed four kinds of roots, in addition to daily refuse and grain. There were fed—

	Dry matter.	Sugar.
(1) Eckendorf mangels containing	11.0 per cent.	6.0 per cent.
(2) Elvetham mangels containing	13.0 per cent.	8.9 per cent.
(3) Fodder sugar beets containing	16.5 per cent.	10.9 per cent.
(4) Sugar beets containing	21.2 per cent.	14.0 per cent.

Lots fed barley only made the largest gain, closely followed by those half of the grain of which was replaced by roots in the following ration:

For one pound barley substituted 7.5 pounds Eckendorf mangels, 6.5 pounds Elvetham mangels, 5 pounds fodder beets and 4 pounds sugar beets. These quantities of different kinds of roots proved nearly equivalent in feeding value. The conclusion was arrived at that about 40 per cent. of the daily ration of the pig may be advantageously made up of roots. Slaughter showed pork from pigs fed roots fully equal to those fed grain only. Long states ("Book of the Pig," 1886, page 254) that he remembers one case where a large quantity of mangels returned $6.24 a ton when fed to pigs. At the New York State Station they made a return of $3 per ton. ("Bulletin 28," New York State Station.)

Carrots are not a profitable crop to grow for feeding live stock, owing to the expenses of cultivating and harvesting. Long states that they have long been used for pigs, although they are too rich for feeding animals. ("Book of the Pig," 1886, page 254.) Numerous experiments, according to this author, have been made in feeding them, and it has been shown in some instances that they have returned as much as $7.20 a ton by being converted into pork.

In the Danish feeding experiments above referred to in 1892-94, on nine different estates, 893 pigs were divided into 175 lots. In comparative trials carrots and mangels containing equal quantities of dry matter had similar value in pig feeding. It was shown that the amount of dry matter in roots is of importance, rather than the total weight or quantity of sugar contained.

Later nine experiments with 277 animals in 54 lots were conducted for the study of relative values of barley, mangels and carrots. Two kinds of mangels and four kinds of carrots were used. Dairy refuse was fed all the lots. Roots were fed in such quantities that 0.84 pounds of dry matter in roots corresponded to one pound of grain. The experiments lasted 80 to 130 days, the average being 102 days. The pigs averaged 66 pounds at the beginning of the experiment and 169.6 at the end. The average daily gain made by the lots on different rations was as follows:

Barley	0.986 lb.
Eckendorf mangel wurzels	0.828 lb.
Elvetham mangel wurzels	0.833 lb.
Vogeser and Champion carrots	0.875 lb.
James and Giant	0.900 lb.

The gains made on roots in these experiments are not up to the previous ones. Carrots are shown to be of similar feeding value for pigs as mangels when equal amounts of dry matter are fed.

Kohl rabi is practically unknown as a pig food in America, I believe, but in England Sanders Spencer uses it to a considerable extent. The following quotation is of more than common interest, not only in relation to the food used, but method of handling the pigs. ("Pigs: Breeds and Management," 1897, page 64):

"It is scarcely necessary to remind our readers that a somewhat different system of feeding the sows is advisable in the winter to that which is suitable in the summer, when there is plenty of grass. * * * At the time of writing (December) we have some sixty aged sows, the majority of which are carrying their pigs. * * * These are being kept in three lots, one of which comprises thirty-six of the strongest and most lusty of the sows; these have the run of some fifteen acres of grass, and besides what they can find on the grass field they have nothing but kohl rabi and an occasional feed of small or diseased potatoes. As those of the sows which are forward in pig require more nutritious food they will be drafted out and supplied with it. Another lot of nine sows, which have each reared one good, large litter of pigs and are again forward in pig, have the run of a grass field of some five acres in extent, in which is an open shed which is used by the sows for shelter. Their food consists of kohl rabi and some mixed meal, of barley, wheat, maize and peas, fed to them as slop, night and morning. Other sows that are older are fed kohl rabi run through a root cutter.

"This system of feeding sows will continue until about March, when the rabi will have lost much of their goodness and the supply of them will be exhausted. Mangels will gradually take the place of the rabi, but in smaller quantities." * * * "We grow but very few swedes or white turnips, or these would take the place of kohl rabi. At one time we grew a considerable quantity of cabbages for the pigs, but we found that these caused constipation and were not at all suited for the little pigs or for young boars which were kept confined in sties. Even kohl rabi require to be sparingly used for the younger pigs or they will sometimes cause constipation."

Turnips are only fed in a small way in America, and then, I believe, usually boiled. Long states ("Book of the Pig," 1886, page 254) that they furnish an admirable diet when judiciously given, and that he has known many thoroughly practical feeders to use them largely in the winter with good effect. At the same time he says that numerous instances could be quoted in which they have caused disease, weak litters and even abortion. Like all roots, he says turnips should be cut up as small as possible for pig feeding and mixed with the meal at least twenty-four hours before being fed.

In Danish feeding experiments, when feeding barley and whey to pigs, turnips were substituted in part for whey. In two experiments with thirty animals barley and whey gave an increase of 1.08 pounds per head daily, while turnips gave 0.96 pound. The experiment lasted 130 and 110 days each. ("Experiment Station Record," Vol. VII, 1895-96, page 243.)

Pumpkins have for years been fed by our farmers to some extent to pigs, and while they have as a rule met with favor we know little of their feeding value on the basis of reports. The Oregon Station fed pumpkins to six Berkshire pigs, which were about eight months old when

the experiment began. The pumpkins were cooked in a vat and mixed with shorts. They were fed from October 30 to December 25. Reckoning pumpkins at $2.50 per ton and shorts at $12, the amount of the former fed was worth $9.40 and the latter $5.54, a total of $14.94. The total gain in live weight was 499 pounds, making the cost of the food for 100 pounds of gain in live weight $2. The pigs consumed large amounts of pumpkins, averaging for the two last feeding periods 26 pounds each per day. At first only small amounts of shorts were necessary, but later this amount had to be increased. The average daily gain for the entire period was one and one-half pounds per pig. The quality of the meat was very fine. ("Bulletin 54," Oregon Experiment Station, 1898.)

The real value of succulent food for swine can not be measured by simple gains in weight of pigs given such food. Undoubtedly where animals are confined to a pure grain diet the digestive tract is more torpid and sickness is more likely to occur than when succulent food is given. Then the digestive organs are more active and natural in movement and the body is better prepared to resist disease than when pure grain food is fed. The influence of this succulent food on sows in pig or sucking pigs can not be measured by the scales, but the general testimony of practical feeders of experience is that such diet promotes easy parturition, a generous milk flow and vigorous offspring. Pigs that are to be fattened in a short period of feeding do not perhaps need roots in their diet, though I believe it would be to their advantage, but breeding stock, both male and female, and suckling sows will certainly be materially benefited by summer pasturage and roots in winter. Swine should always be fed with discretion the first few days of turning on pasture to prevent bloat, but where roots are fed no special danger is likely to occur.

Of the summer pasture plants red clover and rape are undoubtedly the most desirable, while the sugar beet and mangel wurzel, all things considered, offer the cheapest food in the form of roots. Possibly swedes or kohl rabi are equally desirable, though they are probably more of an unknown quality with American feeders than the other two. Those roots with the greatest amount of sugar in them, however, will be eaten with more relish, and probably give the best returns, as is shown in the Danish experiments where the sugar contents of beets is reported on.

POOR STOCK.

No other branch of farming has been so remunerative for a few years past as the production of pork. This has been a stimulus to the farmer for adopting a better class of swine, as well as better methods of management and development. Still too many farmers are simply wasting time and feed on grades of swine that do not betoken for them the first speck of pride or ambition for keeping pace with the advancement of the times.

BEST SUMMER PASTURE FOR HOGS.

BY H. Z. CHURCHILL, ELIZABETHTOWN, KY.

To ascertain and discuss the best summer pasture for hogs is a subject upon which very few persons in any locality agree; and in writing anything about this subject one must take up and discuss it entirely from his own point of view and experience. Of course, different conditions and localities make different results. What might be the "very thing" here in Kentucky might not be at all advisable or practicable for Indiana, Illinois, or the trans-Mississippi States, as much depends upon latitude, climate and the adaptability of the soil that one may be so fortunate to own or cultivate for a summer pasture.

By the meaning of the summer pasture, I certainly would not confine it just to the three summer months June, July and August, but would add part of the spring and fall months, thereby covering a period so as to include the time of farrowing in the spring until the time the hog is old enough to be placed in the fattening pen in the fall to be prepared for the market, making our pastures not only for the fine pedigreed and show hogs, which are only sold for breeding purposes, but for the hog that is raised by every successful farmer for the market. The first thing to be considered in the arrangement of a good pasture is the water supply, for without good and wholesome water no pasture or feeding of any kind will be a success; no animal of any kind, however plentiful and good its feed may be, will thrive without water; it may be and is true that grasses contain a larger quantity of water than any other kind of feed, yet it does not take the place of water, nor should the raiser of hogs allow himself to think it does.

To start your hogs off in a thriving condition in the spring, when it is possible so to do, arrange a small lot and sow it in rye. Then by the last of March or the first of April, on all pleasant days, turn your hogs into the lot of green rye. The way both young and old relish it is wonderful indeed; nothing puts their system in so good a condition to stand the long summer months as this rye. Myself and partner were so fortunate this spring and part of the winter months to have the wheat so high that it was an advantage to both wheat and hogs to be turned on a fifty-acre field. To come right to the beginning of the summer pasture, nothing in my experience can compare to the clover field. It is certainly the "king of all pastures," and without it we would certainly be in a dilemma as to what to do and where to go at that season of the year for a substitute. Clover stands higher in analysis than almost any other grass for pasturage; besides it is very useful for the farmer, more so than

most crops, as a fertilizer, for nothing enriches the land more than this self-same clover when plowed under in the fall, after having been pastured all of the summer season to the fullest extent. If any hog raiser has never tried the virtues of a good clover pasture in summer, let him hasten to do so at once. Towards the last of the summer months all clover fields become somewhat rank and dry; from then on they are not ample for the thorough maintenance and growth of hogs. So other kinds of pasture should be provided. Look around and search your books on feeding and see if you can find anything that compares with cow peas; a patch of them would be the very thing required to finish out your summer pasture. The peas themselves stand ninth, and the hay twelfth in feeding value of all mill products, grain, green fodder and hay, which is very high, considering fifty American feeding materials are treated. Hogs love this pasture, and with the eating of the peas and the green pea vines they come to the fall months sleek and almost fat enough for the market.

In making a pasture of cow peas do not try and get all of one kind or variety. Get for the first a variety that will make a large quantity of vines and follow up with the variety that produces a great quantity of peas, so when cold weather comes the hogs will be prepared to take readily to grain that will then be given them.

The cow pea, like clover, improves the land instead of taking from it; in other words, it both fattens the hogs and fattens the land. So it follows, in summing up, that in the judgment of the writer, for the best results to the hog and the constant improvement of the land, the best summer pasture for hogs would be to start them off early on a rye or wheat field; as soon as clover is well enough advanced turn the hogs on and keep them there until the latter part of the summer, and then finish them for the summer on a good pasture of cow peas. By this method you will find yourself with a herd of fat, healthy porkers, and raised at a small expense. Not losing sight of the water supply, which should be plentiful and healthy, always remember that pastures for your pigs should contain grasses that are tender and juicy, if you wish them to thrive. Pigs do not have all of their temporary set of teeth until they are three months old, and, of course, can not bite or masticate anything old or tough; and when they do cut their temporary set they only contain about one-half as many teeth as they have when they have a full permanent set. One of the greatest causes of the death of so many pigs is because they are placed on food they can not masticate, and thereby die of many disorders.

