

Chapter 9 Diseases and Their Control

Because you are now in the pig business, it's important to know some of the common diseases that may attack pigs. A few are listed below with brief descriptions.

Infectious Diseases

Actinobacillus Pleuropneumonia

Actinobacillus pleuropneumonia (APP), formerly known as *Hemophilus pleuropneumonia*, is a severe, often fatal pneumonia of growing-finishing swine. This disease is worldwide and causes significant economic losses in the swine industries in many countries.



Figure 9.1

Sudden death caused by *Actinobacillus pleuropneumonia*

Pigs of all ages are susceptible, but most commonly affected are growing pigs 40 pounds to market weight. Sudden death of apparently healthy pigs may be the first sign that the disease is present in a herd. Death losses often follow a stressful period, such as relocation, weather change, and mixing.

Infected pigs may have labored breathing, high fever (104–107°F.), depression, and reluctance to move. Pigs that do survive may have severely damaged lungs. Because the organisms are spread through the air, the number affected in a group can quickly reach 100%, with death loss reaching 20–40% or more if immediate treatment is not started.

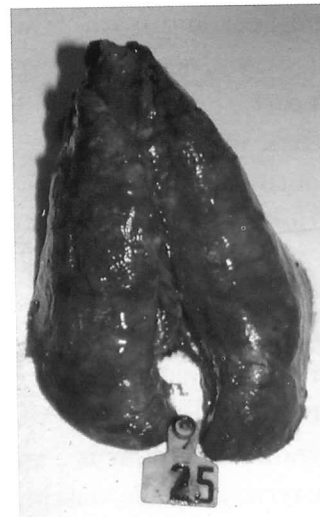


Figure 9.2
Diseased lungs

Pigs held in overcrowded, poorly ventilated buildings are more likely to have problems. Sudden weather changes and drafts can also increase the chances for APP outbreak. Once APP is in the herd, environmental quality must be held at optimum levels. Therefore, efforts to reduce overcrowding and to maintain good ventilation are very important. Antibiotics and vaccines are used in treatment and control.

Anemia

While pigs are born with enough iron for hemoglobin, they soon become deficient when they are raised in clean, modern confinement facilities. As most pigs quadruple their birth weight in the first 2–3 weeks, they need more iron for hemoglobin to carry oxygen throughout their much larger body. Signs of iron deficiency include pale skin and mucous membranes such as the lining of the mouth, unthrifty appearance with rough hair coats, rapid labored breathing (thumps), and uneven growth. Sows' milk contains very little iron. When pigs are in contact with dirt, they ingest enough to supply sufficient iron. To prevent anemia, piglets are routinely given injectable or oral iron preparations soon after birth.

Atrophic rhinitis

Rhinitis is an inflammation of the mucous membranes that line the pig's nose. When caused by certain bacteria, it is a contagious disease characterized by the wasting away or lack of growth of the turbinate bones in the nose. The turbinate bones are small, mucous membrane-covered structures in each nostril.

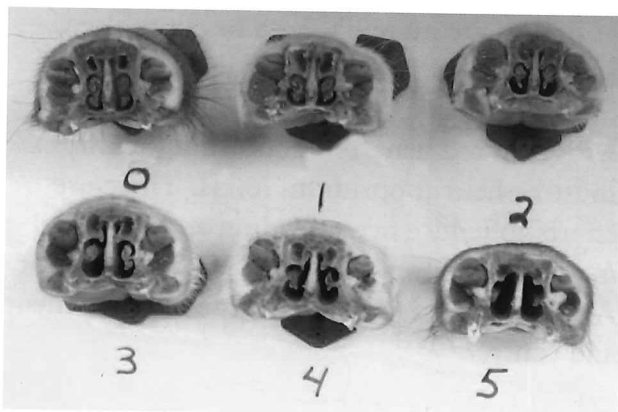


Figure 9.3

Cross section of snouts showing various degrees of Atrophic rhinitis

They condition the air by warming, moistening and filtering it. The organisms that cause atrophic rhinitis also cause pigs to grow more slowly and have poorer feed conversion.

Common signs of the disease are sneezing, sniffing, snorting and coughing. A moist crescent-shaped area on the face below the eye caused by excessive tearing is usually present. Also, a clear-to-yellowish discharge from the nostrils is observed. In advanced cases, the snout may be shortened and crooked. Vaccines and antibiotics are used to control atrophic rhinitis.



Figure 9.4
Crooked snout caused by
Atrophic rhinitis

Colibacillosis

Colibacillosis is an infection of the intestinal tract by *E. coli* bacteria causing diarrhea. In severe cases, death results from dehydration caused by fluid loss. Colibacillosis is most often seen in pigs less than 5 days old but may also occur about a week after weaning. The bacteria enter the mouth of pig, attach to the lining of the small intestine, and produce a toxin which causes diarrhea.

