Publication 1442 (Section 5)

SWINE PRODUCTION

▪ DISEASES

CANADA DEPARTMENT OF AGRICULTURE

SWINE PRODUCTION

▪ DISEASES

O.M. Radostits, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon.

V.E. Senior, Veterinary Division, Saskatchewan Department of Agriculture, Regina

Prepared under Direction of the Saskatchewan Advisory Council on Animal Production

Publication 1442 (Section 5)

CANADA DEPARTMENT OF AGRICULTURE

The text for this publication was prepared under the direction of the Saskatchewan Advisory Council on Animal Production and appears in five separate sections:

1. Economics
   by
   R.J. Bens and A.G. Wilson, Department of Agricultural Economics, University of Saskatchewan, Saskatoon, and R.W. May and J.F. Hickie, Production and Marketing Branch, and Economics and Statistics Branch, Saskatchewan Department of Agriculture, Regina.

2. Feeding
   by
   J.M. Bell and B.D. Owen, Department of Animal Science, University of Saskatchewan, Saskatoon.

3. Routine Care and Management
   by
   L.A. Blair, Production and Marketing Branch, Saskatchewan Department of Agriculture, Melfort, and
   A. Castell, Canada Research Station, Canada Department of Agriculture, Melfort.

4. Buildings and Equipment
   by
   J. Kristjanson, Family Farm Improvement Branch, Saskatchewan Department of Agriculture, Regina, and
   W.P. Lampman, Department of Agricultural Engineering, University of Saskatchewan, Saskatoon.

5. Diseases
   by
   O.M. Radostits, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, and
   V.E. Senior, Veterinary Division, Saskatchewan Department of Agriculture, Regina.

This publication was published by the Canada Department of Agriculture in accordance with the terms of reference of the Federal-Provincial Regional Cooperative Publishing Program.

NOTE TO READERS

The attention of readers is drawn to the fact that the text for this publication was prepared by the Saskatchewan Advisory Committee on Swine Production and that where recommendations for pesticide use appear, they are consistent with those of that province. However, readers who reside in other provinces should check with provincial authorities to determine whether or not the recommendations apply in their province.

CONTENTS

SWINE HERD HEALTH PROGRAM

Pigs are susceptible to many diseases and these diseases can be the largest single limiting factor preventing the successful rearing of pigs. It is unlikely that a swine producer would run into serious economic losses because of lack of information on swine genetics or swine nutrition. But several of the common diseases of swine can cause losses to the point of complete financial failure.

Therefore, anyone or any group of persons contemplating the establishment of a large scale swine enterprise should consider and plan an effective disease control and production program before they start. Initially the herd should be kept down to a manageable size so that personnel can be trained to handle the problems, which are going to be numerous in the beginning. Some of the factors that influence a successful herd health and production program in a swine unit are discussed here.

Experience – Considerable skill and knowhow are necessary in the successful management of a 100-sow farrow-finish operation. One of the most important requirements is an experienced herdsman who has a sound knowledge of raising pigs and who is conscious of disease problems. There is a real need for a training program in which interested people can learn how to operate a farrow-finish enterprise.

As the size of a swine herd increases, the successful management of the piggery becomes more demanding and may even become a full-time job.

A goal – The producer must have a goal. He must decide whether to sell weanlings, breeding stock, or finish out his own pigs. Also, he must set minimum standards of health and plan for a definite level of animal performance.

A satisfactory record system – The most important single factor in a herd health program is a simple record system. The records should show the sow number, birth date of sow or arrival date, registration number, tattoo number, vaccination history, breeding and production record.

The breeding and production record should show:

- date of farrowing.
- number of pigs born and average weight.
- number of pigs born alive.
- number of pigs born dead.
- number of pigs weaned and average weight.
- reasons for piglet mortality from birth to weaning.
- date pigs weaned.
- date sow in heat and when bred.

A sample breeding and production record card is kept for each sow (see sample).

Early diagnosis of sick and dead pigs – It is extremely important that the reasons for illness and deaths be determined as soon as possible so that early treatment and control or preventive measures can be instituted. Some diseases such as pig scours cannot be completely prevented but the incidence of the disease can be kept to a minimum by early diagnosis and treatment. If the various types of swine diarrhea are allowed to go unchecked, then it sometimes spreads out of control in a herd.

Veterinary services – The veterinarian is an important part of a successful swine health program. Large farrow-finish and feeder operations now have their

BREEDING AND PRODUCTION RECORD

Date	Event	No. pigs born		Av. birth wt.	Pigs weaned		Sow wt.		Reasons for culling, disease, piglet mortality, etc.
		Alive	Dead		No.	Av. wt.	Farrow	Wean	

DATE	DISEASE RECORD
	Removed from herd (reason)

veterinarian visit the premises once weekly or once every 2 weeks for consultation about disease control and animal performance. Constant surveillance by a veterinarian who takes an interest in the swine operation should result in a decrease in the incidence of disease, an increase in animal performance and increased profits.

The veterinarian must set up a herd health program that will result in maximum sow productivity and maximum feed efficiency. These are the two chief determinants for maximization of pork production.

The key to a successful herd health program is mutual confidence and understanding between the veterinarian and the herdsman. The veterinarian and the herdsman must meet on a regular basis and discuss why certain losses are occurring, discuss methods or treatment and analyze production problems that revolve around sow productivity and feed efficiency.

In the first year or two of a herd health program the level of disease should go down and the economics of having a veterinarian on a regular basis become obvious. Very often when disease seems not to be a problem any longer, the herdsman will find it difficult on economic grounds to pay for a regular veterinary visit when there is 'nothing to do'. At this stage the herdsman will have to decide how useful the veterinarian might be in maintaining or holding the level of production where it is by examining other 'untouched' parts of the herd. No swine herd remains free of diseases or production problems and an interested veterinarian should be able to identify these situations if he visits and examines the herd and its production regularly.

Swine producers must look upon planned veterinary service as one of the several important production resources to be used in the herd.

Maximum sow productivity – Every swine herdsman should be interested in the maximization of pork production. Sow productivity is one of the most important determinants of pork production and depends upon: . getting the greatest number

- getting the greatest number of gilts to come into heat at puberty and after weaning.
- a high percentage of conception at first service.
- maintenance of a high percentage of embryos during pregnancy.
- reducing losses at birth to a minimum.
- reducing losses from birth to weaning to a minimum.
- maintaining boars with a high degree of fertility.
- a high degree of feed efficiency.

Methods used in disease prevention and in maximizing animal production

The methods used for the prevention of the common diseases of swine and in maximizing animal production include:

Knowledge – A knowledge of the diseases and when they are likely to occur. This is probably the most important part of a disease control and production program.

Immunization – Immunization against certain diseases is widely used but, unfortunately, there are only a few diseases for which there are effective vaccines. A good example is vaccination for erysipelas.

Quarantine and isolation – Pigs that are sick should be isolated. This may result in fighting when the pig is returned to its original pen, but this is usually not as bad as spreading disease throughout the whole barn.

The introduction of new breeding stock into a herd is very often responsible for new infections occurring in the home-raised pigs. The ideal situation would be to quarantine all new arrivals for at least 2 weeks before putting them with the rest of the herd. A useful test for detecting new infections is to place a few of the home-raised pigs in together with the new arrivals and observe both groups for evidence of disease.

Depopulation, cleanout and repopulation – Depopulation refers to a complete emptying of an animal pen or barn. *Serial depopulation* means emptying out successive adjacent pens such as might be done in a feeder pig operation. As each pen of pigs is shipped to market the pen is cleaned out, left vacant and then restocked. Restocking is not done until every pig has left that pen. *Complete depopulation* refers to a complete emptying of the barn followed by a cleanup and restocking. After emptying the barn, the floors, walls, ceilings and farrowing crates are cleaned and scrubbed with a low-volume, high-pressure sprayer followed by the application of a disinfectant. The barn is then left vacant for a few days or a week before restocking.

Depopulation, cleanout and repopulation is a very important method of controlling and preventing disease in a piggery. It is also known as the ALL IN – ALL OUT method and is used widely in farrow-finish operations where group-breeding and group-farrowing are practiced. In this way, a group of sows can be brought into a clean farrowing barn where they can farrow and wean their pigs within a short time period. Such a practice will reduce the infection rate in the barn and incidence of baby pig scours will also be reduced.

A continuous farrowing program where sows are coming into the farrowing house on a year-round basis, and where it is never really cleaned out, is not recommended.

Sanitation and disinfection – For successful sanitation and disinfection of pens that have been occupied by swine:

- Depopulate the pen. All pigs must be removed.
- Clean all units. Solid partitions will prevent dirt and manure spreading to adjacent pens.
- Use a low-volume, high-pressure sprayer that delivers 600 lb (psi) water pressure on the walls, floors, ceilings, corners of pens and on the farrowing crates. It is difficult to clean farrowing crates even with a high-pressure sprayer. The gross dirt and dried manure must be scraped or brushed off before a disinfectant is applied. This cleaning is essential for the disinfectant to be effective.
- Apply any commercially available reliable disinfectant. Formalin at 1-2 percent in a fine spray is one of the most effective germicides but it must be used with caution.