In discussing the subject of pastures, I have lost sight of such pastures as rape, alfalfa and blue grass, for the simple reason that the writer knows nothing of the first two, as they are not grown in his section, and the latter grows on land that is too expensive in this State to allow hogs to run on, and probably root up, so as to destroy these beautiful pastures

that are the mainstay for the fine horses and cattle. However, when it is possible, the blue grass pasture is one of the very best to go side and side with the clover and the two mixed help wonderfully to make the ideal summer pasture.

It is sometimes, and I may say generally, that the pasturing of hogs is supplemented with feeding of grain. In fact, it makes a quick growth and fattening for the market and is commonly carried on by most feeders who ship young and quickly fattened stock. But I must urge that it is best not to make the feeding of any kind of animal too expensive, especially the hog. While we can buy a great variety of mill feeds that are very fattening, the question is, does it pay to buy these to put on this additional weight? I should think not; better not to feed at all than to make it cost more than can be realized. Just feed what you raise on your farm, which consists of corn and oats principally, and if you have any overabundance of either you might sell some of it and invest that money in shipstuff or shorts. I have found for a summer feed, with pasture, that a small feed twice a day consisting of two parts ground corn, one part shorts and one part ground oats makes an ideal hog food. This mixed with water the consistency of a thick slop and given about six quarts twice a day to each grown hog, with about half the quantity to shoats, is all they require in summer while running on pasture.

PASTURING PIGS ON STUBBLE.

No matter how carefully grain is harvested, some always escapes the reaper, and unless stock is turned on the stubble it is lost. While the amount may hardly be sufficient to make it profitable to follow the machine with a rake, the scattered grain may be profitably utilized by turning pigs or other stock into the fields, and as a matter of fact, the custom of pasturing hogs on such fields is quite common. Some recent experiments along this line are reported by a Farmers' Bulletin, Agricultural Department, to show the value of this kind of feeding with other methods.

Forty-one pigs from six to nine months old were allowed the run of barley, wheat, and pea stubble fields of 18, 10.44, and 10.73 acres, respectively. For some time before the test they had been pastured on alfalfa and fed one pound of cracked barley per head daily. For ten weeks immediately preceding the test, they made a daily average gain of .42 pound per head. While pastured on the stubble fields they were given no grain in addition to what they could find except on stormy days. The grain thus fed amounted to 24.1 pounds in the five weeks of the test. During this time the pigs made a gain of 22.8 pounds per head, or 17.5 pounds, deducting the amount which it was calculated they gained from the grain fed during stormy weather. On the supposition that 4.5 pounds of grain

are required to produce a pound of pork, the forty-one pigs gathered 3,228.75 pounds of grain, which otherwise would have been lost. The harvesting had been done in the usual manner, and, in the investigator's opinion, the amount of peas and grain remaining in the field did not exceed that left in the stubble fields on the average farm. The scattered grain could not have been saved in any other way, and represents a clear profit. The grain saved from the stubble fields by these pigs was not all that could have been gathered if they had remained in the fields a longer time. Seven brood sows were afterward pastured during the winter on the Station stubble fields, which included a twenty-four-acre oat field in addition to those mentioned above. They were given no food in addition to what they could gather, except kitchen slops and a small grain ration on stormy days. The sows frequently rooted down through six inches of snow and found sufficient grain to keep them in good condition throughout the entire winter. It is stated in a recent communication from the Montana Station that several brood sows have been pastured during the past season on stubble fields without receiving any grain in addition, and that they are in fair condition. They had, in addition to the grain stubble fields, the range of clover, alfalfa, and timothy meadows, and the gleanings of fields where root crops had been raised. The manure from grain-fed stock, which was spread upon the fields, also furnished some gain.

CLOVER FOR HOGS.

To produce the cheapest as well as the best pork, clover must be the mainstay of the swine breeder. How to get the most out of the clover crop is a question good farmers are somewhat divided in opinion upon. Some advocate that hogs should not be turned on clover until it begins to bloom. Mr. S. Farill, of Wisconsin, and a very successful breeder, says: Instead of waiting until it begins to bloom I should let them in as soon as the clover is fairly started—say from four to six inches high—and I would put in hogs enough so that they would keep it down so that but little, if any, of it would get up enough to bloom. And then if we have fairly seasonable showers we shall have a fresh pasture nearly all summer. But if they are not turned in until the clover begins to bloom it will be nearly full-grown and the hogs will only eat the top off, and the whole field will soon become old and woody and they will eat but little of it. It is true it will, to some extent, spring up fresh, but only in a small way compared with what it will if it is kept cropped off so that it does not head out. A little thought will discover the reason for this. The whole effort of the plant is for reproduction, and as that is done through the seed the plant will continue its effort to make seed until the strength of the root is exhausted, so that reason and experience teach that the usefulness of the clover plant for summer pasture can be greatly

prolonged by keeping it from heading and blossoming. This is equally true whether hogs or neat stock are to be pastured on it. There is no question about the economy of growing hogs on clover pasture, provided one has the right kind of hogs. But just here comes the trouble. Hogs to do the best on clover pasture must be at least five or six months old, and if we would have them on hand for the early spring clover it means wintering them, and that I have of late years entirely abandoned—only wintering my breeding stock. I breed two litters a year and see to it that the pigs from start to finish have the best of care and feed till they go into the market at from six to eight months old. It is the statement of Mr. A. J. Lovejoy that 400 pounds of growth can be made from an acre of clover. I accept his statement, and will go him 200 pounds better. I have made 600 pounds' growth from an acre, by actual weight, not guess-work. This was the way of it: I have all my life been a hog raiser, and always tried to have a pasture for them in the summer, in connection with their other feed, and I always considered the pasture a valuable adjunct in successful hog raising, but I never was so situated but once that I could tell, without too much trouble, how much of the profit should be credited to the pasture. A few years since I found myself with an eight-acre field of clover that had come through the winter very nicely, and I decided to see how much pork I could make from that field of clover. I bought fifty shoats that were from six to eight months old. They had been fairly well wintered, but were not fat; their average weight was 100 pounds. They were put into the clover fields when the clover had gotten about four inches high, and were kept in that field until the 15th of September, when they were sold, and their average weight was 225 pounds. But that is not the whole story. These hogs were fed, in addition to the clover pasture, one pound (by weight, not guess) of shelled corn for each hog per day. That was all the feed they had. They had free access to good, clean water. Their drinking trough was kept full by an automatic arrangement connected with the water tank. It was covered so they could not get into it to foul it. They had free access to salt and wood ashes mixed in about equal parts, kept under the shed so as not to be wasted by the rain, and I was surprised at the quantity they ate of it. The corn was fed regularly once a day, at a little before sunset. The first month the corn was soaked in water twelve hours; after that it was fed dry, another small item of importance. The corn was not fed in troughs or even in piles, but was scattered broadcast so they were obliged to eat it slowly. This may seem like a trifle, but success or failure is often determined by these little things. It was so with the regular feeding of corn; hogs (like the rest of us) are creatures of habit, and they soon did not look for any feed, except in the pasture, only at evening. This is not quite all about that clover field. In the early part of June I found that the hogs were not keeping all of the field cropped down, but were leaving bunches that were commencing to blossom. I turned eight

head of cattle and two colts into the field and kept them there four days. After that the hogs kept it down. In the final summing up of this matter I gave the clover credit for 600 pounds of the gain to the acre, and charged the balance of the gain, 1,450 pounds, to the corn. That would fully pay for all the corn they ate at 50 cents per bushel. Whether this division of the gain is a fair one others can judge as well as I. One thing is certain, the result of the experiment was quite satisfactory. But the conditions were all favorable. The hogs were about the right age and condition, and we had rain often enough to keep the clover growing. These favorable conditions can not always be secured (the mechanical part can), so one can not always be sure of such satisfactory results. But it will always be found profitable to have clover for growing hogs. It is cheaper feed than corn.

STREAKS OF LEAN.

BY I. N. COWDRY, GRATIOT COUNTY, MICH.

There is too much fat pork used in the family. Good pork is healthy, and makes the best of meat, but it is usually too fat. Now, there is a way to fatten for lean pork, as well as for fat pork. I remember years ago we thought that a hog should be made so fat that it couldn't get up. This was invariably the rule we went by if we had corn enough to put them in that condition. The hogs were put in a pen, with a floor, early in the fall, and fed corn and water until after Christmas, when they usually contained enough "blubber" to satisfy. Then butchering day came, and sometimes as many as seven large hogs were killed and packed down for the year's use. Then this ended the work of butchering for another twelve months. Of course, headcheese and liverwurst had to be made, which has become a lost art with us now, except the sausage part of it. Practically, nearly everything about the hog was used up then, where much now goes to waste. I remember that my part at butchering time was the tail. It was cut off and given to me. I would slice it around with a butcherknife, put salt and pepper on and roast it on the live coals. This I thought the most dainty part of the hog. Perhaps because it was not so fat as the rest.

The country was new in those days, and a great deal of hard work had to be done clearing up the farms; and I can well remember how hungry I would get before noon and long for the big chunk of fat meat with beans or cabbage that we were almost sure to get for dinner. In those days in the cold winter time, when we did the chopping, the fat meat was most welcome.

But those days of hard winter work are done with most farmers in the United States, and it naturally calls for a different kind of meat. More lean is desired. Smaller hogs are in demand. Instead of the hog weighing 500, a 100 or a 200 pig is asked for, and instead of having one butchering day in the year three or four such days are now required to satisfy the changed conditions. Now, how shall we do to get this streak of lean and streak of fat pig pork—the sweetest and best of all meats? Why, feed for it, of course. Commence as soon as your pigs are farrowed. Feed bran and middlings to the mother to develop bone and muscle. Make long, rangy pigs of them instead of chuffy ones. Be sure to have plenty of good pasture for them all summer if you have to sow it for them. Rye, oats, clover and rape make good pasture for them. When the pigs are three months old they can have considerable corn if they have plenty of pasture. If the corn is hard it is best to soak it about a day before feeding.

Now, if you want some choice meat for your own use, select out as many as you want and feed them separately from those that you intend for market. Select long, rangy fellows, with big bone and deep up and down, and narrow on the back. This is the bacon type and makes the best meat. Don't select a blocky or chuffy one, for there will be too much fat. Let the most of their feed be pasture, milk, bran, and other cheap slops, with a little corn, not much. Increase on the corn as the pigs grow, and the last six weeks before killing they should have all the corn they can eat up clean two or three times a day. Don't shut them up on a floor, but let them have the run of a good pasture lot until ready to kill.

For the best of pork the pig should be a rustler, wide awake and not lazy, always active and a good runner. This is the kind of pig that will sandwich a streak of lean through the fat, and smells good while cooking and tastes good for dinner. This is some trouble, but the best things always make some trouble to get them.

CONVENIENCES FOR HANDLING HOGS.

BY W. A. HART, PORTLAND, IND.

A visit among those engaged in caring for hogs will convince any person that the same thought and talent have never been expended upon devising means for the convenient care of hogs that have been expended in almost any other line of farm work.