While *E. coli* bacteria can be found in the pig's environment, they occur in the larger numbers needed to cause disease where the conditions are wet and dirty. Some strains are

more likely to cause disease. The most important source of contamination is from other scouring pigs. The effects of chilling on baby pigs often results in colibacillosis. Pigs that develop colibacillosis should be treated promptly with antibiotics and kept in a warm, dry environment. Even with proper treatment, death and performance losses make this a very costly disease.

In addition to good management, sanitation, and thermal control, key parts of controlling colibacillosis losses are vaccination of the sows prefarrowing and adequate colostrum/milk intake by piglets.

Erysipelas

Erysipelas is bacterial disease of swine that can cause sudden death, fever, diamond skin lesions, arthritis, heart valve lesions, and abortion. The organism, *Erysipelothrix rhusiopathiae* can be found in the tonsils of

many normal healthy swine and is passed in the feces of sick and carrier animals. The disease is more frequently seen in hogs raised outside as the soil becomes contaminated by manure of infected animals. After a susceptible pig has ingested the organism and the infection has started in the tonsils, the bacteria spread throughout the body causing fever as they go to the skin, joints, and heart.

Red skin blotches, purplish tails and ears, reluctance to get up and move around, and depression are signs often observed. Pregnant sows may abort from the fever which is often 106–108°F. Feeding of pork garbage to hogs can lead to erysipelas as the organism can remain infective in hams through the curing process. Erysipelas is seldom seen as most swine are vaccinated against it. Hogs with erysipelas can be treated with penicillin and antiserum.



Figure 9.5
Pig showing skin lesions of Erysipelas

Exudative Epidermitis

This condition is commonly called “Greasy Pig Disease” as the affected pigs develop areas of brown debris on the skin starting on the head and neck. All parts of the body become dark and greasy to touch. This is a bacterial infection caused by *Staphylococcus hyicus* and is most often seen in nursery pigs. The condition spreads to other pigs in the group if the affected pigs are not removed and treated. Many of the pigs die of dehydration while survivors are stunted. Treatment consists of antibiotics and spraying with dilute disinfectants. Control includes minimizing skin abrasions/wounds, reducing relative humidity, and insuring adequate availability of drinking water.



Figure 9.6
A “Greasy pig”

Haemophilus parasuis (Glasser’s Disease)

Haemophilus parasuis is a bacterial infection which affects the chest and abdominal body cavities, the organs in those cavities, and joints. The disease is most often seen in 2 to 16 week old pigs after a period of stress such as weaning or moving. High fevers accompany panting respirations and coughing. Because of swollen painful joints, pigs may squeal when forced to move around. Some pigs may have tremors or convulsions. Bacterial cultures may be needed to confirm the diagnosis. If one pig in a group is affected, all in the group should be treated with antibiotics immediately. In herds where this disease is a problem, vaccines and medications can be used to prevent outbreaks.



Figure 9.7
Haemophilus parasuis

Ileitis

Lawsonia intracellularis bacteria infect the cells of the intestinal tract wall causing it to become thickened. The diarrhea it produces can be seen in pigs from weaning to market weight. Some heavier hogs may die suddenly when the infection causes massive hemorrhage

into the intestinal tract. Most experience chronic diarrhea and weight loss. While many things are not known about the spread of this disease, it's known that the introduction is usually via new herd additions. Antibiotics in the feed can be used to treat and prevent ileitis. There is no vaccine.



Figure 9.8
Top: intestine showing ileitis
Bottom: normal intestine

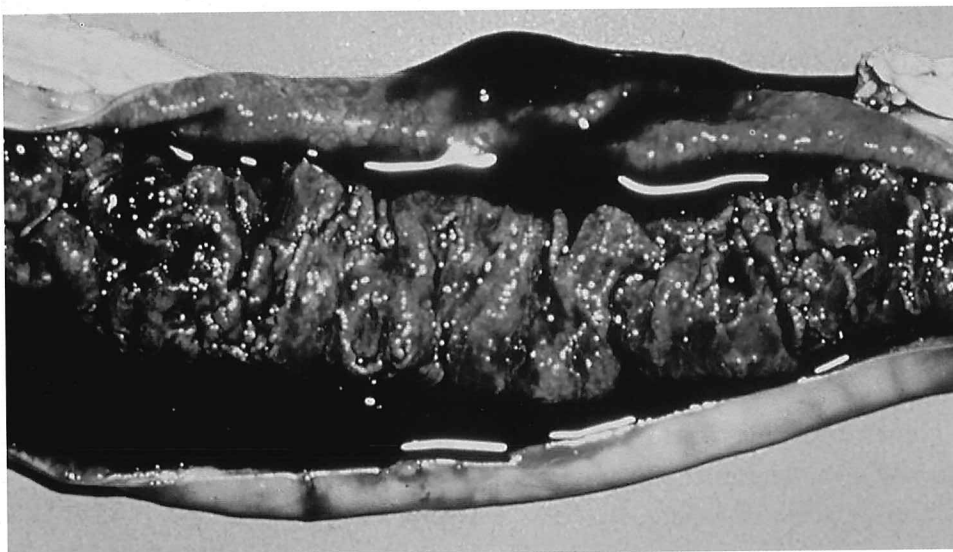


Figure 9.9
Intestine showing hemorrhagic form of ileitis.