Adequate nutrition – The nutrient requirements of all ages of pigs are well known and significant nutritional deficiencies shouldn't be much of a problem. However, many nutritional deficiencies still occur in pigs and in almost all cases, the ration did not contain all of the known requirements.

Breeding program – The selection of breeding stock and the measurement of the

performance of the progeny will affect the production in the herd. Effective breeding programs are discussed in another section.

Constant surveillance and monitoring – A neglected aspect of swine herd management is constant surveillance and monitoring of disease and animal performance. Very few piggeries keep records that are useful. New swine technology demands that records show where disease is occurring, what losses have occurred, the size and weight of litters, number of pigs weaned per sow per year, feed efficiency of growing pigs and other animal performance factors. The constant measurement of animal performance is not an easy task – it requires time, work and some fairly good facilities, but it will bring profits in the end.

This information should be easily and systematically retrievable from a record system so that the herdsman and his veterinarian can fully assess the health status and determine sow productivity and feed efficiency. The herdsman must be able to decide whether it will be more economical to prevent the disease or to allow it to run its course. For example, it is much more economical to vaccinate pigs against erysipelas than to wait until the disease occurs and then treat affected pigs. On the other hand, it is not economical to spend a lot of time and money in attempting to prevent streptococcal arthritis and meningitis in young pigs when it doesn't occur very often and doesn't account for significant losses.

A very useful method of helping to arrive at a diagnosis of subclinical disease such as atrophic rhinitis or enzootic pneumonia in swine is to have the heads and lungs of the slaughtered market pigs examined by a veterinarian. In the same way, the reproductive tracts of gilts or sows that don't come into heat or fail to conceive can be examined when at slaughter and an attempt made to determine the cause of the reproductive failure.

Control of parasites – The control of *internal* parasites (roundworms) is dependent on a routine deworming program for the weanlings at weaning time and for the breeding stock a few weeks before farrowing. Piperazine compounds are usually used. The control of *external* parasites (lice and mange) depends on early recognition of the problem and early treatment with recommended organophosphates insecticides.

Individual care at farrowing – Individual care of gilts and sows particularly at the time of farrowing will pay dividends. Once a sow or gilt begins to farrow, she should deliver a piglet about every 15 to 17 minutes. If she is having difficulty and appears that she has not finished farrowing, professional assistance should be obtained. It is much more profitable to have a caesarean section done on a sow, if she needs it, than to allow her to labor for up to 24 hours.

Individual care of each piglet as soon as it is born will increase the number of live pigs reaching weaning age. Piglets should be dried off, their navels swabbed with a disinfectant, and then put in a clean box heated with a heat lamp. After the last piglet is born, the udder of the sow should be washed and the piglets allowed to nurse as a litter. This kind of individual attention will save pigs.

Planning for the prevention and minimization of diseases in swine

There are several critical periods during the life of a pig when it is susceptible to a

SWINE LIFE CYCLE REPRODUCTION AND HEALTH RECORD

BIRTH DATE ______________________________

HEAD NUMBER ______________________________

ARRIVAL DATE ______________________________

REGISTRATION NUMBER ______________________________

DESCRIPTION ______________________________

TATTOO NUMBER ______________________________

VACCINATION ______________________________

BREEDING SELECTION CRITERIA ______________________________

BREEDING AND PRODUCTION RECORD

Date	Event	No. pigs born		Av. birth wt.	Pigs weaned		Sow wt.		Reasons for culling, disease, piglet mortality, etc.
		Alive	Dead		No.	Av. wt.	Farrow	Wean	

Code for Important Events

H – in Heat – not bred	W – Weaned pigs
B – in heat and Bred	F – Farrowed pigs

variety of diseases. These diseases can be plotted out on a chart as shown on page 12. The herdsman can then anticipate a problem and take preventive measures to minimize the effects of some of the more common diseases by early recognition and treatment.

The flow chart shows when the economically important diseases are more likely to occur in pigs. Details about the symptoms, control and prevention of each disease are described in the text.

The medication of swine

Sick pigs may be medicated through water, feed or by injections. Water and feed medication are often inadequate because when ill, pigs go off their feed and will not drink a sufficient amount of medicated water to effect a cure. Therefore, they usually need to be treated individually.

When giving an intramuscular injection, make certain that the drug is deposited deep in the muscles and not in the heavy fat layer under the skin. The needle must be long enough to reach the muscles. These injections should be made deep in the ham (half-way between the stifle and the hip joint) or in the neck muscles. Consult your veterinarian for the correct size of needles to use. Prior to injection, clean the site thoroughly and disinfect with alcohol. Disposable needles and plastic syringes are now readily available and inexpensive; they are preferred to the glass or steel-type syringes which must be cleaned and boiled regularly.

DISEASES OF THE PIGLET FROM BIRTH TO A FEW DAYS OF AGE

The following are diseases of piglets that are present at birth or develop within the first few days of life:

Myoclonia congenita

Piglets with Myoclonia congenita (known also as dancing piglets or congenital tremors) start to shake within hours after birth or the symptoms may be delayed until they are 2-3 days of age. The shaking and trembling may be localized over the head and neck or occur over the whole body. The trembling is particularly pronounced when the piglet is standing or is being handled. This begins to disappear in about 2 weeks to 2 months and is barely noticeable when the pigs are resting. The cause of the disease is unknown and there is no treatment for this condition. If the piglets are able to suckle, they will usually recover with time. Fortunately, only part of the litter may be affected. All available evidence suggests that the disease may be caused by several different agents: In some cases, a viral infection of the dam during gestation has been suspected; in other instances, a nutritional deficiency in the dam during pregnancy; and in some outbreaks, inheritance seems to play a role. None of these possibilities has been definitely shown to be a causative factor and, hopefully, further research will be conducted to determine the cause.

Splay legs (spraddle-legged)

The spraddled leg syndrome is probably a complex one. Within hours after birth,

affected piglets will be unable to stand up. Their hind legs are splayed-out and flat on the ground, and point forward at an angle from their body. If the piglets are picked up and made to stand, their hind legs splay out away from their body when let go. Otherwise they are bright and alert and their forelimbs are usually normal.

There is no specific treatment for this disease. Good nursing care consists of holding affected pigs up to the teat. Most will recover in about a week. If the creep floor is slippery, some shavings or sawdust should be sprinkled so the affected piglet can get a footing. Tying the affected hind legs together with a gauze bandage has been used successfully. There are probably several causes for this disease. Pathological examinations of affected piglets has shown that some have a failure of normal development in the spinal cord, others have immature muscle fibers, others have muscular dystrophy due to vitamin E deficiency of the dam during pregnancy and, in others, no lesion is found.

Congenial vitamin A deficiency

A dietary deficiency of vitamin A in the ration of sows or gilts during the early part of gestation can result in congenital defects in the newborn piglets. Some of the common abnormalities are:

- Pigs born dead or very weak and die soon after birth.
- Absence of eyes or smaller than normal eyes.
- Absence of legs or feet.
- Cleft palates.

The congenital defects can be prevented by supplementation of the gestation ration with vitamin A.

Coliform septicemia

Coliform septicemia of newborn piglets is a common disease. It is caused by the sudden invasion of the newborn piglet by the bacteria that cause baby pig diarrhea (scours). The bacteria invade the bloodstream of the piglet, multiply quickly and produce a powerful toxin. The combined effects of the multiplication of bacteria and the toxin result in a septicemia that kills the piglet very quickly. The piglet suddenly becomes ill, turns blue (cyanosis), becomes very weak and dies within 6-11 hours. There may be some evidence of diarrhea but usually there is not enough time for this to develop. The positive diagnosis of coliform septicemia can only be made in a veterinary diagnostic laboratory or by a local veterinarian with laboratory facilities. The bacteria must first be grown on laboratory media then, using special techniques, the disease-producing strains of the bacteria are identified and tests made to determine which drug will be most effective. Early treatment of coliform septicemia is a necessity to save affected piglets. Consult your local veterinarian for the broad spectrum antibiotic of choice. Piglets must be treated by mouth for the intestinal part of the infection and by the intramuscular route for the systemic part. Also, they should be given about 10 cc of a glucose-electrolyte solution intraperitoneally or subcutaneously to combat loss of fluids and low blood sugar.

Methods for the prevention of coliform septicemia in newborn piglets are the same as those used for the prevention of baby pig scours or enteric colibacillosis, since they are caused by the same bacteria.

Successful prevention starts with an effective breeding and farrowing program. The practice of group breeding and farrowing is proving very successful. In this method, a group of sows are bred so they will farrow within a 3-week period. After the lactation period, all the sows are moved out of the farrowing house, which is completely emptied, cleaned with a low-volume, high-pressure sprayer (600 lb psi), disinfected and then left vacant until the next group of pregnant sows is ready to come in. This is the ALL IN - ALL OUT production program.

Traumatic injury

An important cause of death of newborn piglets is traumatic injury caused by the sow lying on the piglet. Only good management and proper building design – especially of the creep area – will reduce the losses from such injury. This area should be large enough and heated either by a heat lamp or by floor heating.