The most of us seem to imagine when we start with our pail of slop that it is necessary to the comfort of the hog that we permit ourselves

to be run over and trampled down just as the feeders did ages ago. This article is prompted by reason of the old-time careless, inconvenient method being generally in vogue.

First among the necessities for conveniently and successfully handling hogs is a convenient feeding house. Much improvement may be made in this respect. Many have expended hundreds and even thousands of dollars for feeding houses and yet find them so cumbersome and inconvenient that they seldom, if ever, use them for the purpose for which they were built. A feeding house that does not lessen the work of feeding, that does not give better return for the feed used, and that can

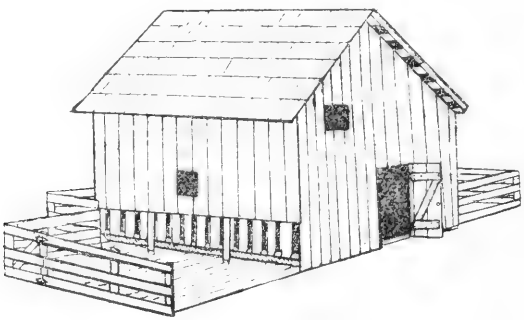


Fig. 1. Feeding House.

not be built with but trifling expense, can never come into general use among farmers. An effort will be made in this article, aided by the accompanying illustrations, to describe a feeding house that accomplishes these results, so that any carpenter or intelligent farmer can build such a house. As an illustration, I will use a feeding house fourteen feet square and eleven feet high to the eaves, with ordinary comb roof of the desired pitch. Such a house is shown in Fig. 1. It may be a surprise to the reader to learn that such a house will furnish crib-room overhead for 450 bushels of corn, bin-room on the ground floor for nearly two tons of ground feed, convenient troughs and feeding rooms for more than fifty hogs, three good stock fountains to furnish pure water to three different lots, and all at a cost of less than $100. The hogs do not go inside of the building at all, but eat slop from a V-shaped trough, the outer edge of which comes out even with the outer edge of the building. This trough arrangement extends around three sides of the building, giving a length of about forty feet of trough. Outside of the building at each side at which there is a trough, and fitting up against the building, is a tight plank floor, eight feet wide and extending the full length of the trough. This platform is enclosed with an ordinary board fence, with the bottom plank of the fence resting down tight upon the floor, to prevent the hogs from rooting ear corn off the platform. A small gate or door is made in

this fence that the hogs may be shut in or out of this pen. The house on the three sides at which the troughs are placed is weatherboarded up and down, but the siding only extends down eight feet from the eaves, thus leaving a space of three feet between the bottom end of the siding and the ground, through which the hogs eat out of the trough.

The trough shown in Fig. 2 is the old-fashioned V-shaped trough made of two solid oak planks, each one and a half inches thick, the one eight and the other ten inches wide. Pieces of plank are nailed on the end of the trough in the old-fashioned way, but are cut exactly as long as the trough is wide at the top. Two pieces of inch plank eleven and a half inches wide must then be cut long enough so that when the lower end

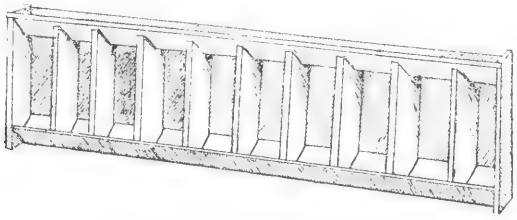


Fig. 2. A Convenient Trough.

is made fast to the end of the trough the upper end extends an inch or so above the lower end of the siding of the building to which it fastens.

This trough is then partitioned off into spaces of from eight to fourteen inches, to suit the size of the hogs to be fed. This partitioning is done with inch plank eleven and a half inches wide, standing with the lower end fitting down into the trough and cut long enough so that the upper ends extend up to within about two inches of the lower end of the weatherboarding. These partition boards must lack about four inches of being cut to a point at the lower end, leaving space at the bottom of the trough for slop to run from one end of trough to the other. Use plank tongued and grooved the length of the trough for back wall. Let the first plank so used fit down tightly on the inner edge of the trough. Board up to about four inches above the upper end of the partition board of the trough. Cut a board nearly a foot wide just the length between the two boards standing upright that are nailed to the ends of the trough. Fasten one edge of this board to the inside of the weatherboarding above the trough so that the other edge will rest on the upper ends of the partition boards set in trough. This board and back wall nailed fast to the partition through the trough into the lower ends of the partition boards serves to hold them in place, and the back wall and this board form a hopper into which to pour the slop. This board throws the slop back against the back wall as it descends to the trough and prevents the slop from falling on the heads of the hogs. It is for this reason that the back wall must be watertight.

Fig 3 shows the inside arrangement on the ground floor. The three troughs will be noticed in place around the three sides. The bin for ground feed is seven feet square and built in the center, and extends from the ground floor to the floor overhead, and is built very strong to help support the floor overhead. This leaves a space three and one-half feet wide in the front end of the building and two and one-half feet wide next to the troughs, to pass around and pour in slop. A three-quarter inch pipe running into the house from a small tank outside and following around and fastened to the back wall of the trough, furnishes the water to automatic stock fountains, one placed in one of the end spaces in each of the troughs. The partition at the space in which stock fountain is

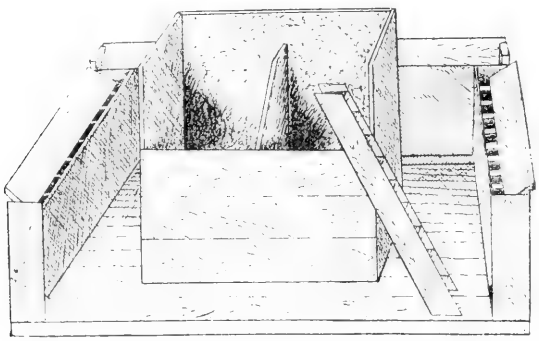


Fig. 3. Inside Arrangement of Feeding House.

placed must extend to the bottom of the trough to prevent slop from running into this space under the fountain. The steps from the ground floor above slant toward the center of the building, so that the landing is near the comb of the roof. Board up around the landing, about three feet high, to prevent corn from falling down stairs. You will notice from cut No. 1 a small door immediately over the trough from which to throw ear corn on to the platform. If shelled corn is fed it can best be fed in the trough. With this arrangement the feeding can all be done from the inside of the house, and it is impossible for the hogs to dirty or waste the feed. Besides, the partitions in the troughs prevent the hogs from fighting and pushing one another. It is much less work to clean out the feeding pans when they are outside than when they are inside of the building. A separate lot is used for the hogs at each side of the building, at which a trough is placed. These lots are made about twenty-five rods long and each contains about one and one-fourth acres.

A sleeping house, which is described below, is placed in each of these lots at a point about twenty-five rods from the feeding house, so that the hogs may be compelled in bad weather to take exercise of going to and from feed.

Another convenience that is indispensable for handling hogs with profit is a good sleeping house. The sleeping house as illustrated by cut No. 4 possesses many advantages over almost any other plan used. The side walls should be made about eighteen inches high, and the roof, a comb roof, at half pitch. A small door, to be kept closed except one may need to open it to aid sow at farrowing, should be made in back end, and an opening in the front end only large enough for the hog to go in and out. No door is required in the front end, which should face to the south. The strip of timber across at the bottom of this opening should be two inches thick and six inches wide. Sufficient dirt should be thrown inside of the house that water will not run into it, and a plank floor laid flat on the ground to prevent draft from beneath floor. A small box should be securely fastened in one of the corners at the front end of this house in which to place salt, lime, ashes, etc., for the hogs. The bed at farrowing time

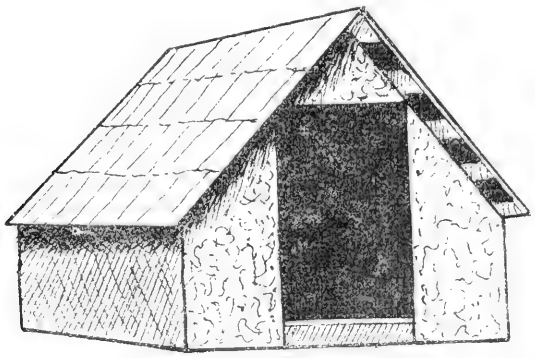


Fig. 4. A Very Satisfactory, Inexpensive Sleeping House.

should be of some material that will not bunch badly and will keep the pigs as dry and warm as possible. For bedding older pigs or hogs a bed of dry cobs from the corn-sheller filled in five or six inches deep all over the bottom of the house will be found much more satisfactory than anything now in general use. Slaked lime should be scattered plentifully through the bed. Such a bed is always dry, free from dust, and the hogs can not cover up in it and get too warm. Besides, even in bad weather, it seldom needs to be changed. The low side walls and low roof prevent the sow from lying too close to the side wall and crushing her pigs.

The single opening prevents draft, and the weather has to be excessively cold when the heat from the body of the sow does not keep the house warm and comfortable. The house should be no larger than necessary to accommodate the hogs sleeping in it. Unless the sow is very large, five feet wide and six feet long will be a very good size for the house for sow and pigs, and where twelve to fifteen hogs sleep together,

unless they are very large, a house eight feet wide and ten feet long will be found large enough. In changing bedding upend the house, burn the bed on the space occupied by floor of house, and replace the house on space burned over, and re-bed as before. The smaller-sized house may be built at a cash expense of not to exceed $2. A trial of such a house so arranged will convince any farmer that a hog can be made to gain a pound a day with the feed on which the same hog with poor shelter and a wet bed will make no growth.

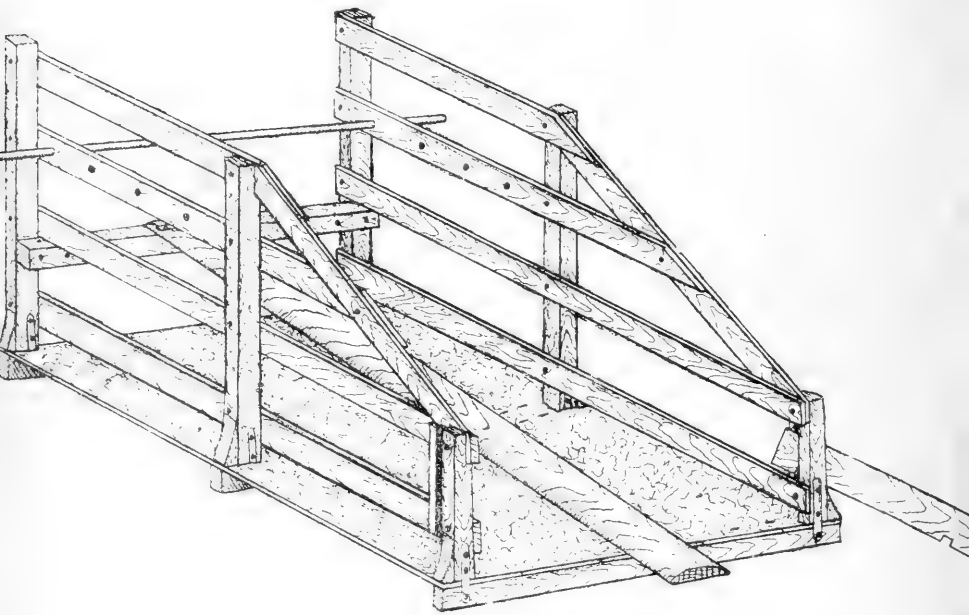


Fig. 5. A Homemade Breeding Box.