Leptospirosis

Signs of leptospirosis are usually confined to gestating sows where “lepto” causes abortions, stillbirths, mummies, weak pigs, and decreased litter size. The disease is spread by contact with the urine of sick and carrier animals. As the organism lives much longer in wet conditions, the elimination of standing water and wet areas in housing areas is recommended. Many species of animals, both domestic and wild, can carry leptospirosis, which infects swine. Rats are a recognized threat in the spread of leptospirosis. Because it is so difficult to control exposure, vaccination of breeding swine is routinely done prior to each breeding.



Figure 9.10
Leptospirosis—aborted fetuses

Mycoplasma Pneumonia

This disease affects pigs of all ages starting with those as young as 10–16 days of age, but signs of the disease are often not noticed until after 3 months of age. It is estimated that 90% or more of the swine herds in the midwestern United States are infected with mycoplasmal pneumonia.

It is a chronic (long-lasting) disease. A high percentage of the pigs are affected, but the death loss is low. Pigs affected have a dry, nonproductive cough that is most noticeable after exercise. Generally, while they continue to eat, some do not grow at a normal rate if lesions (areas of tissue altered—made sore or irritated—by disease organisms) are extensive.



Figure 9.11
Uneven growth in group caused by
Mycoplasma pneumonia

Antibiotics and vaccinations are useful in the control of mycoplasmal pneumonia. Good nutrition and a warm, dry, dust-free and draft-free environment, along with lungworm control programs, are also useful in its control.

Parvovirus

Parvovirus infections cause swine reproductive failure, primarily in gilts and first litter sows. The virus remains stable in the environment and practically all herds are considered infected. When young females first become exposed at the time of breeding or early in gestation, the virus infects the fetuses causing their death. Depending on the stage of gestation when the infection occurs, infertility, mummified fetuses, or stillborn pigs may result. Abortions are unusual with parvovirus infections. Control of parvovirus is by vaccination and/or exposure of gilts to manure of boars or cull sows one month before breeding.

Porcine Reproductive and Respiratory Syndrome (PRRS)

PRRS is caused by a virus. In pregnant sows it is responsible for premature farrowings, stillborn and mummified fetuses. Those piglets born alive are usually weak and many die. The sows usually have poor conception rates at the next breeding. In growing pigs, PRRS leads to respiratory problems as the virus attacks the defenses of the lungs. Pigs with PRRS often have additional diseases and do not respond to normal treatments. PRRS is usually brought into a herd with infected animals which can shed the organism for several months. Transmission is most often by close contact. Laboratory testing is often needed to confirm the diagnosis of PRRS. When investigating herd additions, only PRRS-negative pigs from PRRS-negative herds should be considered. While several vaccines are available to reduce PRRS losses, special management effort is also needed.

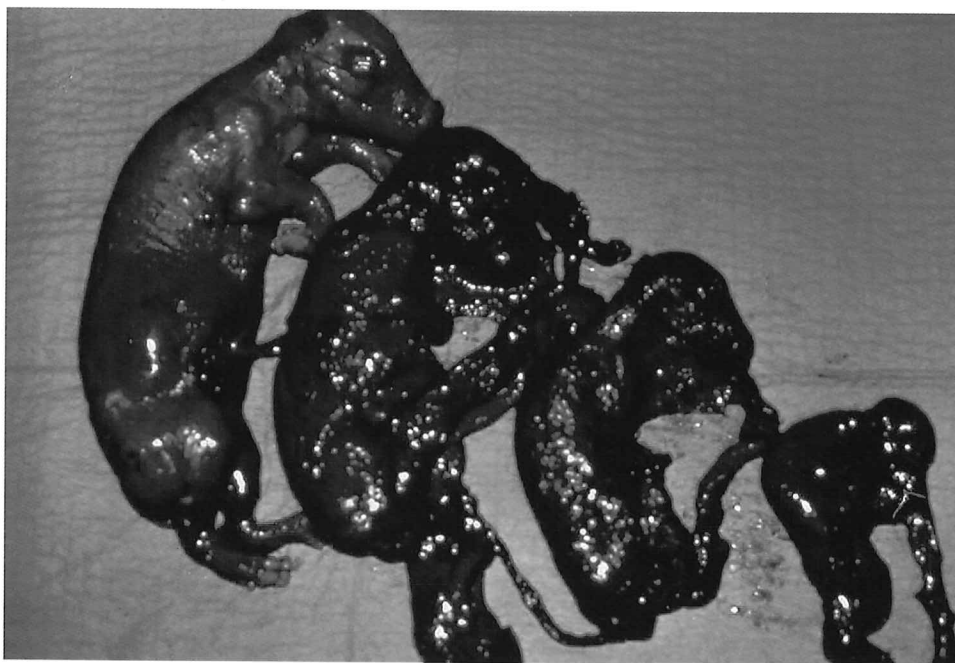


Figure 9.12
Parvovirus—Mummies of various sizes

Pseudorabies (Aujeszky's Disease)