Bleeding from the navel

Occasionally, newborn piglets will bleed excessively from the navel (umbilicus). The cause is unknown. The vessels must be tied with a suture to prevent excessive hemorrhage and death.

Iron hypersensitivity

Occasionally, piglets will die within 6 to 12 hours after they have been injected with an iron dextran compound at 3 days of age for the prevention of iron deficiency anemia. Most of these deaths are due to iron hypersensitivity caused by a vitamin E deficiency in the sow or gilt during gestation. A postmortem examination should be done by a veterinarian for a positive diagnosis. The disease is prevented by adding adequate amounts of vitamin E to the ration of the sow or gilt during gestation.

DISEASES OF THE PIGLET THAT OCCUR FROM ABOUT 2 DAYS UP TO 3 WEEKS OF AGE

Coliform septicemia

This is a common disease in piglets and has already been discussed (page 14).

Baby pig scours (enteric colibacillosis)

Baby pig scours is the most common disease of piglets under 10 days of age. It usually occurs when the piglets are about 3 to 6 days but can occur at anytime up to 3 or 4 weeks. The disease is caused by pathogenic strains of the bacteria *E. coli*. Some authorities think that there are several predisposing factors that trigger or start the disease in piglets.

Some of these are:

- Poor ventilation.
- Cold farrowing pens and creep areas.
- High-producing, crossbred (hybrid) sows.
- Lack of a good ration for the sow or gilt during her gestation.
- High rate of infection in the farrowing barn.

The signs of baby pig diarrhea (scours) are easily noticeable. The piglet passes bright yellow droppings (feces) which are soft and foamy. In severe cases they are watery.

The tails of the piglets are usually limp and wet. The bright yellow droppings are easily seen scattered about on the floor. Some piglets with mild diarrhea will continue to nurse the sow but others do not.

When piglets have scoured for several hours they are dehydrated and actually appear starved. Some die in 24 hours, others continue to scour for a few days and then die. Many will recover with treatment and do well later; others survive but remain unthrifty. There is usually *no* vomiting in piglets affected with enteric colibacillosis, whereas piglets affected with wasting disease and transmissible gastroenteritis will vomit. This is an important feature for differentiating these similar diseases.

Piglets with enteric colibacillosis must be treated with antibacterial drugs given by mouth and intramuscular injections. In addition, if the piglets are dehydrated they should be given some glucose and fluids by mouth and/or injections into the abdominal cavity, all three are necessary. Death from diarrhea is the result of dehydration. Providing insufficient fluids is an important reason for the failure of treatment for scours.

The prevention of enteric colibacillosis should be of utmost concern to swine producers. It is costly to be constantly treating piglets for diarrhea: the losses resulting from dead pigs and the expenditures for treatment are too great.

The problems of baby pig scours can be minimized or eliminated by practising the principles of disease prevention. More specifically, the following should be considered:

- Avoid continuous farrowing in the same pens without a break for cleaning and disinfection.
- Practice group breeding and farrowing. This allows for a complete cleanout and period of vacancy (up to 10 days) before the next group of pregnant sows or gilts starts to fill the farrowing barn.
- Raise all pregnant gilts in the environment of the sows that have been on the farm before. This allows the gilts to come in contact with the bacteria and they will become immune. This immunity is passed on to piglets when they receive the colostrum or first milk.

Every effort should be made to give the piglet a good start at birth. Someone should be present at the time of farrowing and completely dry off each pig as it is born, put each pig in a warm, clean box until the last pig is born and then wash off the sow's udder and allow the piglets to nurse as a whole litter. In this way each piglet gets about the same level of immune bodies from the colostrum. If the piglets

are allowed to nurse in succession as they are born, there is a rapid drop in the concentration of immune bodies in the colostrum as each new piglet suckles and the pigs born during the latter part of farrowing receive less immunoglobulin.

Vaccines for the prevention of baby pig scours are available but the results have been inconsistent. The vaccine is given to the gilt or sow some weeks before farrowing and she then passes this immunity on to the piglets through her colostrum.

There is little documented evidence that feeding antibiotics to the sow during pregnancy or injecting her with antibiotics just before farrowing will prevent infectious scours in baby pigs. The medications used in feeds do not eliminate the bacteria from the environment of the piglet. Levels of antibiotics, recommended for injection, are insufficient to protect the piglets nursing on colostrum.

In summary, the prevention of baby pig scours depends on:

- Good management, good housing and good nutrition of the sow and gilt.
- Group breeding and farrowing and an ALL IN – ALL OUT program.
- The best sanitation possible.
- Early treatment of piglets.

Hypoglycemia (3-day baby pig disease)

Hypoglycemia (low blood sugar) occurs when piglets are starved when they are less than 1 week of age. Starvation in piglets is usually due to a lack of milk production because the sow is seriously ill or dying. Piglets under 1 week of age are too immature to draw on body reserves for energy and consequently their blood sugar level goes down.

Affected piglets show some incoordination, shiver, are cold and clammy, their hair stands on end, and they appear hungry. They usually have a subnormal temperature, become very weak and, within 24 hours, are lying on their sides in a coma which is usually followed by death.

Affected piglets require an intraperitoneal injection of 10 to 15 cc of a 5 percent solution of glucose repeated at intervals of 4 to 6 hours. Recovery is evident when the pig begins to feed from a foster mother, or drinks cow's milk from a pan or bottle.

Prevention of hypoglycemia depends on making certain that piglets under 1 week of age receive a supply of energy either from the feeding of a milk substitute or 5 percent glucose. A ready source of energy is 1 oz of corn syrup given every 4 hours by mouth. It may be mixed with the cow's milk.

Starvation of baby pigs

If piglets older than 1 week of age are starved because the milk production in the sow declines drastically for any reason, the piglets will lose weight, become severely dehydrated and die in a few days. Such piglets can be weaned on to cow's milk provided in a small tray. Every effort should be made to stimulate milk production or let-down in the sow. An injection of oxytocin will usually cause a milk let-down and it may be enough to keep the piglets alive until the sow's milk production returns to normal, which normally happens in 24 to 36 hours after treatment. Viral

Viral encephalomyelitis of swine (vomiting and wasting disease)

There are several related viruses that cause infection of the brain and spinal cord (encephalomyelitis) of baby pigs. The disease usually occurs when the piglets are about 1 week of age but it can also occur in older piglets. The disease usually occurs in explosive form when there are many young piglets in the farrowing barn at the same time. Usually all pigs die if they get the disease when under 2 to 3 weeks of age.

The entire litter is usually affected. The sick pigs stop nursing, develop a fever and vomit in the early stages. They are usually constipated. In about 24 hours after the start of the illness, signs of encephalitis may occur. The pigs are stiff, incoordinated, fall backwards when they walk and squeal when touched. Some pigs fall on their sides, paddle their legs, stretch out their head and neck and often go into a convulsion. By about the third or fourth day, they have lost considerable weight and then lie quietly. The older pigs, the weaners, feeders, sows and boars, usually develop a mild form of the disease. They have a mild fever, vomit and go off feed for 1 or 2 days and then recover completely. There is no specific treatment for the disease. Some piglets will only vomit and waste and not show any signs of encephalitis. Older pigs, up to weaning age, rarely show nervous signs but may get a chronic form of vomiting and wasting disease. They remain stunted, unthrifty and never fully recover.

An outbreak of the disease is very difficult to control. In the early stages, it may be possible to isolate all pregnant sows or gilts that are going to farrow in the next 2 to 3 weeks. Sows and gilts, that are more than 3 weeks away from farrowing should be brought into the infected farrowing house so that they will come in contact with the virus, develop an immunity and pass it on to their piglets. Such a plan has been quite effective.

There is still some controversy about whether or not viral encephalomyelitis of swine and vomiting and wasting disease of swine are related. For practical purposes at the present time it is safe to assume that they are closely related diseases.

Streptococcal arthritis and meningitis

Arthritis is inflammation and swelling of the joints. Meningitis is inflammation of the membranes covering the brain. Streptococci bacteria commonly cause arthritis in piglets at about 2 weeks of age. The arthritis is seen as swollen, painful joints and usually the back and elbow joints are affected. The pig has a fever and is always lame. Meningitis is present when the piglet shows loss of balance, falling on his side, shaking and finally convulsions and death. Treatment with penicillin in the early stages is remarkably effective. When an outbreak occurs, the farrowing barn and nursery must be cleaned out, disinfected and left vacant for several days. The infection is carried by the sow for a long time.

Greasy pigs disease (exudative epidermitis)

Greasy pig disease is a common disease of piglets from 1 week to 6 to 8 weeks of age. The younger the pig, the more severe the disease. As the name suggests, the entire body of the pig becomes covered with a dark brown, grease-like substance

that is the result of a widespread inflammation of the skin. During the first few hours of the disease, the piglet looks red, then he becomes covered with the dark brown greasy material, which turns to a very dark color if he survives.

The hyperacute disease is common in piglets at about 1 week of age and they usually die in 48 hours with a black appearance. The entire litter is usually affected.