Another convenience that is indispensable, if a properly developed, mature boar is used, is a properly constructed breeding box. Such a box is shown by cut No. 5. By the use of a breeding box it matters not how small the sow, she may be bred to any sized boar, and always receive a good service. Any boar gets better litters of pigs and has much less trouble about getting sows in pig where the box is used.

In order to accommodate all sized sows, the floor of this box is made thirty-two inches wide and five feet four inches long, and is nailed to three cross pieces two by three inches, placed an equal distance apart underneath the floor. The upright pieces are two by three inches and the two longer ones on each side are thirty inches long and the shorter one

on each side is same size and fourteen inches long. The cut shows straps of iron on each side of these upright pieces and extending down through the floor so that the ends of the straps of iron fit in each side of the cross piece underneath the floor. A bolt extends through the lower ends of these straps of iron and through the cross piece underneath the floor to hold the side of the box in place. In from the row of mortises in the right side of the floor five inches and ten inches a second and third row of mortises are made, that this side of the box when the sows to be bred are smaller may be moved in and thus make the box narrower to suit the size of the smaller sow. The body of the sow should fill the space between the two sides of the box. The board lengthwise in the center of the breeding box is five inches wide with the two upper edges rounded off. This board is bolted at one end to a cross piece about ten inches above the floor. This cross piece also has holes bored in end to suit the different widths at which box is used. The high open end of the breeding box should be placed against a fence or side of a building when used. The cut shows the box ready to receive the sow. As soon as the sow goes into the box astride the board the end of the board now resting on the floor is raised up between her hind legs and the notched bar shown in the cut is slipped through the end of the box under the end of the board and behind the hind legs of the sow.

This prevents her from backing out of the box. The notches in this bar fit over the edges of the side pieces of the box and prevent it from spreading. A row of auger holes is bored in one of the strips on each side of the box through which a piece of half-inch gas pipe is run at proper place to prevent the sow from running too far forward in the box. A plank platform two feet wide and three feet long should be placed at the lower end of the breeding box immediately behind the sow. This platform may be propped up higher or lower to suit the boar to the height of the sow. The timber, iron, bolts, etc., for such a box will cost about $1.25.

SNARE AND HURDLES.

Two other conveniences that are inexpensive and yet indespensable in handling hogs are a snare and a hurdle. The snare is made of a piece of small, stout rope, about six feet long, with a slip-nose in one end to slip over the upper jaw of the hog, and a short stick tied to the other end to take hold of. A hog becomes perfectly manageable when the snare is put on him. Hurdles are made of parts like small gates about thirty-two inches high and four feet long. The most common form of hurdle is made of two of these parts connected in the center by a pair of strap hinges. A man at each end of the hurdle can corner and catch almost any hog, and by the use of the snare and hurdle hogs soon become as manageable as any other kind of stock.

WHAT THE HOG HAS DONE FOR THE FARMER.

BY THEO. LOUIS, DUNN COUNTY, WIS.

It is a difficult matter to do justice to this subject. From the days of our Pilgrim Fathers he was the companion and supporter of the pioneer on his journey westward, until his abode is in every State and Territory of the Union from the Atlantic to the Pacific. On the plains and in the Rockies (the home of the buffalo, the antelope and the grizzly) he reigns supreme, at home in every clime, the ever true abiding friend of the pioneer. It would give volumes of interesting reading if farmers had left behind stories of his individual benefit, ever dividing the hardships, with a contented grunt for the smallest favors. It would be the story of millions that the hog laid the foundation of their happy, free and independent homes—if we were not so forgetful and did not ascribe success to our own individual efforts, forgetting that in the mighty struggle he divided the hardships of poor shelter, storms and starvation. It was he that furnished the main stable of wholesome nutritious meat and the necessaries of life; he paid for shoes and winter garments; it was he that paid for the first cow, he that paid for the first plow; it was he that furnished the money for taxes, however small they were, but they were cash. When other products had to be sold for half cash and half trade he demanded cash and it was ever forthcoming. He walked to his burial and future home and liquidated the note on the team; he bought the school books; it was he that paid for the material for stable, for horses and cow; while he without a discontented grunt took his abode in a straw pile, and his mate brought forth lusty litters, any one of which would excel the three-year-old steer in value in ten months. It was he that paid the doctor bill, he that lighted up the first Christmas tree and furnished the toys for the kids, the first merino dress, calico and trimmings, and caused the smiles and tears of joy. It was he that replaced the log hut, the sod house, the shanty, with comfortable and often stately homes. He paid for the education at city schools, and the professional boy forgets that his superior education is somewhat due to the American hog.

The wheat farmer of the West, that trusted his all in wheat until it went below the cost of production, found in him his savior—he paid his way, ten pounds per bushel, live weight. His presence changed agriculture on the plains; he ate alfalfa, clover and bluegrass. Corn was no longer a drug on the market, but a remunerative freight product for railroad. It was no longer fuel—he replaced it with coal and gasoline. He brought about mixed husbandry. Go where you will, if you find him in-

telligently cared for with a liberal hand, the farmer's reward is sure to come.

In 1898 he found his way to distant shores in—

Live hogs	$110,487
Bacon	46,380,918
Hams	18,987,525
Pork, fresh	815,075
Pork, pickled	4,906,961
Lard	39,710,672
Total	$110,811,638

American farmer, read, think, stick with intelligence to the American hog, better his condition, stick to him as he sticks to you, brother-like. They tell you that he is not what he should be, they show you figures of sales and exports, but all sink into insignificance in comparison with the American hog.

TREATING THUMPS IN PIGS.

BY W S. HALEY, WILSON COUNTY, TENN.

Thumps is one of the most disastrous diseases among hogs. In fact, I believe it keeps more pigs from reaching the smoke-house than all other diseases combined. Its ravages, however, are almost entirely confined to shoats or pigs, so we do not feel the loss from them as badly as when cholera takes off the same number of large hogs, yet where real cholera kills one hog, thumps take off pigs by the score. Then how to prevent thumps and how to cure them are subjects of vital importance to every hog-raiser. For thumps, as for all other diseases, preventives are better than cures, still, after all known precautions have been followed, we will have a few cases of thumps, then we have a need for a remedy. The most frequent causes which have come under my observation, I believe, are exposure to bad weather, sleeping in dust, a want of a properly balanced ration, and a lack of proper exercise. The last mentioned cause of thumps is often really the effect of one or all of the preceding, yet it is sometimes due to pure laziness in the pig and that laziness the result of the way the pigs are fed. The sleeping quarters may be warm, dry, and free from dust; the pigs may have access to them at all times as they certainly should have; and the food may be of exactly the right nature as far as we can determine and plentiful at that; if it is always fed to them from the trough

the pigs will become lazy and inactive, and their health will be endangered. I have actually seen pigs that had been fed that way starve to death before they would get out and get something to eat when good succulent food was plentiful at the cost of just a little exercise. That seems strange, but it is true nevertheless. In a bunch of forty I bought one spring there were ten pigs that had been fed on slops and scraps in that way. They were the prettiest pigs in the lot. I turned them into a plenty of green rye and artichokes, but neither of those ten would work for a living. I fed them for awhile and tried to reduce their feed gradually, but they would not get out of their lazy wallows. I would toll them out into the field every day, but they would go right back to their wallows. They would eat the roots greedily if fed to them, but they would not root nor graze. Right there in one month five of those pigs starved to death, and it was only by the greatest patience that I ever induced the other five to quit their lazy habits, while the rest of the shoats did well. So my advice is to have plenty of good food, but let the pigs gather for themselves as much as possible in good weather. Teach them to be industrious, be careful to provide good sleeping places, keep them free from lice, and you will reduce thumps close to a minimum. As I said before, after all possible caution we are likely to have an occasional case of thumps. Then we need a remedy. I know of none that is infallible, but I have had real good success with a very simple treatment. I have never seen a case of thumps in a pig without there being some constipation, and often the bowels are terribly hard. I remove this evil by injecting some warm, greasy suds by means of a syringe, about once a day until the bowels are regulated, or give castor oil for the same purpose, but I prefer the former method as the relief is immediate and the stomach unmolested. Then with either treatment give regular feed of good slops, scraps of meat, potatoes, etc. Induce them to eat but do not overfeed.

HOW LONG TO FEED HOGS.

It is often a question as to how long a pig should be fed before it should be marketed, or rather at what weight it is best to sell in order to realize the best profit. There is one fact pretty well settled, and that is, the greater the weight of the animal being fed the greater the cost per pound for the gain secured. But no set rules can be given, as conditions must always be considered in determining which is best. Sometimes it will be better to feed longer and for a heavier weight than at others. There are two kinds of days that are unfavorable seasons for feeding. These are extremely cold days of winter and extremely hot days in summer. Of course on the farm and especially when it is an item to feed

out the greater portion of the products grown upon the farm to stock on the farm, some stock must be fed during these seasons, but as far as possible these should be either young growing stock or breeding animals. This is especially the case with hogs. In fact, in many cases it will be better to sell a little lighter weight than to feed through the summer. In fact, generally light weight hogs, averaging 150 to 175 pounds, will bring better prices per pound than those of heavier weight, and when, in addition, the unfavorable conditions of growth with the risk of loss, are taken into consideration it will be better to sell in June rather than to feed longer.

It is always advisable so far as possible to have hogs sent to market in a good condition, and it will pay to commence in good season in order to secure this. But it is rarely advisable at this time to feed for heavy weight when this would compel feeding through July and August before marketing.

It will be a good plan to look after the pigs and push the growth of all that can be put in a good marketable condition by July, and all these should be sold, feeding only young, growing pigs and what breeding hogs it is considered best to keep.

BREEDING AND FEEDING HOGS.

BY P. W. PETERSON, VERMILLION, S. D.