Pseudorabies (PRV) is an acute, frequently fatal disease affecting most species of animals, except humans. The disease is caused by a virus and involves the nervous and respiratory systems. Diagnosis, of course, should always be confirmed by lab tests, as the virus may be isolated in the spleen, lungs, liver or brain. It can affect pigs of all ages.

PRV is spread mainly by direct contact between swine with the nose and mouth being the main entry points. Recovered pigs may become carriers of the virus and can later infect other pigs and most domestic animals (cattle, sheep, goats, cats and dogs).

The chances for introduction of the disease can be minimized by the owner through strict control of the movement of people, animals and objects into swine premises. Clean clothes should be worn, and instruments, boots and other objects should be decontaminated routinely.



Figure 9.13
Strep suis-pig in seizure

Salmonellosis

Salmonellosis is a bacterial infection by a species of *Salmonella*. While infection with the most common species leads to septicemia and pneumonia, another species causes diarrhea. Apparently healthy carrier pigs are the usual means of introduction into a herd. Ingestion of contaminated material is the main route of infection. The organism is shed in the feces, and can survive in water for 24 days, in a mixture of water and swine manure sludge for 78 days, or in pasture dirt for over a year. Outbreaks are often associated with a stress such as transportation, co-mingling, and overcrowding. Control is based on sanitation, minimizing stress, treatment with antibiotics, and vaccination.

Streptococcus suis

Strep suis is a bacterial infection carried in the nose and tonsils of many swine and is often acquired by piglets during the act of farrowing. The infection can also be

transmitted by a pig to its pen mates through nose-to-nose contact. After a period of stress, the organism spreads from the tonsils to other parts of the body such as body cavities, joints, heart, lungs, and brain. Infections can also occur with skin wounds such as tail biting, tail docking, and abrasions of knees on rough floors. *Strep suis* infection is a common cause of convulsions 1–2 weeks post-weaning. If one or more pigs in a group

are diagnosed with *Strep suis*, all pigs in the group should be treated with antibiotics immediately to prevent further losses in the group. Vaccines are available to prevent future outbreaks.

Swine Dysentery

Swine Dysentery occurs most commonly in 8–14 week old pigs, although all ages are susceptible. The affected pigs pass loose stools containing blood and mucus. When swine dysentery occurs in young weaned pigs, 90–100% may be affected and 20–30% may die if effective treatment is not given. The disease is usually milder in older pigs. To prevent further outbreaks of swine dysentery, the affected groups must be treated, the pens must be cleaned and disinfected and rodents eliminated. Mice have been shown to transmit the organism for up to 6 months.

Economic losses in most herds result from poor rate of gain, poor feed efficiency, and prolonged medication costs.

Swine Influenza (Flu)

Swine Influenza Virus causes a short but severe respiratory disease episode. Outbreaks of “flu” often occur after pigs have been moved or co-mingled, such as at a show and sale. The disease spreads rapidly so that the

entire group seems to get sick in the matter of a day. Breathing becomes labored and open-mouthed. There are episodes of barking coughs. While nearly all the pigs get too sick to move around or eat for a couple of days, only rarely does one die. Recovery is almost as quick as the disease onset. Antibiotics are of limited use but vaccines are now available to help prevent such outbreaks.

Transmissible Gastroenteritis (TGE)

TGE is a highly contagious viral disease characterized by vomiting, diarrhea and nearly 100% mortality in pigs less than 2 weeks old. This virus is very stable in cold conditions and outbreaks are typically experienced during the winter. Birds are able to carry the infection between neighboring swine herds as they search for feed. The symptoms of vomiting and watery diarrhea leads to rapid dehydration, shock and death. Older hogs and adults go off feed and have diarrhea but soon recover. In another form, TGE can be a problem of post-weaning diarrhea. Vaccines are available but are of limited value. Treatment usually does not change the death rate. Control in an outbreak is aimed at exposing the entire herd at one time to shorten the length of the outbreak.

Internal Parasites

Parasites cause damage to swine and loss of production efficiency. Internal parasites are those that are within the body of the animal while external parasites are found on or in the skin. Infection with internal parasites is usually acquired by

ingestion of egg-forms of the parasite. Some of the more common internal parasites that infect pigs are roundworms, whip worms, nodular worms, stomach worms, lung worms, thread worms, and kidney worms. These are described in the table on page 9–10.