The acute disease also occurs in older piglets and, if they are not treated, they will die in about 2 to 4 days. Some piglets survive but remain unthrifty for several weeks and are covered with brown flake-like scales, which peel off easily leaving a normal skin beneath. The disease is caused by a specific bacteria, *Staphylococcus hyicers.* Treatment consists of the injection of long-acting penicillin and the application of a penicillin ointment. Many affected piglets die in spite of treatment. When an outbreak occurs, a thorough cleaning and disinfection of the farrowing barn and nursery must be carried out.

Transmissible gastroenteritis (TGE)

This disease has been known for many years in the U.S.A. but only recently has it been diagnosed in Canada. It affects piglets under 2 weeks of age and causes diarrhea and vomiting, and the piglets usually die. It usually affects the entire litter and will spread very quickly to all other young piglets. It is therefore a very explosive disease and can completely wipe out all piglets under 2 to 3 weeks of age. There is no treatment. All pregnant sows and gilts that are due to farrow within 3 weeks from the start of an outbreak should be farrowed in isolation. All sows and gilts due to farrow in more than 1 month may be brought into the infected barn to let them become infected and develop an immunity, which will be passed on to their piglets through the colostrum. A veterinarian should be consulted before undertaking such a prevention program. A vaccine is being developed and may be available soon.

Rhinitis (inflammation of the nasal cavity)

Atrophic rhinitis is a disease characterized by sneezing in piglets and a distorted snout when the pig is actively growing. The exact cause, or causes, of atrophic rhinitis (turbinate atrophy, leading to twisted noses) was unknown for a long time. There is now fairly good acceptance that most of the atrophic rhinitis is caused by infection with the bacteria *Bordetella brochiseptica.* If a pig's snout is distorted by atrophic rhinitis, the infection was probably transmitted from its infected mother which may not show any symptoms.

Atrophic rhinitis may or may not cause distortion of the snout. However, distortion suggests a severe case of rhinitis. The major effect of atrophic rhinitis is reduced growth rate.

The effects of rhinitis can be minimized by good ventilation, a reduction in dust, and the addition of antibiotics in the feed at therapeutic levels until the pigs are marketed. The prevention of rhinitis is difficult to achieve under the conventional systems of rearing pigs.

Some recent work has shown that the bacteria *Bordetella brochiseptica,* which are responsible for most cases of atrophic rhinitis (turbinate atrophy), can be successfully eliminated from the nasal cavities of swine by medication of the feed for about 3 weeks with a suitable sulfonamide. A nasal swab is taken from the noses of suspected pigs and the laboratory attempts to culture the bacteria and determine which drug should be used. If the organism is eliminated from the noses, the swabs taken after treatment will be negative and there is a very good chance that progeny from those breeding stock will not become infected, provided there is no new introduction of infected pigs. There is no effective treatment for deviation of the nose and, though the medicated feed may eliminate the bacteria, the nose, if already twisted, will remain twisted.

Inclusion body rhinitis (piglet sniffles)

Inclusion body rhinitis is an acute viral disease of piglets of about 2 to 4 weeks of age. Every piglet in the litter may be affected with a stuffed nasal cavity which causes sneezy breathing. Thick yellowish discharge usually drains from the nostrils. Affected piglets will usually be sick for about 1 week and lose considerable weight. Consult your veterinarian for his choice of antibiotics and nasal spray which are necessary for treatment. Affected piglets need special care and treatment because they commonly get a secondary pneumonia caused by *Pasturella muetocida* or *Bordetella bronshiseptica.*

To date there is no evidence of any relationship between the virus that causes inclusion body rhinitis and the virus that cause atrophic rhinitis. The control and prevention of inclusion body rhinitis is difficult because almost nothing is known about the virus. Affected piglets should be isolated from the rest of the herd.

Unthrifty young piglets

Unthriftiness is fairly common in piglets that have had diarrhea. They seem to recover from the diarrhea but never do well and become 'runty' pigs. They should be grouped together and fed water-soaked rations fortified with minerals and B-vitamins. Some will gain weight but most will not and it is probably not economical to keep such pigs.

DISEASES OF WEANLING, GROWING AND FINISHING PIG

Swine dysentery (bloody scours)

Swine dysentery is one of the most common infectious diseases of the digestive tract of swine. Affected pigs have diarrhea. The manure (stool or feces) is soft, sometimes like jelly, and its color varies from a cement grey in mild cases to a bright red in severe cases where there is hemorrhage in the large bowel. Most pigs with dysentery will have diarrhea for several days, their abdomen looks gaunt or empty and they lose weight. The disease will normally spread slowly but steadily in a barn where large numbers of pigs are raised together. The agent responsible for

the disease is present in manure and the disease will spread if pigs are overcrowded, or if there is direct communication between pens.

This disease is most common in growing and finishing pigs. It usually starts in the growing pigs and spreads to the older and younger pigs. In the weanling age group, it can be confused with weanling diarrhea of piglets.

The treatment of choice for swine dysentery has been arsanilic acid in the drinking water for 6 days. In some cases, arsanilic acid will not be effective and other specific antibiotics such as tylosin may be necessary. Pigs that are obviously ill and not eating, should be treated individually because they usually do not drink enough medicated water for effective treatment. Individual treatment consists of daily intramuscular injections with an antibiotic such as tylosin for 3 days.

The control and prevention of severe dysentery is difficult. It can be a most frustrating disease because, after a successful treatment, it will reappear in the same pigs or barn after a few days or weeks.

Prevention is dependent almost entirely on serial depopulation of the pens as the pigs go to market, followed by cleanup and disinfection, a period of vacancy (about 1 week), and then restocking with pigs of known origin. This system of ALL IN - ALL OUT is very effective if it can be programmed. In addition, an arsenic compound or an antibiotic or sulfonamide can be added to the water supply of newly arrived pigs for the first week.

The inclusion of antibiotics in feeds for the long-term prevention of swine dysentery has not given consistent results. It seems to work on some farms but on others has given poor results. Consult your veterinarian for advice on the use of antibiotics in the feed.

Weanling diarrhea (enteric colibacillosis)

Weanling diarrhea is probably the most common disease of the modern pig. It is characterized by diarrhea and some other acute signs at about the time of weaning, or shortly thereafter.

There is more than one form of the disease, but the most common type is recognized by a yellowish-colored diarrhea, a loss of appetite and a gradual loss of body weight. The pig usually scours for several days and then dies. Some pigs die quickly, usually on the first day, because of an acute infection in the bloodstream.

The treatment for weanling diarrhea is starvation for 1 or 2 days and medication of the drinking water supply with nitrofurazone compounds for 6 days. Pigs that are obviously ill must be treated with an injection of a broad-spectrum antibiotic to hasten recovery so that they will drink enough medicated water. The prevention of weanling diarrhea is difficult. There is no available vaccine of any value. However, with good management, the incidence and the effects can be minimized.

The cause of weanling diarrhea is complex and involves feeding programs, management of pigs at weaning time, and the bacteria present in their intestines.

Some practical suggestions for the prevention of weanling diarrhea are:

- If early weaning (at 3 weeks of age) is causing too much trouble with diarrhea, then delay weaning for a further 2-3 weeks until the pigs are 4 to 6 weeks of age.

- Offer a creep feed to piglets at about 5 days of age. The creep feed should be placed in easily accessible creep feeders and only in small amounts. If the piglets do not eat the allotted amount, remove it and replace with fresh feed. It is undesirable to put a 2- or 3-week supply of creep feed in a feeder as it becomes stale and loses its appeal.
- Make sure piglets have a supply of clean water located near the creep feeder. Also, keep them from eating or drinking from the sow's feed or water supply.
- Use a palatable, high-quality creep feed. Do not give weanlings a combination of skim milk and high-quality creep feed; such a mixture causes digestive upsets leading to colibacillosis.
- At weaning time, remove the sow from the farrowing crate and leave the piglets in their creep areas for at least 1 week. In this way the only major change for the piglets is the loss of the sow.
- Carry out all routine procedures, such as castration and vaccination, before or after weaning. If done on the day of weaning, they cause too great a stress resulting in digestive upsets and weanling diarrhea.
- For a feeder operation, buy weanlings from a breeder who will supply them on a regular contract basis. The pigs should be at least 6 weeks of age. During transportation, especially during the cold seasons, weanlings should have lots of bedding and the traveling time should be at a minimum. Much of the success of a feeder operation depends on the trucker who handles weanlings with a minimum of stress.
- Consult your local veterinarian before using medicated water and feed. In some cases, the general use of nitrofurans in water seems to precipitate the disease but in others medicated water is beneficial. Some large commercial feeders no longer use medicated feed or water unless disease is evident. Others claim good results by medicating the water supply for the first week after arrival.
- Starve weanling pigs with diarrhea for a few days and give them only medicated water until they have returned to normal.

Unthrifty pigs from weanling diarrhea

Some pigs that develop weanling diarrhea remain ill for a long time following the acute stage of the disease. They have poor appetites, continue to lose weight and become very unthrifty. They are sometimes called runts. These pigs have suffered irreparable damage to the digestive tracts and they lack the ability to absorb nutrients. There is no specific treatment. Affected pigs should be fed water-soaked feed with a high level of anitibiotics and B-complex vitamins. However, only a few will respond to this kind of treatment.