Hog-raising is a financial issue; the problem now before us is what kind of hog shall we breed, and what shall we feed to produce the most dollars and cents in the least time and with the least feed. On this point there is a diversity of opinion between farmers, breeders and professors of agricultural colleges, but not so much on the feed as on the breed. We all have some idea as to what we want in the shape of a hog, some preferring one kind and others something different, and with some color makes considerable difference, and they will sacrifice some quality to obtain the desired color, while knowing that the market price makes no difference as long as the hog carries the required quality and finish. The selection of the sow is the first and most important matter for the breeder to consider. Some people are satisfied when they have a sow that will raise a large litter of pigs, but do not stop to consider either the feeding qualities or early maturity, nor symmetry in form, which is so very essential in the foundation of a herd. I have noted some farms where there have been all colors and all shapes of swine, and these have been used as brood sows, and in nine cases out of ten these sows have all been mated

with the same male. Such breeding is simply ridiculous, and shows the inability of the breeder to understand his business. It is this kind of breeding that degenerates size, quality and would in two or three crosses bring the hogs back to where they were twenty or thirty years ago, and we would still be annoyed by razor backs and rail splitters the same as our southern neighbors are this very day, where the hogs are all let run at large and breed at nature's will. By comparing the up-to-date bred hog with the wild razor back of the South, is it any wonder that the breeder of improved hogs feels proud of his success? These men, the improvers of hogs, have been very careful in the selection of their breeding stock and have not selected anything for breeding purposes which has not shown up the necessary qualifications to help to promote an ideal hog. In selecting their brood sows they have picked those that had the qualifications for thriftiness, short wide nose, which denotes strength, wide between the eyes and ears, which denotes intelligence, wide between the forearms, a full neck, a well filled heart girth, and a well-sprung rib, which denotes good lung power, an active heart, and a robust constitution. Then comes the straight, wide, slightly arched back and shoulders and hams to compare, all put upon four straight, stout legs well set out on the corners. After they have chosen their brood sows as near to these qualifications as their circumstances would permit they have then to set about getting a herd header which, upon past experience would induce them to believe, would produce good results by mating, and helping to improve the most deficient point in their herd. Now then we have arrived at one of the most critical points of the hog business, which is the time of breeding. It is as important to have your hogs in the right condition at this period of time as it is to have a steam engine in condition before you fire up. If you do not something will go wrong during the event and the manager of the engine or the herd of hogs will have to suffer the consequences of his neglect. In order to acquire the best results from your breeding, it is necessary that your hogs should not be too fat, rather a little thin and on the upward turn, on moderate feed as under those circumstances your sows and male both are more apt to be healthy, strong and vigorous, which is very necessary in order to produce a large, healthy, strong litter of pigs. After breeding it is also necessary that your sows should be dieted in order to obtain good results at farrowing. By dieting, I mean that the sows should be fed diversified feed which has a tendency to produce more bone and muscles than fat. It is to the detriment of both the mother and the young to feed a full corn diet at this time. I have had very good luck with my brood sows by feeding them one-third oats, one-third barley, and one-third corn chopped and soaked twelve hours before feeding, but I allow them to take plenty of exercise at this period of time, and as a tonic I feed them beets, mangelwurzels or potatoes, whichever I happen to have. Either of these are first-class substitutes for green pasture in summer. I also intend to feed enough of the above rations

from breeding to farrowing to keep the sows on a steady gain. I prefer a sow in pretty good flesh at farrowing time, which enables her to withstand the pressure for a long time caused by the sucking pigs. At and after farrowing we must be very careful as to what and how much we feed the sow, as on the first few days' feeding depends altogether the welfare of our young litter of pigs. It is also necessary in cold or chilly weather, that the youngsters should be watched and cared for so they do not chill right after birth. I keep a stove in my farrowing house, and as soon as a pig is born he is carried to the stove, wiped and dried by the fire. I then leave him by the stove to exercise and wait for the next pig which goes through the same performance. After the labors are all over, and I have a whole box of nice, lively pigs, I take them to the mother, and give them their first meal, and see to it that they all get something to eat. I then put them in the box again and place it by the stove where the little beauties will lie down to sleep, quiver and sneeze to show how they appreciate the warmth of the fire in the new world. They are kept in this box for one or two days, according to the weather and the disposition of the mother, but are taken to their mother once every three hours to be fed. After the pigs are a couple of days old they commence to feel very independent, can stand considerable cold, and can keep out of the way of their mother's feet. As I said before, the feeding of the mother plays a very important part at and after farrowing time. I shall tell you my experience, and how I feed at this time. Twenty-four hours after farrowing I feed the sow her first meal, which consists of some light food made into a swill and about one ounce of Glauber salts mixed with it, and of this mixture I only feed about one-half regular feed for three or four days. After that I commence to increase the feed very slowly minus the salts until I have her on full feed in about ten days, but I never feed more than what she is willing to clean up well before she leaves the trough. By giving a sow a little too much feed after farrowing, especially heavy food, it will create a fever which will terminate in milk fever, which is very fatal to her young and dangerous to herself. Too rapid an increase in the mother's feed will increase the flow of her milk in excess to the demand of her young, and as they will only nurse what they need the rest is left in the udder, where it will become stale and unpalatable to the youngsters. The next time they nurse, they will nurse less, leaving a larger surplus of milk in the udder which will at once commence to clot, and we then have what we call a clotted udder, which also brings on a fever, and if the pigs will nurse at all, you are sure to lose a part, if not all of them, from the effects of the feverish milk, and in nine cases out of ten your sow will go dry, and if any pigs remain after nursing the feverish milk, they starve to death. In most cases of this kind, the experienced man will lay the fault to the sow saying she is no milker at all; she is just starving her pigs to death; while the fact remains that he is to blame, and no one else. By judicious feeding we can avoid all this trouble, and

then have a slick, growthy, looking litter of pigs, and there is nothing better looking on the farm among the domestic animals than a nice even litter of pigs. When pigs are about five weeks old they should be taught to eat by themselves, separate from their mother, in a place made for that purpose where they can eat without being disturbed. As they proceed to learn to eat, the mother's feed should be decreased, and prepare her to wean her pigs with as small a flow of milk as possible. After weaning, these pigs should be kept on full feed and fed three times a day of milk and shorts, ground barley or oats with one-half corn meal which should be made into a slop and let soak from one meal to another, but care must be taken to see that this swill is always kept sweet, as acid from sour swill will ruin the digestive organs of young pigs, which will leave the system susceptible to any disease within reach, and then your hog business will be unprofitable. After a pig is past five months of age his digestive organs are stronger and can digest more heavy food, stand more abuse and still thrive. At six to seven months of age those that are intended for the market should be separated from those intended for breeding purposes and should gradually be put on full feed and pushed to a finish as soon as possible. In order to finish a hog he should be on a full feed of corn, but after you have got him as fat as he can be without detracting from his comfort put him on the market at once for he is very unsafe to keep because a hog fatted on a corn diet is very tender and cannot stand any abuse or disease. These hogs kept for breeding purposes should never be put on a corn diet but should be fed feed that has more bone and muscle producing qualities.

VALUE OF PURE-BRED HOGS FOR THE MARKET.

BY J. O. HIBBS, VINE GROVE, KY.

The value of thoroughbred swine on the market is of a twofold nature. To the producer it means a lessening of both time and food, two valuable adjuncts for the farmer to combine. Formerly with the ridge-rooters it took from 18 to 24 months to get a pig ready for the market. Now, with increased knowledge and consequently thoroughbred hogs, the pig is ready for the market in from six to eight months, a saving of from 12 to 16 months' time, attention and food. This is of equally as much interest to the consumer as to the grower; they get younger, purer, sweeter meat.

It has been said "the demand creates the supply." In regard to pork and bacon I beg to reverse the axiom and say that pork and bacon will

create the demand. By this I mean the kind, the quality of pork and bacon will increase or decrease the demand. Let a butcher serve his patrons with strong, coarse meats and his customers will soon lose all appetite for such. Let him put young, fresh, sweet, juicy pork on the market and the patrons will buy more and buy oftener. One lamentable fact stands out more prominently than all others, that is, some farmers (with emphasis on some and a soft accent on farmers) send hogs to the market that should not even go to the soap factory for fear that after the addition of lye and a continued boiling some of the disease germs might linger. I doubt, indeed, if they are fit for anything other than a bullet followed by a lime pit. There are farmers who are more anxious for financial gain than personal honor, knowing such hogs cannot pass the inspector, cure these diseased animals as country bacon, thus doing irreparable harm to the honest farmer, to say nothing of the harm done the community.

The twentieth century farmer should breed nothing but the best, feed nothing but the best in order to get the best results. Bear in mind we cannot plug off time, neither can we rest on our oars without drifting down stream. "Time and the tide wait for no man." If we hope to deal creditably with the hog, we must take Father Time by the forelock and with a retrospection of the past and a hope for the future be up and doing in the present. A question might be raised, should all farmers (both little and big) breed thoroughbreds? I claim they should. The little farmer is apt to say, "I raise so few hogs it would not pay me to carry thoroughbreds," to which there can be but one answer, "It does pay." Is there not a sense of satisfaction in looking at even a few good hogs? In addition to this, they feed better, sell better, and a farmer naturally takes better care of thoroughbreds than scrubs. He would not forget to give them salt and hardwood ashes every ten days; he would keep a sharp lookout for vermin, would watch for coughs and feed charred corn to lessen the chance for swine plague.

The farmer in the present and future must needs to cultivate both brain and muscle if he hopes to reach the front rank. He should provide himself with from five to six good agricultural papers, and in the experience of others reap profits unto himself, and thus become a walking encyclopedia of knowledge—a blessing to his own household and a ready help to his neighbors. He should be able to go on an old abandoned farm and with rye, clover and peas, with a little corn with which to finish, with good thoroughbreds and be able to rear hogs by the dozen where originally hogs would not grow at all.

A farmer who carries thoroughbreds soon becomes a noted figure in the community and instead of his having to seek a buyer the buyer seeks him, knowing full well such hogs are always in demand and will top the market.

DEVELOPING BREEDING STOCK.

BY CALDWELL NORTON, LOUISVILLE, KY.

The future usefulness of any young breeding animal depends in a great measure upon its development. To illustrate: I will take a farmer and a breeder living on adjoining farms. Both are corresponding with a breeder of another State in regard to pigs three months old. Price and description satisfactory. Pigs arrived and were up to expectations in every way, and both buyers well pleased. The breeder takes his pig home and, as he is only three months old, puts him in a lot of one acre with six other boar pigs of the same size, with good grass and comfortable house for protection from the weather. This pig is fed on a rich slop made of shipstuff and water, and is given just what he will clean up three times a day, with enough corn and oats to keep in good flesh and at the same time it makes a balanced ration. This pig is kept this way until October 1st, when he is put in a lot to himself and pushed a little faster, as he will have to do service the following months on about five sows, and is fed more so he will not go down hill at a time he should be growing out of pighood into hoghood. When there is a sow to be bred she is brought to his lot, or put in breeding box just outside, and he is taught how to serve either in or out of box. We find the breeder's pig at eight months old in good fix, weighing about 300 pounds, not over-fat, and growing right along. We find him in the same lot next March at one year old, weighing 400 pounds, having had plenty to eat and dry, clean place to sleep all winter. We find him the next March, at two years old, in the same lot in breeding fix, weighing between 600 and 650 pounds, and the sire of 200 stout, healthy pigs. The breeder's pig is just sold for $150 and is well worth the money because he has proved to be a good sire.

The farmer's pig is taken home and turned in an orchard with a few calves. He is fed more corn than he can eat for about a month, and is also treated to the dish water from the house, but is beginning to show that he misses the good, rich slop that is the only thing that will grow a pig right. By the first of July the pig is forgotten, as the farmer is so busy laying corn by and getting ready to start in his hay. Although the pig is seen on Sundays and the farmer thinks he is not doing well at all, and wonders what is the matter. By the middle of August the apples begin to fall and the pig gets more than he should have, and in another month he looks like he would soon farrow, but there is very little fat on his bones. He, next month, is expected to do service, and is turned in with six old sows and about six gilts and makes a record for himself that would do him credit if he had been three years old, and at this time in

his life is when he is overworked and his usefulness is marred forever. We find him all winter sleeping around a straw stack and being fed his corn in the mud that is about six inches deep. This pig has forgotten a long time ago what slop tastes like, as he has never seen any since he left the home where he was farrowed. We now find the farmer's pig, at one year old, in very thin order, after having only about half he wanted to eat all winter, weighing about 175 pounds, and the farmer is disgusted with him, but should be with himself, as this pig could not grow on only feed enough to keep up animal heat, but the farmer could not see that he had neglected him. Farmer's pig is put in the fattening pen, and the last we see of him he is en route for the stock yard weighing something less than 300 pounds at eighteen months old, and the farmer is fully convinced that it's good money thrown away to invest the same in pedigreed stock.