Figure 9.14
Roundworms

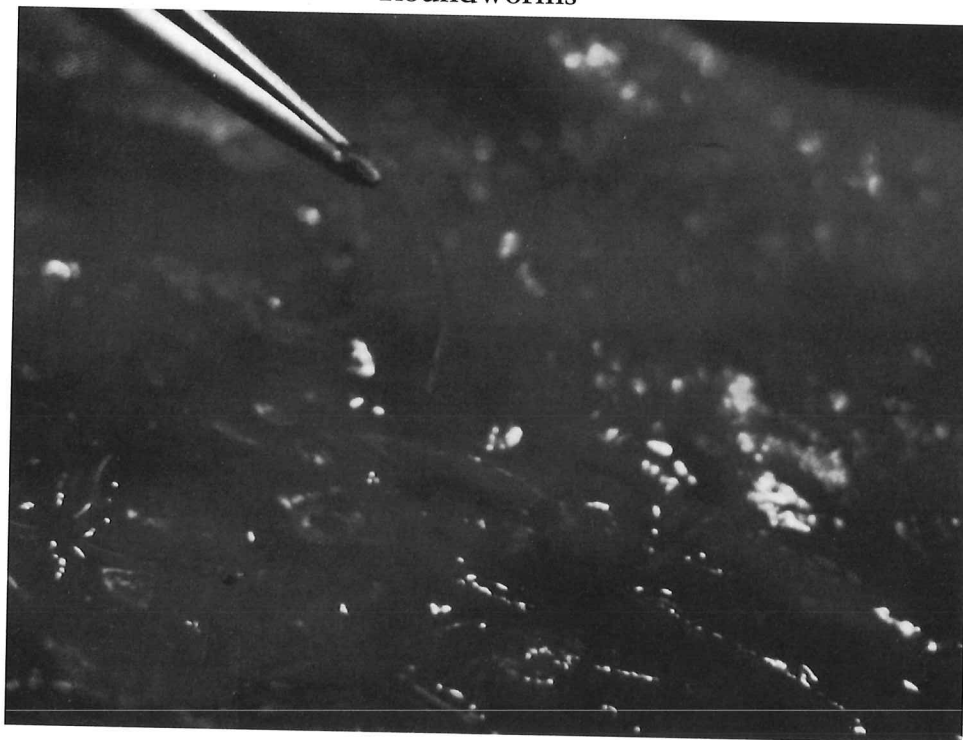


Figure 9.15
Nodular worms

There are numerous deworming agents (anthelmintics) on the market for controlling/eliminating internal parasite infections. The route of administration varies with the product but includes feed, drinking water, and injection. The choice of the product depends on the types of parasites you wish to control, the method of administration you wish to use, the stage of production of your animals, the cost of the dewormer, and the withdrawal time.

In addition to using the appropriate dewormer at the right time, sanitation is also an important part of a parasite control program. Dirt lots, especially those used for raising swine in the past, are generally contaminated with

parasite eggs and are impossible to clean. The eggs of some parasites remain infective in the soil for more than 5 years. Pens with cement floors are easier to clean but still may be a source of contamination. Deworming pigs without cleaning the pen or moving them to an uncontaminated area is like blowing up a flat tire without fixing the leak—the results are short-lived.

The types of parasites present in your pigs can be determined by having a veterinarian examine fresh fecal samples under a microscope. Once the types of parasites are known, your veterinarian can advise you what to use for deworming, how to administer it properly, when it should be given for best results, and the withdrawal time. Additional information about the treatment and control of swine internal parasites is available in the Pork Industry Handbook factsheet #44.