Gut edema

This is an acute disease of well-nourished pigs which have been weaned recently. Usually only one or two pigs out of a group get the disease. They are commonly found dead and a postmortem examination is necessary to establish the diagnosis. When still alive, they are seen staggering about with swollen eyelids or partly blind.

There is no specific treatment. The disease is associated with the weanling diarrhea complex and the same principles of control and prevention usually apply.

Gastric ulcers

Growing-finishing pigs are susceptible to gastric (stomach) ulcers. If the ulcer erodes a blood vessel there will be acute hemorrhaging and the pig dies suddenly. These acute cases are not common; the chronic or subacute condition is more prevalent.

Ulcers cause a reduced growth rate, the skin appears pale and the feces are dark and sometimes black. In some herds, many pigs have chronic ulcers but they are never noticed because of outstanding symptoms, other than a reduced growth rate, are lacking.

The cause of stomach ulcers in swine remains a mystery. Much research has been done and the conclusions are that the cause is very complex. It is now believed that stress, close confinement and feeding practices are all involved. Some researchers claim that simply moving growing pigs from one pen to another will cause ulcers. A change in the consistency of the feed may also precipitate the disease.

Enzootic swine pneumonia

Enzootic swine pneumonia was formerly called virus pneumonia of pigs.

It now seems established that enzootic swine pneumonia is caused by an infectious agent known as mycoplasma. These microorganisms are between the sizes of viruses and bacteria. They are infectious and seem to need the pig as a reservoir of infection. We now believe that infected sows or growing-finishing pigs act as reservoirs and they pass the infection on to piglets shortly after birth.

Enzootic swine pneumonia is a chronic low-grade infection of the lung. The disease is most common in growing-finishing pigs but can occur in young piglets and in recently weaned piglets. The primary infection doesn't cause much illness but causes a chronic cough and probably reduces growth rate. If the ventilation is poor, and if the pigs are overcrowded, pneumonia will become subacute and the major problem will be that the pigs will not 'fatten up' but require several months to reach market weight.

In a group of pigs with enzootic swine pneumonia there will be flare-ups of acute pneumonia caused by the Pasteurella bacteria. Affected pigs will show labored breathing, will stretch out on cool concrete and have a fever up to 106°F. These cases require treatment with antibiotics such as a mixture of penicillin-streptomycin. They usually respond favorably within 24 hours. However, relapses of acute bacterial pneumonia can occur in the same pigs. In summary, enzootic swine pneumonia is a mild disease that causes a chronic infection and reduced growth rate; flare-ups of acute pneumonia will occur in some of the pigs.

There is no specific treatment for enzootic swine pneumonia. The bacterial pneumonia is secondary and responds to treatment but the pigs are still left with enzootic swine pneumonia.

The stress factors can be minimized using effective ventilation, avoidance of dusty feed, and overcrowding. Pigs with acute pneumonia should be treated with antibiotics. The prime objective should be to get the pigs to market as soon as possible. Medicating the feed with antibiotics such as chlortetracycline or oxytetracycline at a level of 200 to 400 gm per ton of feed will often be very beneficial and will reduce the number of pigs that develop acute bacterial pneumonia.

When a producer has enzootic swine pneumonia in his pigs, he can decide to tolerate the disease by minimizing stress or he can attempt to eradicate it by depopulating the entire barn and restocking with pigs from a herd known to be free of enzootic swine pneumonia and atrophic rhinitis. Some producers will prefer to restock with Specific Pathogen Free (SPF) pigs.

The necessity for pigs free of atrophic rhinitis and enzootic pneumonia has brought about the development of so-called Specific Pathogen Free (SPF) pigs. These are piglets taken by caesarean section, or by hysterectomy, a few days before the sow was due to farrow and raised in isolation until they were several weeks old. They were then placed in clean premises that previously had no pigs (such as new barns) or that had been cleaned out, disinfected and left vacant for several weeks. The words 'Specific Pathogen' referred to the pathogens (disease-producing agents) believed to be responsible for the atrophic rhinitis and enzootic pneumonia. Descendants of the primary SPF stock were also considered to be SPF pigs.

When SPF pigs were first used they showed considerable improvement over conventionally reared pigs. They grew faster and there was marked increase in feed efficiency and improvement in maturity.

With the recent advances in swine nutrition, housing, and the application of the basic principles of disease control, the gap between SPF and conventional pigs has narrowed. It has been very difficult to determine how much of the success is due to better management, nutrition and disease control and how much was due to having SPF pigs.

It is important to remember that when you have SPF stock, you have broken the cycle of infection, which may have existed in the past, but there is no guarantee that a new infection will not occur in the future. Many SPF herds were established, but only a few exist today. Laboratory examination of heads and lungs of slaughtered SPF market pigs showed evidence of atrophic rhinitis and/or enzootic pneumonia. When this happened those herds were no longer SPF and the producer had to tolerate these two diseases or depopulate and restock with clean breeding stock.

Glasser's disease (infectious polyserositis)

Glasser's disease is an infectious disease of recently weaned and growing pigs. There is widespread inflammation of the serous membranes, for example, peritoneum of the abdominal cavity, the pleura of the lungs and the meninges of the brain. Affected pigs have arthritis, peritonitis, pleurisy and meningitis. The disease is difficult to diagnose clinically prior to a postmortem examination. In a group of infected pigs, there are usually more chronic than acute cases.

Treatment consists of injections of tetracyclines. In addition, the feed should be medicated for 10 to 14 days following the initial outbreak. The disease is usually associated with stress such as weaning, moving, cold weather, or poor ventilation. Prevention depends on effectively minimizing these stress factors.

Erysipelas

Erysipelas is a disease of pigs of all ages but it usually affects growing and finishing pigs and adult sows. The disease is caused by a bacteria *Erysipelothrix insidiosa,* which is found in the soil. In modern swine units where pigs are confined on concrete floors and never contact the soil, the incidence of erysipelas has been reduced considerably.

Erysipelas occurs in more than one form. It can cause sudden and rapid deaths in large groups of finishing pigs. Some pigs are found dead, but many are off their feed, look very sick and have a fever of up to 108°F. Many of these sick pigs will die. Those that live, will develop the typical 'diamond-skin' form of the disease. Diamond-shaped reddened areas appear all over the body and are evident for a few days. Most pigs with the 'diamond-skin' form of the disease will respond to treatment with high doses of penicillin. Adult sows usually get the typical skin symptoms during the hot summer months. Sick animals go off their feed, have a fever of up to 106°F and lose their milk. They also need treatment. Arthritis is another common form of erysipelas. One or more joints become swollen and painful and the pig is lame. Usually, there is a fever from 103 to 105°F. This type of arthritis often responds to treatment with penicillin but, if not treated, the condition becomes chronic and the pig becomes permanently crippled.

Erysipelas can be prevented by vaccination. Weanlings are vaccinated at 6-8 weeks of age and the protection usually lasts until the pigs are marketed. Breeding stock should be revaccinated about 4 weeks before the expected farrowing date. The piglets will then obtain protection through the colostrum for 6 to 8 weeks.

Salmonellosis

Salmonellosis is an infectious disease of pigs caused by Salmonella bacteria. This disease usually affects growing and fattening pigs but it can occur in pigs of any age. In an outbreak of this disease, a few pigs are found dead with blue-purple skin, others are very ill with fevers and blue-purple colored ears and some show diarrhea only. All sick pigs must be treated with a broad spectrum antibiotic. Also the drinking water must be medicated with a broad spectrum antibiotic and a nitrofuran type drug for 6 days. No vaccine is effective in the prevention of salmonellosis. In most cases, it is wise to completely depopulate, cleanout, disinfect and vacate the premises for several weeks before restocking. The salmonella bacteria can remain viable in moist places for several months and thus can be a source of infection in the barn for a long time. The principles of sanitation are therefore very important in the prevention and control of this disease.

Greasy pig disease (exudative epidermitis)

Greasy pig disease occurs chiefly in suckling pigs and has already been discussed (page 18).

Pityriasis rosea

This is a skin disease of recently weaned pigs. It usually affects only one or two pigs in a litter and is characterized by raised red rings scattered over the skin of the belly spreading over the rump and back. There is no itching and usually no observable systemic effect. There is no specific treatment and recovery occurs in 2 to 3 weeks. The cause is unknown.

Sarcoptic mange

Sarcoptic mange is caused by the sarcoptes mite. This parasite is usually found on growing pigs and causes grey-colored crustations over the back, behind the ears, on the legs and along the sides. The outstanding symptom is scratching because the mite burrows into the layers of the skin and causes intense itchiness. The parasite will spread to most of the pigs kept in a close group. The adult sow seems to be the carrier although she may or may not show signs of itchiness. The mites live in the inside of the sow's ears and spread from there to the piglets. Mange must be treated with an insecticide. Only a few insecticides are now permitted because of residues in fat and meat and your veterinarian should be consulted for advice on treatment.