AMERICAN SWINE.

BY J. R. DODGE, WASHINGTON, D. C.

This country surpasses all others in swine, as in corn, tobacco and cotton. The numbers reported in packing operations are by no means all, though best known and easiest counted. Mr. C. B. Murray keeps a very complete record of these packing operations, and supplies current data relative to hogs killed, meats cut and cured and lard rendered. The United States Treasury takes note of exports of meats from the packers and live hogs from shipping ports. Usually between one-fourth and one-fifth of the total product of the United States is exported, say 22 per cent., and of late about 28 per cent. of the product of packing establishments.

Last year's packing included 22,201,000 hogs in the west, a decrease of 1,450,000 from the previous year, the largest packing record ever made. The total east and west was 28,172,000, against 29,793,000 the previous year. To this should be added, for farm and town slaughtering in the South, and on farms and in villages from the Atlantic coast to the Pacific, probably 12,000,000 more of various weights, but the larger portion small, and averaging about two-thirds as much as the recorded packing, and making fully 20,000,000 hogs slaughtered the past year in the United States.

The record for last year (to March 1, 1900), east and west, is, for green meats made, 3,498,000,000 pounds; lard, 944,000,000; together, 4,442,000,000. To this add 1,200,000,000 for the farm and other killing outside of organized packing, or 5,642,000,000 pounds of product made in the United States.

The value of hogs slaughtered represents a heavy item in farm production. Last year the regular packers paid $267,858,000 for their hogs.

The farm and other hogs, at an average of $6.50, would add $78,000,000, and make an aggregate value of $345,858,000. Ten years ago the packing record was only $181,169,000, and though the number of hogs was greater in 1898-99, the aggregate cost of last year's supply was greater than in any previous year.

There is a considerable variation in the cost of hogs, depending on the supply. Last year the cost may be considered nearly an average of $4.11 per 100 pounds live weight as paid by western packers. In the last decade the average of four years was greater, up to $5.87 in 1893-94, and former years less, down to $3.30 in 1896-97. The cost averaged a little higher in the previous decade, ranging in the several years from $6.65 in 1882-83 down to $3.75 in 1884-85, lower than $4 only two years, while in the past ten years the average was below that figure four years. The following is a statement of average cost:

Seasons.	*Summer.*	*Winter.*	*Year.*
1890-91	$3 91	$3 54	$3 74
1891-92	4 48	3 91	4 16
1892-93	5 03	6 54	5 60
1893-94	6 33	5 26	5 87
1894-95	4 98	4 28	4 67
1895-96	4 41	3 68	4 07
1896-97	3 30	3 30	3 30
1897-98	3 70	3 53	3 63
1898-99	3 85	3 52	3 71
1899-00	4 00	4 29	4 11

The weight of hogs slaughtered averaged less than in earlier seasons of pork packing. From 1873 to 1890, inclusive, the average weight was less than 250, only in 1888, ranging from 290.53, in 1873 to 251.31 in 1887. Since the highest average was 278.20, in 1894, and the lowest 232.65 in 1899.

Hogs are killed at an earlier age than formerly. Fewer are kept over winter and the tendency is to better care and feeding, more continuous and early fattening, in accordance with the ruling economics of meat making in all lines.

EXERCISE.

It is important that the pigs have a clean, dry bed and plenty of exercise. Whenever the weather permits they should be induced to stir out. Failure to take exercise is the one great hindrance to success in raising pigs in very cold weather. They burrow in their nests and remain inactive until thumps destroy them.

YOUNG OR OLD SOWS FOR BREEDERS.

BY SAM CLARK.

Much has been said and written about the comparative merits of young and old sows for breeding purposes. I tried to breed up my herd in this manner: If I had forty brood sows and desired to retain the same number for the next year's breeding I would carefully watch each sow with her litter as a mother, nurse and suckler, and just before the pigs were weaned I would discard the twenty sows which had raised me the twenty poorest litters. No matter how fine a show animal a sow might be, if she raised a poor litter she had to go, unless I specially desired her for the show ring, and then she is pretty sure to get me into trouble, as I must explain why her pigs are not with her, or, if on exhibition, why they are no better. As a matter of policy, as well as finance, it were better to dispose of her, paying no attention to age.

The sow that raises the best litter of pigs, I retain, no matter if she is five or ten years old; so long as she raises my best litter of pigs she is my best brood sow and I will not discard her for a green, untried one. Now to replace the twenty sows I have discarded and turned into pork, I would take twenty sow pigs from the best sow, being careful to select them from litters of six to ten and all of the pigs in the litter good ones. If a sow had eight or ten pigs and only one or two of the litter good, I would not select breeders from such a litter, although that one or two might be among the very best specimens in the whole herd.

RAPE FOR SWINE FEEDING.

Rape is fast coming to the front as a profitable crop to grow for swine pasture. Every farmer should know how to grow this crop, and give it a trial. Rape may be sown any time from early spring until the first of August, and is ready for use from eight to ten weeks after the seed is sown. The seed may be sown with oats or barley, or it may be sown by itself. If with the former, let the oats appear above ground, and then sow on two or three pounds of rape seed and cover lightly with a harrow. The dragging will not kill the oats, and will cover the rape seed. The rape starting after the oats will grow spindling because shaded. If sown at the same time the rape grows as fast as the oats and makes trouble in harvesting. When the oats are cut the rape will spring forward and furnish feed. Another way is to sow the rape seed by itself broadcast on

well prepared ground. A third way is to drill in the seed the same as rutabaga turnips, having the rows thirty inches apart and cultivating with a one-horse cultivator. Rape so seeded need not be thinned. By sowing early, rape will be ready for pigs by the middle of June, while the latest sowing will furnish feed from the first of October until the ground is frozen solid. It should be remembered that the rape plant stores its nourishment in the leaves which resemble the leaves of the rutabaga turnip, only they are larger, more numerous and more nutritious. Rape cannot be used for making hay, silage or for any such purpose—it should be fed off on the ground by stock or cut and carried to them. While rape is primarily a sheep feed, it serves about equally well for pigs. Every farmer should have a rape patch, if only half an acre in area, for his pigs. Provide an acre of rape for each 2,500 pounds of growing pigs, to be fed upon that crop. As soon as the rape plants are a foot high, turn in the pigs to feed upon them. They will greedily eat the leaves and gain about enough nourishment therefrom to support their bodies. This true, all of the extra feed will go for gain. Corn, middlings, etc., should be fed with the rape. A great advantage of rape feeding is that it keeps the digestive tract expanded and in healthful condition. Pigs fed rape fatten quickly and very cheaply. Farmers should take extra precautions to sow none but the Dwarf Essex rape seed, which costs not over 10 cents per pound if ordered in quantity. In many cases farmers have bought oil rape seed or bird seed rape, and the crop proved a failure. Be sure to order Dwarf Essex rape seed. Sow two to three pounds per acre when drilled, and four or five pounds when broadcasted. Every pig-raiser who has not yet tried rape is urged to do so the present season. Our experiment stations were the main source of introducing rape into this country, and they have paid for themselves in what they have done in helping our farmers to this one crop.

SLEEPING QUARTERS FOR SWINE.

It is better for the hogs for them to sleep in the fence corners or in the beds of leaves and brush on the south side of a big log in the woods than breathe dust and trash under the corn crib, where, if permitted, they invariably seek sleeping quarters. Whether the cholera germ is invigorated or given better opportunity for its development by its victims sleeping in a place where fine dust and trash are several inches deep may be doubted by some, but we have it from an old swine breeder, who says fine dust in the sleeping quarters of hogs aids the germ considerably in getting a grip on the animals. While the hog is an unclean brute and seems to delight in wallowing in mud and eating offensive stuff, we be-

lieve this proclivity has been bred into him by stockmen, who, thinking, him naturally filthy, permit, if not compel, their hogs to occupy any little pen or bare pasture or lot, excusing the case by saying, "any place is good enough for a hog."

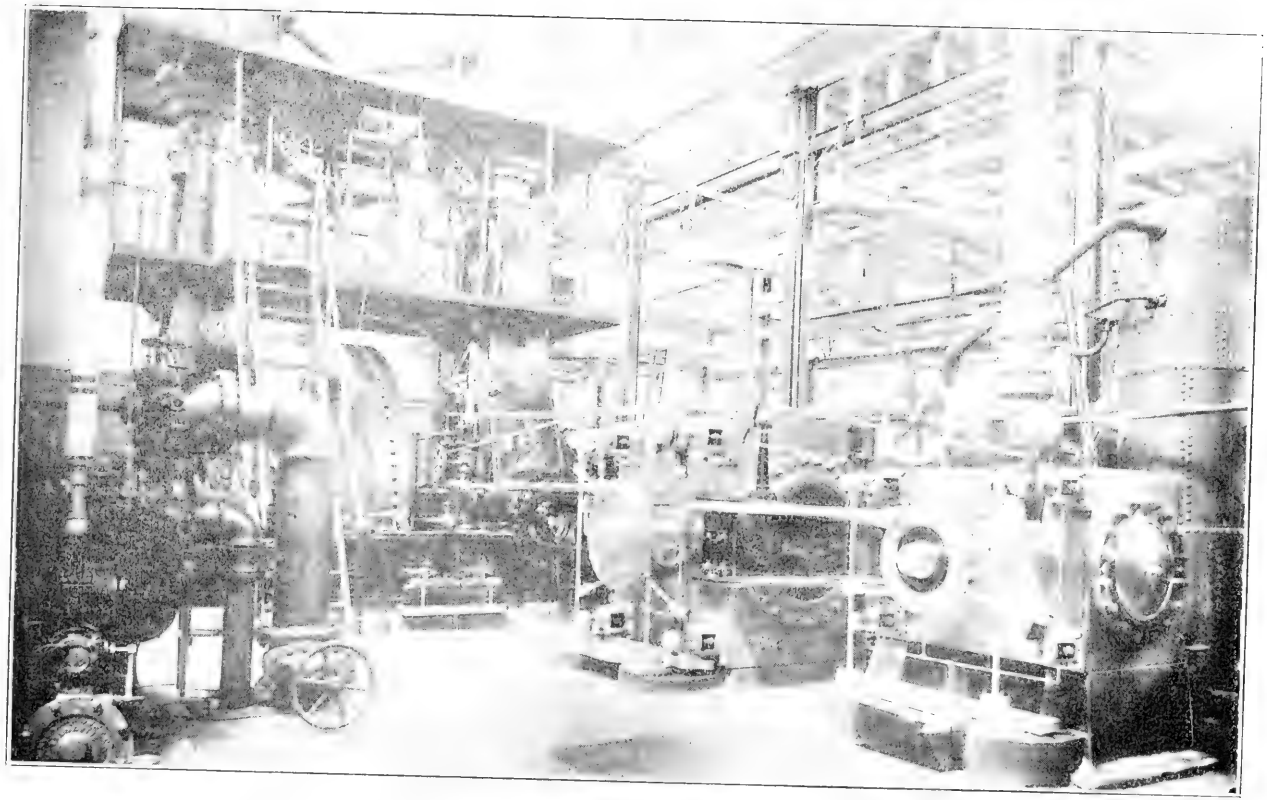
By the same process that has made the hog such an unclean brute we believe he can be improved in his regard for self-cleanliness and decency, though we do not expect him ever to become so fastidious as a pug dog. But by keeping the hogs in grassy pastures, providing thickly bedded sleeping quarters for them, giving feed in clean troughs, access to plenty of clean, fresh water and using the best boars, a very perceptible reformation will result. The health and vigor, however, of the herd will depend to a very large extent upon the sanitation of their sleeping quarters, where much of their time is spent. Where foul odors abound and the wind keeps the air laden with fine dust, each hog breathing the breath of another, there is likely to arise disease of some kind—and too frequently it happens to be cholera.