Figure 9.16
Whip worms

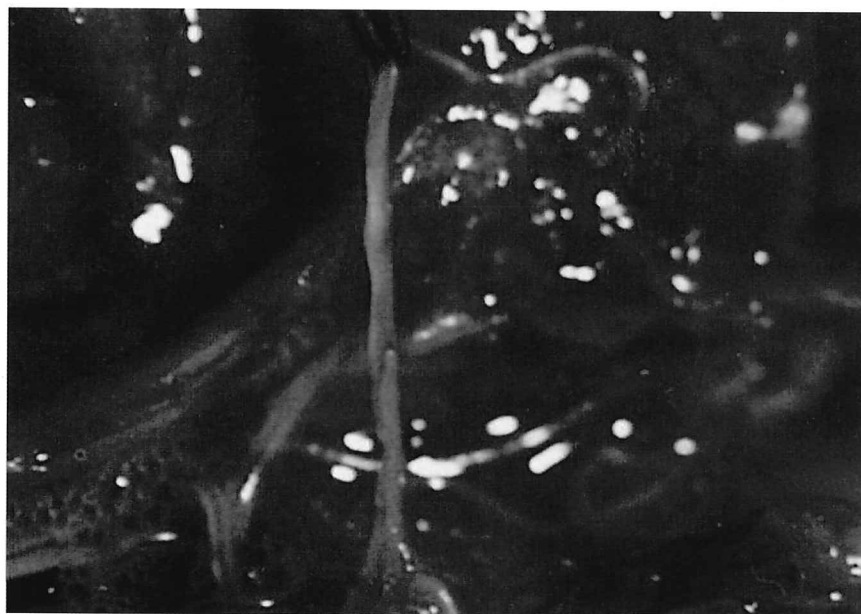


Figure 9.17
Lung worms

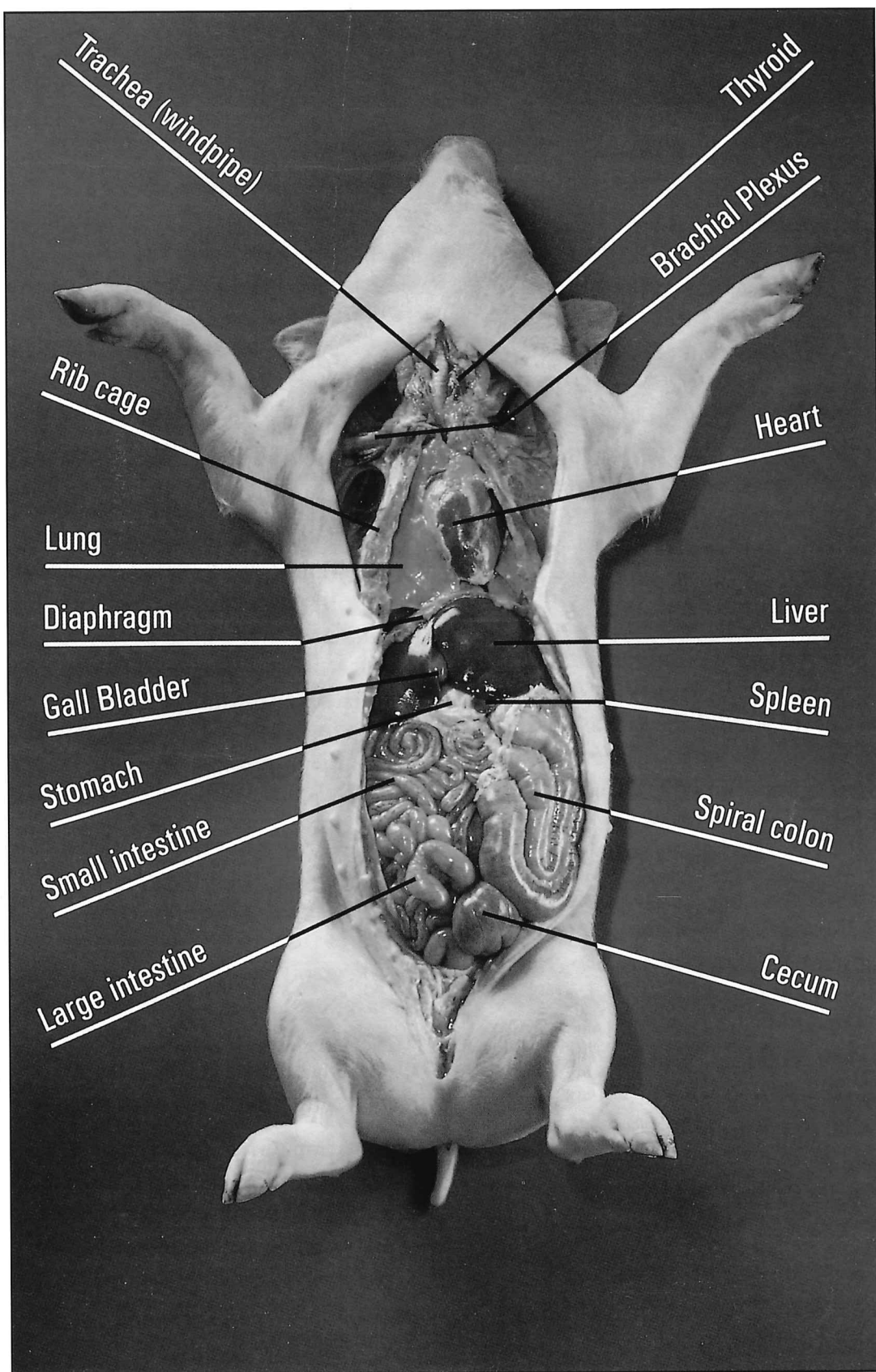


Figure 9.18
Pigs with uneven growth on dirt lots due to internal parasites.