Parakeratosis

Parakeratosis is an abnormal thickening of the skin of pigs caused by a deficiency of zinc in the diet. The requirement for zinc increases if there is too much calcium in the diet and if pigs are receiving a balanced ration the condition should not occur.

Ringworm

Ringworm causes the development of large areas of alopecia (hair loss) on the sides of pigs. It is seldom encountered. The adult sows and boars are often carriers of the infection without showing any noticeable signs.

Swine pox

Swine pox causes 'pock' sores on the skin of the belly and these usually heal quickly. The louse of swine spreads the disease from pig to pig. Swine pox is uncommon and there is no specific treatment.

Mulberry heart disease

This disease of growing and finishing pigs is quite common in some areas of Western Canada. It causes sudden death in well-nourished thrifty pigs. Sick pigs

appear blue, are very weak and breathe heavily because of damaged heart. At postmortem, hemorrhages are present on the heart and some pigs have lesions in the liver (thus the term hepatosis dietetica); these are sometimes considered as part of the mulberry heart disease syndrome. It is believed that the disease is due to a nutritional deficiency of vitamin E and selenium. The incidence of hepatosis dietetica is higher in pigs fed a high soya diet than in pigs fed cereal grains. Some protection is provided by the inclusion of selenium as sodium selenite in the diet but much more research is necessary in this area. Also, it is believed that gastric ulcers may be linked to the mulberry heart and hepatosis dietetica syndromes but this relationship is not clear at present. Recent research has shown a wide variation in the levels of selenium in grains grown in different parts of Canada. It seems that there is a higher incidence of the mulberry heart disease – hepatosis dietetica complex – in areas where the selenium content of the soil is low. This suggests that swine nutritionists will have to examine the possiblility of including selenium as a nutrient requirement in swine rations.

Mulberry heart disease usually occurs in small outbreaks. From 5 to 10 percent of the market-weight pigs can become affected suddenly and most will die in a matter of hours. All 'in-contact' pigs are usually treated individually with an injection of vitamin E and selenium. A feed mixture containing vitamin E and selenium fed for several days provides some degree of protection.

Tail biting

Tail biting is now a common disorder of growing and fattening pigs that are confined in close quarters. Usually one pig will start biting tails and this is soon acquired by several other pigs. Tail biters grasp the tail firmly with their incisor teeth and pull on the tail, thus cutting transversely across the tail. This usually results in bleeding which attracts other pigs and a vicious cycle is started. The tips of the tails are usually chewed off and the tail appears like a swollen stump, which is very painful. Infection usually spreads up the tail and into the tissues of the rump to the spinal cord, causing paralysis of the hindquarters.

If the infection spreads to the bloodstream, deep-seated abscesses and arthritis will occur. When these abscesses break open, there is further spread of the infection to other pigs. Pigs that develop arthritis are usually permanently crippled and, since no treatment is effective, they should be isolated. Pigs with abscesses and arthritis will seldom pass inspection at slaughter.

It is now believed that tail biting is caused by boredom and inadequate ventilation. It is difficult to do much about the boredom of pigs confined in close quarters. Some producers claimed that hanging old tires in the middle of a pen has minimized tail biting. However, this is not a practical measure in large operations and the prevention of tail biting will probably depend on providing adequate ventilation. Docking the tails shortly after birth is now a popular method of preventing tail biting.

Poisonings in swine

The common types of poisonings in swine are:

- Salt poisoning.
- Organic arsenical poisoning.
- Mercury poisoning.

Salt poisoning usually occurs in growing pigs that have been given an excessive quantity of salt and, at the same time, been deprived of water for a day or so and then allowed free access to water. Pigs will not poison themselves on salt if they have free access to water. Salt poisoning in pigs is characterized by the development of epileptiform convulsions, which last about 1 minute and occur regularly about every 7 minutes. Recovery usually follows. There is no specific treatment. Pigs should never be given excessive quantities of salt without free access to water.

Arsenic poisoning occurs in pigs that have been given organic arsenicals in excessive concentration in drinking water or in normal concentration for a long period. Arsenic medication should not exceed 6 days. Arsenic poisoning causes the 'drunken sailor' syndrome. Affected pigs stagger, are blind and usually don't eat or drink. If they have received minor quantities of arsenic, they usually recover without treatment.

Mercury poisoning occurs in pigs fed grain that has been treated with mercury compounds for the control of fungal diseases in field crops. Affected pigs are simply sick and don't do well; some develop nervous signs and others develop a chronic bloody diarrhea. The signs will vary depending on the type of mercurial compound ingested. There is no specific treatment and affected pigs should be destroyed and not sent to slaughter. It is extremely difficult to suggest what level of mercury pigs can safely tolerate. At the present time, no level of mercury should be tolerated in swine feeds.

Nutritional diseases of the bones and joints

A general term for nutritional bone disease is osteodystrophy, which means a degeneration of the bone.

Growing and fattening pigs, as well as lactating sows and young boars, are susceptible to nutritional bone diseases. The general symptoms are stiffness, knuckling over at the fetlock joints, bowing of the long bones, fractures of long bones, particularly the femur (ham bone), which is one cause of the 'downer sow' syndrome and inability of young boars to breed because of painful hip joints (sometimes known as leg weakness). Many pigs may be affected in a short time.

Most commonly these disorders are caused by a absolute deficiency of calcium, phosphorus and vitamin D or an imbalance of calcium to phosphorus in the diet. Pigs raised indoors, need vitamin D supplementation in their diet. In other instances the cause(s) is not known and some diseases of the bones and joints, which appear to be nutritional in origin, may be inherited. The diagnosis is extremely difficult and should be left up to a veterinarian who will need laboratory assistance. When nutritional bone disease is suspected, the ration should be analyzed at a feed testing laboratory.

Internal parasites

The most important internal parasite of swine is the large intestinal roundworm called *Ascaris suum.* At least four other species of worms are becoming important in swine: the nodular worm, *Esophagostomum;* the stomach worm *Hyostrongylus rubidus;* the shipworm, *Trichuris suis;* and the lungworm, *Metastrongylus.*

Infection with the large intestinal roundworm is most common in young pigs from weaning age up to 4 months of age. The symptoms are coughing, unthriftiness and weight loss. The young stages of the worm migrate through the lungs and liver before localizing in the small intestine as adults.

The nodular worm causes chronic diarrhea, poor appetites and unthriftiness. The main lesion is the formation of nodules in the large intestine.

The stomach worm, is most common in adult sows and results in loss of weight, anemia, and diarrhea or constipation. The worms are localized in the stomach and are very difficult to see at postmortem.

The whipworm is found in the large intestine and causes chronic diarrhea, anemia and loss of body weight.

The swine lungworm is not common in Canada.

Diagnosis of internal parasites in swine depends on the clinical symptoms, the laboratory examination of feces, and the examination of pigs at postmortem. In large swine operations it is often helpful to kill a few of the unthrifty pigs and submit them for a postmortem examination. There are specific lesions of each parasite.

The control and prevention of internal parasites in swine depends upon good sanitation to prevent reinfection and regular treatment by deworming. Weaned pigs are treated with piperazine compound shortly after weaning. Sows and gilts are treated in late pregnancy.

DISEASES OF THE BREEDING GILT OR SOW

Anestrus (no estrus)

Failure of breeding females to come into observable heat is probably the most common problem encountered in breeding stock. The problem seems to have become more prevalent since total confinement rearing of swine has become common. Some producers claim that the problem is more serious where sows and gilts are kept in individual stalls and don't get any exercise.

There are two anestrus problems: 1) sows and gilts do not come into heat, and 2) sows and gilts come into heat but only a few show heat symptoms.

In some herds, about 50 percent of sows and gilts fail to show any detectable signs of heat. It has been shown that the smell and sight of a boar, as well as his grunting, have a psychological effect on the sow or gilt in heat. A boar penned across an alley and within sight and hearing distance of sows and gilts is a better stimulus than one running with the herd. Following are some of the causes of failure to come into heat.

Insufficient lighting – Sows and gilts should have at least 10 hours of light every day. There is a direct correlation between amount of light and reproductive cycles in mammals. Some farrow-finish buildings have no windows and are dark inside most of the time.

Uncomfortable housing – Some swine barns are dark, cold, wet and overcrowded and under these circumstances the sows and gilts will not cycle regularly or if they are cycling, they may not show heat (silent heat).

In tie-stall barns, the neck collar may be too tight and thus cause uneasiness and discomfort which will prevent normal estrus.

Individual stalls (cubicles) in which the sow can have some degree of freedom seems to be much more satisfactory. Most tie stalls have the sow or gilt facing a blank wall rather than facing an alleyway across from which may be the boar pens.

Malnutrition – Malnutrition usually means a disorder caused by a lack of one or more of the dietary nutrients such as energy, protein, fat, minerals and vitamins. Malnutrition due to a lack of one or more nutrients is the most common form of nutritional disorder in sows and gilts. An excess of one or more nutrients (usually energy) can cause overweight and is, therefore, a type of malnutrition. Thin and fat sows may experience difficulties in normal heat cycles. The usual problem is that they don't come into heat at the expected time after they wean their pigs or, in the case of gilts, they don't come into heat for several weeks or months after they have reached puberty (breeding age).