WHAT BECOMES OF THE HOG WHEN IT REACHES THE PACKING-HOUSE.

There is probably no industry which better illustrates the economy of thorough organization, both in the saving of labor and in utilizing the whole product than that of packing.

The difference between the method of slaughtering from five to seven hogs on the farm, where it requires the whole of one day and the labor of three or four people to get it into the desired form, and the method used in handling as many thousand per day in one of the large packing houses is so great that it can scarcely be comprehended by the ordinary person. There is probably no large business in which every detail is better mastered so that the following of the pig from the closing of the gate through all the stages of the making of a food product to the placing of the shipping tag is interesting and profitable.

The pig enters the slaughter house near the top and is received with about forty or fifty companions in a small pen. On the side of the pen is a large wheel from the rim of which is attached several chains with hooks. The pig-catcher seizes the pig by a hind leg and places a special chain above the hough and hitches it in one of the chains on the wheel. The wheel is in constant motion and as it turns lifts the hog high in the air and easily places the pig on an inclined rail and sends him on his way to the sticker. Thus one after another they follow in quick succession. As the pigs pass the sticker they are killed by a single thrust of the knife and from this moment nothing is lost. Even the squeal has



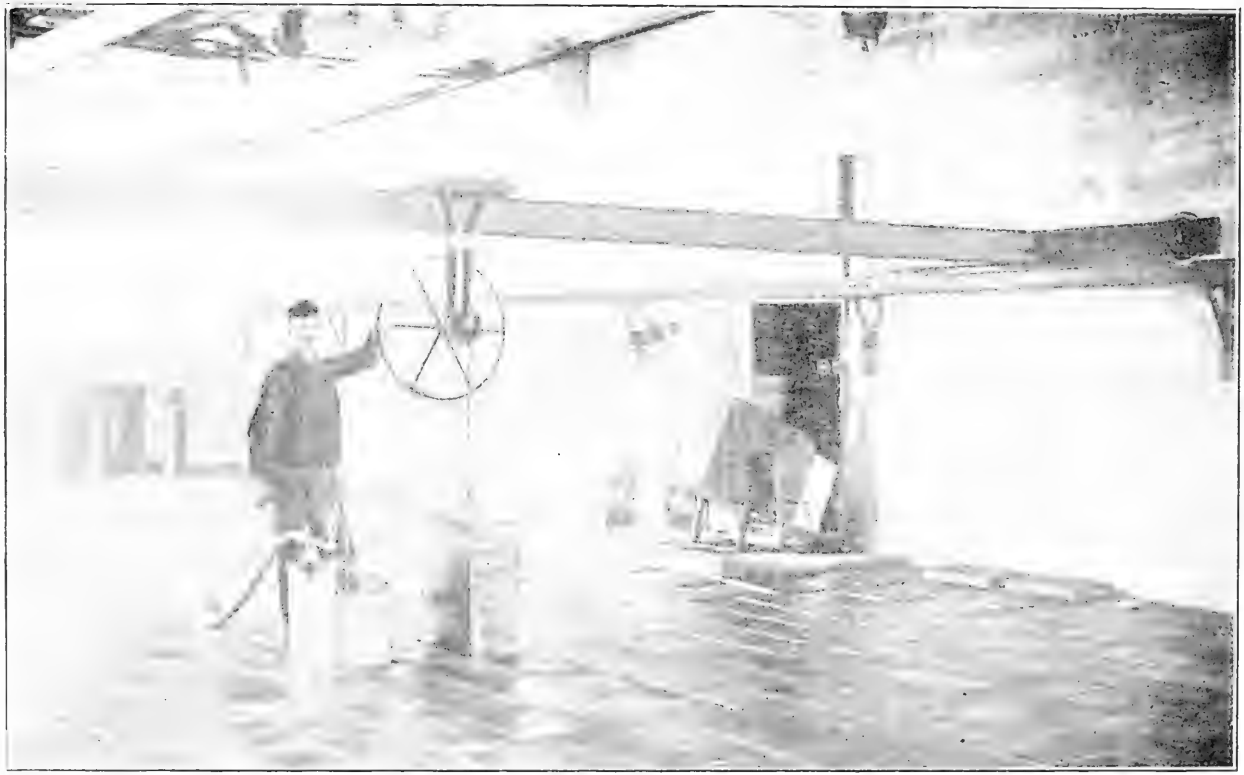
KINGAN'S REFRIGERATING PLANT.

200-Ton Ice Machine, Compressor Type. Cylinders, 22½x36 in. Steam Cylinders: High Pressure, 22x36 in.; Low Pressure, 40x36 in. Fly Wheel, 32,000 Pounds.

been caught on the phonograph and turned into commercial use. Some stickers are so dextrous that no squeal ever occurs after they once seize them. The rate of the movement is checked slightly in order to save all the blood and to give them time to die before reaching the scalding vat. The pig is dropped easily into the scalding vat and again seized by an endless chain bearing heavy prongs and turned over and dragged to the opposite end. The vat is about twenty feet long, and upon reaching the end he is lifted out by a large cradle. Men watch the course to see that the water remains at the proper temperature and to tell when the scalding is done. Upon being lifted out he is again attached to an endless chain that drags him through the scraping machine. The scraper is built like a barrel and has a large number of scrapers mounted on springs projecting from the inside. These scrapers can accommodate themselves to any sized hog or any irregularity of the body so that the hog is almost clean when he reaches the opposite end. A little hair may be left upon the face, ears and feet to be removed by hand. The scraping machine may be horizontal or upright, but in either position the hog receives a copious volume of water to wash away the hair. The hog comes from the scraping machine upon the scraping table where a few men complete the work as nearly as possible while the gambrel is being put in position.

The hog once more starts on a journey and the first place he meets a bath of soda water and a man with a stiff brush to clean any dark-colored patches so as to make the whole carcass look uniform. During this time he is seized and the head half severed from the body. A few feet farther along he meets the gutter, who with one stroke of the knife splits open the hog along the entire length of the body. With two or three more thrusts he releases the intestines to the diaphragm. The next man is known as the snatcher and he seizes the intestines and with one or two movements completely separates the diaphragm and then completes his job by loosening the heart and lungs. How speedily this work is accomplished can only be realized when it is known that three men will handle from five to six thousand hogs in a day. They are about the best paid men in the plant. During the removal of all organs the whole operation is under the eye of a United States inspector who stands behind and above them.

The hog passes on to the next man who turns on a stream of water and sluices out the body. If any remnant of a piece of trachea should remain he removes it. Two or three scrapers are then ready to receive it and shave off any hairs that may have escaped up to this time, and the last man cuts off the teats from sows and the carcass is ready for a bath. The hog moves on and is weighed, and here is the first stop that he takes on his course to the cooling room. The head is then removed and the next gentleman awaiting his arrival is known as the ham facer. He is an expert and decides what kind of ham he is best adapted to make. The weight and size of the hog are large determining factors whether the ham will be faced or not. The next man is the leaf puller and he



KINGAN'S REFRIGERATING PLANT.
Ice Making—Two Rooms, Each Fifty Tons.

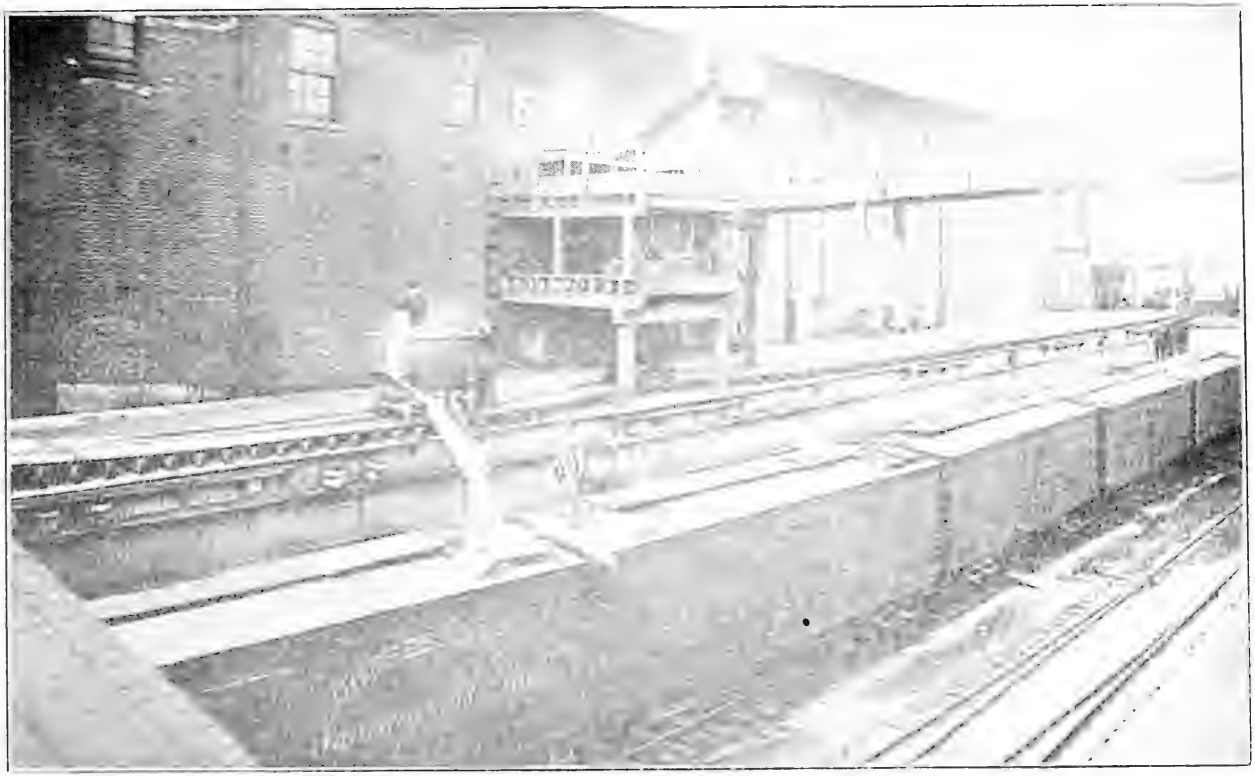
removes the clear fat or leaf lard. At the same time the kidneys are taken out.

One or two experts are now waiting to determine how the carcass shall be divided—whether the back bone shall be split or shall be removed. If they decide that the back bone shall be split the hog goes on directly to the splitter, but if it is to be removed they make a cut from tail to neck on each side of the middle line of the back and the hog goes on to the splitter. The splitters must be able to do their work with great precision, and some are able with only a few blows to exactly divide the spinal marrow throughout its entire length. The last man to be encountered on the way to the cooling room is a scraper, and it is his business to remove all tags and pieces of fat and save the same for lard. One of the objects is to make the carcass appear well.

The hogs intended for microscopic examination are not entirely split; the head may or may not be removed and the leaf lard is left in position.