Internal Parasites

	Pigs in which major reproducing population is found	Specific ways in which parasites damage their hosts*
Threadworm (<i>Strongyloides</i>)	10–20 day old pigs Breeding stock	Causes moderate to severe to bloody diarrhea in very young pigs, Can result in mortalities.
Large roundworm (<i>Ascaris suum</i>)	Weanlings Feeder pigs, 40–75 lb.	Its migrating larvae damage liver and lungs and create conditions favorable for development of bacterial and viral pneumonia, cause diarrhea, and block the intestine. Generally, <i>Ascaris suum</i> causes liver condemnations. Economic damage occurs in pigs.
Whipworm (<i>Trichuris suis</i>)	40–85 lb.	Accumulations of whipworms ulcerate the cecum and anterior large intestine. They provoke bloody diarrhea.
Nodular worm (<i>Oesophagostomum</i> spp)	All ages, 60–350 lb. (increases with age)	The host response results in nodule formation, which decreases digestive efficiency, and outright illness occasionally results.
Stomach worm (<i>Hyoststrongylus rubidus</i>)	All ages, 60–350 lb.	Irritates the lining of the stomach or tunnels beneath it and causes inflammation and ulceration. The end result can be diarrhea.
Lungworm (<i>Metastrongylus</i> spp)	Generally feeder pigs & older 60–150 lb. pigs	Irritates the fine air passages, ruptures tissues, causes bleeding, and allows development of pneumonia.
Kidney worm (<i>Stephanurus</i> spp.)	Generally older hogs & breeding stock	Damages liver, perirenal tissues, ureters, kidney.
Coccidiosis (<i>Isospora suis</i>) (<i>Eimeria</i>)	Suckling pigs	Ruptures intestinal mucosa, diarrhea, poor digestion.

* In terms of economics, parasites affect their hosts by interfering with digestion, feed conversion, and weight gains so that production is made more expensive.



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Figure 9.19
Internal anatomy of a healthy pig

External Parasites

The most common external parasites of swine are lice and mange. Estimates of annual losses due to lice and mange infestations range from \$10–\$50 million. If pigs are seen constantly rubbing on feeders, gates, and buildings, they likely have external parasites. The hog louse has a dark body and is big enough to be seen on the skin when closely examining the flank and abdomen. The lice suck blood through the skin causing irritation and itching. The effect of lice on growing and finishing pigs is decreased feed intake and growth rate as the pigs spend more time rubbing and less time eating. In younger pigs, the blood loss caused by the lice can lead to anemia.

Mange, the result of mite infestation, may first be seen as raised areas of skin covered with brown scabs around the ears and neck. If untreated, the skin becomes thickened and rough over more of the body. The activity of the microscopic mites increases as the skin temperature rises causing increased itching.

For both lice and mange, pig-to-pig contact is the major means of transmission. Control consists of sanitation and the use of agents to kill the lice and mange mites. Products are available as topical sprays and powders, pour-ons, injections, and feed additives. These can be used in conjunction with premise sprays. Consult your veterinarian for advice in establishing an effective plan. Additional information about the treatment and control of swine external parasites is available in the Pork Industry Handbook fact sheet #40.

Herd Health Management Tips

These recommendations should be followed after you have established a good veterinary client-patient relationship (VCPR). Your herd health status can vary greatly from another herd; therefore, it is essential that the proper health program be established with your own veterinarian.

Gilts (5–6 months of age)

Herd additions (purchased gilts) should have a 30-day isolation period followed by a 30-day acclimatization period. During the isolation and/or acclimatization periods, testing and/or retesting for diseases can take place. Home-raised gilts need a 30-day acclimatization period before breeding begins. For acclimatization, cull sows can be mixed in with gilts or put into fenceline contact with the gilts.

Parasite Control: Treat for internal and external parasites. Dewormers come in injectable and oral formulations. External parasites (lice and mange) can be controlled by injectable, oral, and topical medications (spray, powder, or pour-on). Repeat as necessary according to the product's label directions or your veterinarian's recommendation.

Vaccination: Give Parvovirus-Erysipelas-Leptospirosis (6-way, including bratislava) vaccine and repeat 3 weeks later. The use of other vaccines may be recommended depending on the herd's disease experience/status.

Sows/Gilts Prior to Farrowing

Vaccinate against *E. coli* scours (in piglets) at 6 weeks and 2 weeks prefarrowing. The use of other vaccines may be recommended depending on the herd's disease experience/status. Follow label directions in conjunction with your veterinarian's recommendations. Treat for parasites 10 days prior to entering the farrowing house. Wash sows just before they are placed in the farrowing pen.

Sows Before Breeding

Booster immunity by re-vaccinating against Parvovirus, Leptospirosis (6-way), and Erysipelas. This may be given in the farrowing house 2–3 weeks post-farrowing if the sow is to be rebred immediately following weaning. The use of other vaccines may be recommended depending on the herd's disease experience/status.

Boars

New boars should be handled as purchased female herd additions in regard to isolation, acclimatization, testing, parasite treatments, and vaccination. Re-vaccinate at least annually. The use of other vaccines may be recommended depending on the herd's disease experience/status.