The quality and amount of the ration the gilts received from weaning to puberty will often have an effect on the onset of first estrus after puberty. Those gilts that received a balanced ration during rapid growth will usually come into heat at puberty. After weaning, the sow should be on a rising plane of nutrition (flushing) until she is in pig. Complete starvation of the sow from all feed and water for 24 hours after weaning her pigs will induce estrus in 4 to 6 days.

With modern swine units, where restricted feeding during gestation combined with early weaning is practiced, the sow or gilt can become depleted of body reserves very quickly. After she weans her pigs, the sow requires several weeks – even months – to regain the high weight loss and, during this time, she may not come into heat.

Proper nutrition of the breeding gilt and sow is extremely important, particularly under intensified rearing systems. When a producer encounters a problem with anestrus, he should examine, first of all, the nutritional status of his sows or gilts. The nutritional history of the gilts is particularly important.

Other causes of anestrus – The percentage of sows and gilts that fail to come into heat because of a hormonal imbalance is extremely small and is probably not worth discussion. There is no justification for injectable hormones to bring sows and gilts into heat.

A very small percentage of sows and gilts will have a developmental abnormality of their reproductive tract that may prevent estrus. However, these also are not economically important.

Repeat breeder

The repeat breeder sow or gilt is one that doesn't conceive after breeding and continues to return to heat regularly every 3 weeks. Most repeat breeders will eventually conceive after successive breedings but a small number continue to cycle indefinitely and don't conceive. The causes of the repeat breeding syndrome are many, but some of the most common are:

- Insufficient number of boars for the size of breeding herd, or using too many young boars on too many sows or gilts.
- Sterility in the boar. It may be necessary to have the boar's semen evaluated by a veterinarian.
- Infections of the uterus. Fortunately, this is seldom encountered in Canadian sows and gilts.
- Moldy feeds. This may cause repeat breeding in swine but is seldom a problem in this country.

Moldy corn has been the cause of a variety of disturbances in swine. Whether or not molds growing on other grains presents a hazard is unknown. Certain molds produce estrogen-like hormones that can cause breeding problems, abortions and swellings of the vulva. Other molds produce toxins which cause liver damage. If moldy feed is suspected as a cause of disease, a sample of the feed should be submitted for an analysis of the species of mold and then recommendations can be made.

Abortions, mummified fetuses, stillbirths and congenital deformities

Abortion – Abortion is the birth of developing fetuses before full term. A common cause of abortion in swine is *leptospirosis* but this is not very common in Canada. Other causes of abortion are vitamin A deficiency in the sow during pregnancy and the feeding of feeds that may be toxic to the fetuses, such as a large quantity of rapeseed meal. There are many other causes of abortion in swine but only a few have been studied. Some viral infections also cause abortions. Some toxins formed in feed will cause abortions. It is difficult for the laboratory to determine the cause of infections or toxic abortions because the infection or the toxin may have occurred quite some time before the actual abortion. Only about 25 percent of the cases have been determined. For maximum efficiency in the diagnosis of abortions, submit as many fetuses and as much afterbirth as possible to the veterinary laboratory or to your veterinarian.

Mummified fetuses – Fetuses that have died in the uterus and are carried to full term instead of being aborted degenerate and shrink into small, dark-brown-colored masses of tissue. They are usually passed at full term and may accompany some live piglets. There are many causes of mummification and veterinary laboratory assistance is necessary for a diagnosis, which is often very difficult.

Stillbirths – There are many causes of stillbirths (piglets born dead at full term). Prolonged farrowing is a common cause. In normal farrowing, a piglet should be born about every 15 minutes. Long intervals between piglets increases the chance

for death while still in the birth canal. Farrowing assistance can reduce the incidence of stillbirths from sows that farrow slowly. Often there is something wrong with sows that take several hours to farrow. A veterinarian should be consulted for advice on how to provide farrowing assistance (page 7). Very often it is wisest to have a caesarean done in sows that take a long time to farrow and need assistance. Even when the operator removes several piglets by hand, he never really knows how many more still remain in the sow's uterus. In the time wasted over contemplating whether or not there are more piglets left, a caesarean could have been done with satisfactory results.

Other causes of stillbirths are inadequate nutrition of the sow during pregnancy, viral infections during pregnancy, too many fetuses in the uterus and the development of small piglets which simply lack strength at birth.

Congenital deformities – Congenital deformities are those present at birth. There are many causes of congenital defects. The inheritance of defective genes is only one cause. Anything that injures the embryo in the first third of pregnancy can cause a congenital defect. Inherited defects are usually congenital but not all congenital defects are inherited. Some of the common congenital defects of swine are:

- Vitamin A deficiency in the sow during pregnancy. This is probably the most common cause of deformities in newborn piglets and causes small eyes, absence of legs or eyes, swellings under the skin (usually generalized edema), absence of kidneys and deformities of the ears and jaws. The affected piglets may be born prematurely or carried to term but are usually dead.
- Inherited umbilical and scrotal hernia and cryptorchidism. These defects are not usually obvious at birth but show up later. They have been considered as inherited defects for many years. Now it is believed that not all umbilical hernias are inherited but some may be caused by excessive pulling of the umbilical (navel) vessels just after birth by the operator. Excessive pulling with the forceps to tie off the navel may weaken the belly wall surrounding the umbilicus. Surgery is required to repair umbilical and scrotal hernias as well as cryptorchidism (undescended testes). When a large number of cryptorchid pigs show up, the boar should be suspect.

In many instances, it is difficult to determine with accuracy the cause of a congenital defect. Whatever caused the defect – a nutritional deficiency, an infection with viruses, or inheritance – the effect on the embryo occurred during the early stages of pregnancy and there are no clear-cut tests that can be conducted to provide a positive answer. Only after careful consideration of the breeding history, the breeding stock, the nutrition of the pregnant sows and the occurrence of any diseases during early pregnancy, can a possible cause be suggested.

Thin-sow syndrome

In recent years, some producers have recognized a wasting disease in sows. It usually starts with an unusually heavy weight loss in lactation and early pregnancy, followed by a failure to regain enough weight before farrowing again. In some cases

the thinness becomes progressive and the sow dies of emaciation. Some cases have been attributed to parasitism. In other cases, thin sows are the result of poor environment and management. The main environmental cause is cold and damp housing, particularly during early pregnancy. The feeding of strict levels of feed to sows, regardless of their condition, and the practice of restricted low-level feeding of pregnant sows also contributes to excessive weight loss. The thin-sow syndrome can be avoided by providing warmth and comfort for sows, regular deworming practices and feed according to individual requirements.

Lameness in breeding stock

There are many causes of lameness in gilts, sows and boars. Some of these are listed below.

Osteodystrophies (metabolic disease of the bones) – This is due to a dietary deficiency or imbalance of calcium, phosphorus and vitamins. Affected animals may appear stiff when they walk. If the deficiency is not corrected, the stiffness becomes worse and eventually the animal is permanently crippled.

The downer-sow syndrome occurs in sows that have gone through a long and heavy lactation and, a few days after they have weaned their pigs, they go down in the hindquarters and can't get up. Some of these sows have pathological fractures of the bones in the hind legs caused by bone demineralization resulting from heavy lactation. Not all downer sows have fractures. Some downer sows have spinal cord abscesses and some have fractured spinal column. These are difficult to diagnose. About one half of downer sows after weaning have no recognizable abnormalities. It is possible that some of them have 'sore bones and joints' because of mineral drain following a long, heavy lactation. If these downer sows are carefully looked after and fed a ration containing the necessary minerals and vitamins, they will usually improve.

Most osteodystrophies can be prevented by an adequate nutritional level. Breeding stock raised under total confinement and fed under modern systems need a well-balanced ration and, where restricted feeding is practiced, they may need increased levels of mineral and vitamins in their diet.

Diseases of the foot – There are a few diseases of the feet that cause lameness in breeding stock. Some gilts and sows will develop sore feet when introduced to a new barn with an abrasive concrete floor surface. Examination of their feet reveals that the soles are very tender and warm. The soles of the feet of boars seem to be very susceptible to cracks and sores, which cause severe lameness. Foot rot may occur as a secondary condition.

A veterinarian should be consulted for an accurate diagnosis and treatment.

The soles and hooves may have to be trimmed and cleaned out. This is a very painful procedure and the veterinarian will usually use a general anaesthetic to put the animal 'to sleep' while the trimming is done. After trimming, the feet are usually bandaged for a few days and recovery is rapid. Boars will usually breed within a few days of the operation whereas they had difficulty before.

Chronic arthritis – The most common cause of chronic arthritis in adult swine is erysipelas. Affected animals usually have slightly swollen, stiff joints and prefer to

be down most of the time. Pigs with chronic arthritis are usually unthrifty and do not respond to treatment. A veterinarian should be consulted for a positive diagnosis. Effective preventive measures are available for erysipelas.