Hogs that are condemned never have the backs removed but are thrown out entire. On leaving the killing floor for the cooling room the gambrel (which is complicated) drops and leaves each half on a separate track. The time occupied for all this from the penning to the cooling room is about ten minutes.

The hanging room has the same temperature as the outside air, and the hogs remain there only such time as the weather will permit, but the object is to get rid of the animal heat. The pig is moved on to the chilling room and here he remains from twenty-four to forty-eight hours. The temperature is held at from thirty-six degrees to forty-four degrees Fahrenheit. The next place he reaches is the cutting room and here he is disposed of with the same speed as has moved up to this point. The ribs are removed with huge curved draw knife; bones are either cut off with one stroke of a cleaver or sawed off on a band saw. The different packers have different names for the same cut, but they are in general, regular hams, long-cut hams, regular shoulders, the boneless ham, which is a shoulder with the bones removed, the picnics or California hams, which are shoulders cut like hams; boneless plates, salt butts, or butt cuts, which come from the neck; fat backs, the fat from the back with the loin removed; long clear middles, short clear middles, Stafford middles, or middles with the ribs left in; clear belly or bacon, loins and tenderloins, and Cumberland cut, or a half hog with the ham, shoulder blade and humerus removed and feet cut off. The backs make the joints, the tail and the last few joints go into the lard; the feet go for pickle, for pigs feet jelly, and into glue; the knuckles go to the canning factory; the trimmings go into lard and sausage; the cut stuffs go to the cellar as dry salt or sweet pickle. Each packer has his own formula for preserving and these are kept secret.



RINGAN'S REFRIGERATING PLANT.

LOADING ICE IN REFRIGERATOR CARS TO INSURE SAFE TRANSIT OF MEAT

Most of the stuff must remain in the cellar from sixty to ninety days, depending upon the season. During the winter the meats may be shipped much greener than in summer. These meats must be moved very often and the changing of the acres of meat in order that it shall cure properly is one of the very large labor problems about the place. Some of the hams, shoulders and bacon are smoked, and this requires an immense amount of work. All meat before being packed for shipment is tested by an expert who forces a sharp-pointed instrument into the center of the piece and then smells of it.

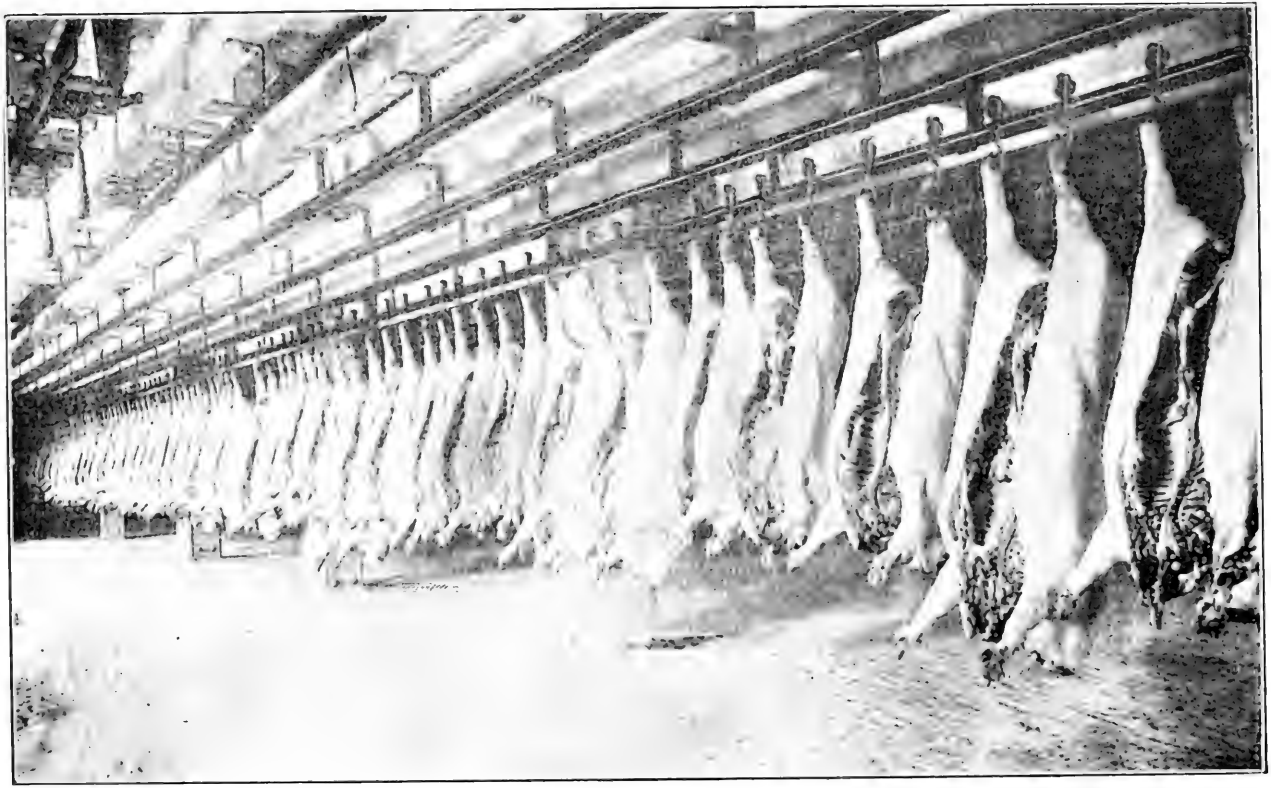
To return again to the part of the pig left along the way. The blood is all saved and from it are made albumen now largely used by bakeries, buttons, and fertilizer. It is one of the principal sources of nitrogen for the commercial fertilizers. The hairs are saved, the bristles saved for brushes and the other hair broken and split for mortar.

The intestines, with the liver, heart and lungs, have found their way to the table; the liver, heart and lungs are separated; the intestines are "run," separating all the fat; the stomach is saved for large sausages and the small intestines cleaned for small or link sausages. The large intestines are split open and the contents cleaned and thrown in the rendering tank. From the stomach rennet is obtained and pepsin made. The pancreas furnishes the sweetbreads and pancreatin. The suprarenal capsules furnish suprarenal extract. The bladders are saved for putty. The spleen goes into fertilizer. The livers are only saved in part for shipment, some are used in puddings and the balance go for fertilizer. The fat about the heart and lungs is stripped; the heart is made into sausage and the remainder goes into the rendering tank. The head is not a very valuable part; the jowl is opened and the lean removed to make sausage; the tongues go to the canner, some are pickled and some into sausage. The balance of the head goes to the lard tank.

Lard is designated in the market as prime clear, pure leaf, open kettle, rendered, etc. The rendering tanks also yield white grease and black grease and from this machine oils, soap grease, etc., is derived. The cracklings from the lard press are ground up and make meat meal for dogs and stock. The other cracklings, bones, etc., go into fertilizer.

Very little pork goes into sausage. The main part of the meat used in sausage is beef with only sufficient pork to give flavor.

A considerable amount of fat is also used in the butterine with the beef fat.



KINGAN'S KILLING DEPARTMENT.

HOG-HANGING ROOM FOR 3,000 HOGS.

KINGAN'S LARD DEPARTMENT.

RENDERING TANKS. THIRTY-SIX TANKS, AVERAGE CAPACITY 7,000 POUNDS EACH.

KINGAN'S LARD DEPARTMENT.

FILLING LARD TUBS.

KINGAN'S LARD DEPARTMENT.

Lard Oil Presses.

KINGAN'S CURING DEPARTMENT.

SALTING MEAT.

KINGAN'S BEEF DEPARTMENT.

Beef Cooling Room—Capacity, 1,000 Head.

KINGAN'S CANNING DEPARTMENT.

PREPARING TONGUES.

KINGAN'S CANNING DEPARTMENT.

Making Cans.

KINGAN'S CANNING DEPARTMENT.

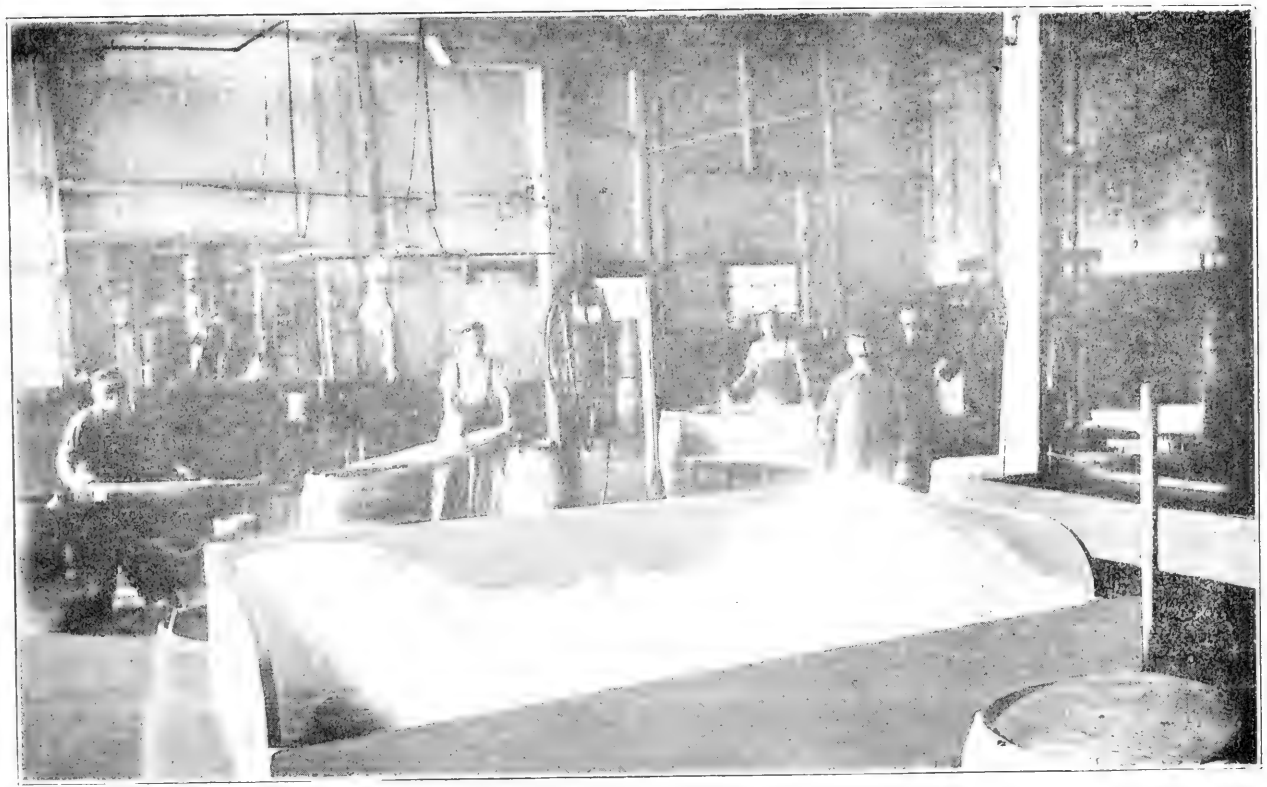
Labeling Room.

KINGAN'S BUTTERINE DEPARTMENT.

Butterine Cooler, Packing Rolls.

KINGAN'S SAUSAGE DEPARTMENT.

Sausage Meat Cutters.



KINGAN'S CASING CLEANING DEPARTMENT.

KINGAN'S JOBBING-HOUSE YARD.

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