Parasites in breeding swine

Internal parasites in adult swine – The common roundworm of swine is *ascaris lumbricoides*. Sows should be allowed to pass their worms in a 'dirty' pen, and then should be washed down with soap and water, and placed in a 'clean' pen prior to going into the farrowing barn. Sows should be free of roundworms and their eggs before they enter the farrowing barn, as this will minimize the spread of worms to young pigs.

The red stomach worm of swine (*Hyostrongylus rubidus*) lives on the lining of the stomach of adult swine and causes unthriftiness and may contribute to the 'thin-sow syndrome'. A laboratory examination of the feces is necessary for a diagnosis.

Other internal parasites of swine include *Esophagostomum, Strongyloides* and *Trichuris* roundworms. They occur sporadically and a laboratory examination of the feces is necessary for a diagnosis.

Coccidiosis occurs occasionally in adult swine. It causes unthriftiness, poor production and diarrhea or constipation. If internal parasites are suspected, a veterinarian should be consulted before a widespread deworming program is started without an accurate diagnosis. There are many causes of unthriftiness in sows and it is not economical, in the long run, to treat blindly without a diagnosis.

External parasites of breeding swine – The common external parasites of adult swine are sarcoptic mange caused by the mite *Sarcoptes scabei* and lice caused by *Hematopinus sirus*. Sows and boars can act as reservoirs for the mange mite. The mite will often settle in the ears of sows and may not cause any scratching. However, sows do develop skin mange and will scratch excessively. Mange in sows can be treated with topical malathion preparation and it is important to treat the insides of their ears.

Lice in swine are important because of diseases they can spread. A wide variety of insecticides are available for their control.

Rectal prolapse in adult swine

The causes of rectal prolapse are not definitely known. Constipation, parasites and confinement in individual stalls with a very steep floor are thought to predispose to rectal prolapse. The prolapsed rectum must be replaced and sutured in place as soon as possible before tissue damage occurs from exposure.

Pyelonephritis and cystitis in sows

Pyelonephritis (infection of the kidney) and cystitis (infection of the bladder) occur occasionally in sows a few days after breeding. It is thought that the infection is transmitted from the boar. Affected sows show bloody urine and a fever, and go off feed. Occasionally the infection remains quiet until after farrowing, at which

time the condition becomes very severe and most affected sows die because the disease is too far advanced. Early diagnosis and treatment are necessary.

Diseases of the boar

Boars are susceptible to almost all of the infections, parasitic and nutritional diseases that occur in females. Some special problems of boars are lack of libido (lack of desire to breed), and sterility because of poor semen quality. There are many causes of lack of libido and a veterinarian should examine the boar carefully. It is now possible for a veterinarian to eletroejaculate a boar and obtain a semen sample for examination of semen quality. Some large-scale units are now having all their boars examined routinely before using them for breeding. This, at least, will let the herdsman know whether or not the boar may be at fault when there are a large number of repeat breeder gilts or sows.

It is not uncommon for young boars to show a stiffness at about the time they start breeding. There is probably more than one cause of this stiffness but two important causes are nutritional imbalance and infections of the joints. Most of these stiff boars seem to recover in a few months and perhaps the combination of breeding activity, a poor quality floor (which may be too rough or too slippery), and a slight deficiency of calcium and phosphorus accounts for most cases.

A common cause of lameness in boars is sore feet and these must be examined carefully.

When a large number of gilts and sows return to service repeatedly, the semen quality of the boar should be examined by a veterinarian.

The mastitis-metritis-agalactia complex at farrowing

The mastitis-metritis-agalactia complex at farrowing time occurs frequently and, in some herds, is a serious problem.

Mastitis refers to an inflammation of the mammary gland. True mastitis as it occurs in dairy cattle is probably not very common in farrowing gilts or sows. Usually when the mammary glands are swollen, hard and warm, it is because of udder edema or 'caked udders', but a diagnosis of mastitis is often made. Metritis means an inflammation of the uterus and occurs fairly often, usually following a slow farrowing or in cases where many pigs were born dead, or when farrowing assistance was given and contamination and bruising of the reproductive tract occurred. Agalactia, or no milk, usually occurs with udder edema but not always.

Sows or gilts with the mastitis-metritis-agalactia complex are usually off feed, they have a fever of up to 105eF (normal 102eF), their mammary glands are swollen, hard and painful to touch and there is no milk. The sow will usually lay on her belly and won't let the piglets suck. Usually there is a yellowish discharge from the vagina. Constipation is also common. Affected sows or gilts are obviously sick and need veterinary attention. The little piglets are usually quite hungry and many die from starvation if the sow or gilt does not recover in a day or two and start milking again.

The advice of a veterinarian should be sought regarding diagnosis and treatment and prevention of this disease. It is very important that an adequate dose of antibiotics be used for treatment. Too often a failure to respond is due to an underdose of drugs.

Oxytocin of posterior pituitary extract (POP) is a hormone used to stimulate milk let-down in swine and cattle. Unfortunately too many producers expect dramatic results from the use of POP on every sow or gilt that doesn't have any milk. Agalactia or an absence of milk can be due to a failure in milk production because the animal is sick, or it can be due to a failure in milk let-down because the animal is disturbed about something, or because her teats are sore. POP can only give effective results when there is a failure of milk let-down – it cannot and does not make the body produce milk.

There are many causes of agalactia and some of the common ones are outlined below:

Failure of milk let-down

Inverted teat ends.
Sore teats.
Udder edema (swelling without inflammation).
Hysterical sow or gilt.
Piglets with sharp teeth.
Constipation.

Failure of milk production

Sow or gilt may be ill with any number of diseases, the most common ones being:

- mastitis,
- metritis,
- erysipelas,
- pyelonephritis (kidney infection).

Ergot poisoning. There is lack of udder development because of a high level of ergot in the feed during pregnancy.
Poor mammary tissue development as sometime occurs in gilts.
Constipation.

Because of the many different causes of agalactia in swine, it is important to make a diagnosis before administrating repeated doses of oxytocin. Oxytocin (POP) is not without danger and a veterinarian should be consulted about its use. Some sows are more sensitive to the drug than others and an overdose can cause vomiting, wretching, diarrhea, collapse and even death. The safest method to administer oxytocin is by the intramuscular route.

Constipation

Constipation is a common condition in sows or gilts at farrowing time. The feces of most gilts and sows are firmer and drier than normal then and it is probably a normal physiological occurrence. In clinical constipation the manure (feces or stool is hard and impacted in the rectum and the animal usually passes less than normal quantities of manure. Constipation causes a state of uneasiness: sows and gilts may lose their appetite, they may not let-down their milk and if they are constipated for too long, milk production may stop altogether.

There are many causes of constipation in sows or gilts at farrowing time; in some cases, it is difficult to pin-point the actual cause. Some of the causes are:

- Lack of exercise before farrowing.
- Reduced intake of water.
- Not enough bulk in the feed.
- Illness with many diseases.
- Prolonged farrowing time.

Constipation seems to be more common since farrowing crates have become popular and this suggests that a lack of exercise is an important cause. Therefore, if exercise is limited, the ration fed to sows or gilts before farrowing must contain some added bulk that will act as a laxative. Many producers are now adding, with good results, bran or beet pulp to the ration of the sow or gilt for about 4-6 days before farrowing.

Treatment of constipation in sows or gilts is sometimes difficult. Veterinarians recommend the feeding of mineral oil or warm bran mashes and sometimes they will use injectable laxatives. Injectable laxatives must be used only after the intestinal contents have been softened with mineral oil or some other softening agents.

Farrowing difficulties

Some sows or gilts have a difficult time at farrowing time. They come to their milk, make their bed but do not have any pigs, or they may have one or two and no more. It is extremely difficult to determine, even by careful clinical examination of a farrowing sow or gilt, just how many more pigs she has in her uterus. If she has had only a few piglets she should be examined by a veterinarian. If a veterinarian is not available, then the herdsman can examine the reproductive tract. Cleanliness is of utmost importance. The hands and arms should be washed with a disinfectant soap and then lubricated with any non-irritating jelly-like compound. One hand and arm is introduced into the vagina and then slowly and carefully pushed forward as far as possible to explore the uterus for pigs which may be stuck in the birth canal. Piglets that can be grasped are pulled out slowly and carefully. The membranes should be removed from around the piglet's mouth and it should be shaken to stimulate breathing. This procedure is repeated every few minutes until all pigs are born. Uterine boluses containing an antibiotic or sulfonamide should be placed as far forward in the uterus as possible to minimize any possible infection in the uterus. This obstetrical procedure just described is not without danger and only experienced herdsmen should give such assistance.

As a general rule, it is a good practice to give any sow or gilt that has had difficulty at farrowing, an antibiotic injection to minimize some of the common infections that may occur. Even with careful examination of the reproductive tract of the sow or gilt through the vagina, it is often difficult to determine if all the pigs have been removed. It is not uncommon for one or more pigs to be 'hidden' in the uterus. If these are not removed, they decompose and make the sow sick with a metritis. Veterinarians prefer to conduct a caesarean section on difficult cases of

farrowing. In this way, the uterus can be examined thoroughly and all pigs easily removed. Successful caesarean operations will not normally affect the reproductive performance of the sow or gilt.