Pigs

Within hours of birth, navel cords should be disinfected and trimmed, if needed. Insure all piglets are nursing and have received colostrum in the first 12 hours after birth. Processing at 1–2 days of age may include iron injection and clipping needle teeth. Processing at 1–10 days of age may also include tail docking, ear notching, and castration. Vaccines, such as atrophic rhinitis,

may be given as early as 7 days of age. Wean at 14–28 days of age. Erysipelas vaccine should be given at 6–8 weeks of age. The use of other vaccines may be recommended depending on the herd's disease experience/status. Follow label directions in conjunction with your veterinarian's recommendations. Treatment for parasites depends largely on conditions on the farm. Frequency of treatment and choice of product should be based on the results of tests for parasites.

Growing Pigs/Hogs

The use of certain vaccines may be warranted depending on the herd's disease experience/status. Follow label directions in conjunction with your veterinarian's recommendations. Treatment for parasites depends largely on conditions on the farm. Frequency of treatment and choice of product should be based on the results of tests for parasites. Observe withdrawal times for medications including medicated feeds. Use slaughter checks to monitor herd health status and efficacy of control programs.

Other vaccines that may be considered:

- Actinobacillus pleuropneumonia (APP)
- Atrophic rhinitis (Bordetella and Pasteurella)
- Clostridium perfringens
- Haemophilus parasuis
- Mycoplasma hyopneumoniae
- Porcine Reproductive and Respiratory Syndrome (PRRS)
- Rotavirus
- Salmonella choleraesuis/typhimurium
- Streptococcus suis
- Swine Influenza
- Transmissible Gastroenteritis (TGE)

Death

Your investment in a market animal or breeding project will eventually lead to understanding the involvement of death in the food chain. People react in many different ways when an animal dies. Their reactions may depend on the cause of death and how attached they are to the animal. Death is a part of the life process that all living organisms are going to experience.

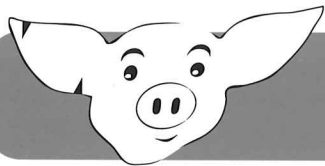
The loss of an animal can be stressful both emotionally and financially. It is important to discuss the cause of an animal's loss and how

you feel with your parents. In commercial swine production, pigs are produced for human consumption and you should know that going into the project. Unless the animal dies of disease or natural causes they will be harvested for food.

Animals that die due to causes other than through the harvesting process should be necropsied by a veterinarian. Why? Swine are susceptible to many diseases, therefore you, as a swine producer, can help prevent additional losses if you know the cause of this death. Once the cause of death is determined, steps may be taken to protect the rest of the herd.



Figure 9.20
Newborn piglet that did not survive farrowing



Chapter 10 Ear Notching

Ear notching is the most common method for permanent pig identification. The notches or holes grow as the pig grows. Ear notching should be done soon after birth for immediate identification. Each pig must have a unique ear notch in many seedstock herds because it is a requirement for pedigree and performance records.

It is not necessary that each pig have an individual

number in commercial operations where all hogs except replacement gilts are marketed for slaughter. Each litter, or all pigs in a farrowing group, or only gilts to be

considered for replacements, might be ear-notched at birth with the same pattern. Market hogs might be notched with the week they were born, starting with week one on January 1 and July 1. This makes it possible to calculate days to market weight.



***The Universal Swine
Ear Notching System
is the most widely
used and most easily
understood permanent
identification method in
the United States.***

Universal Ear Notching System

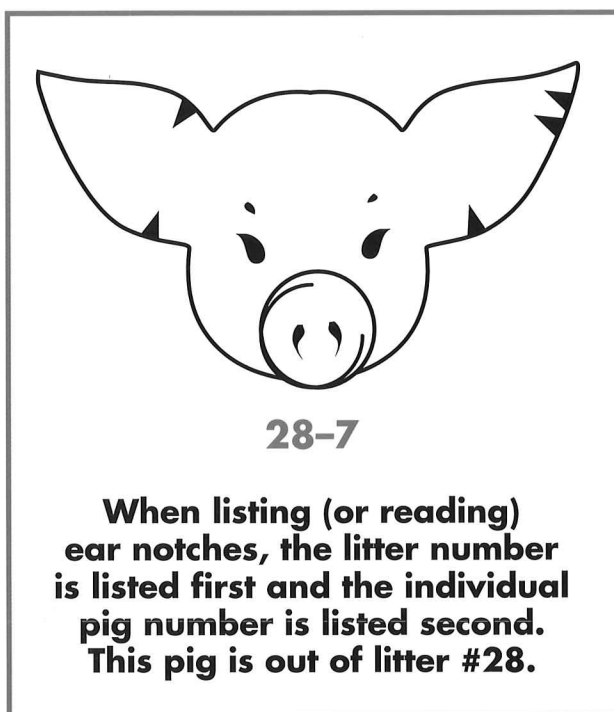
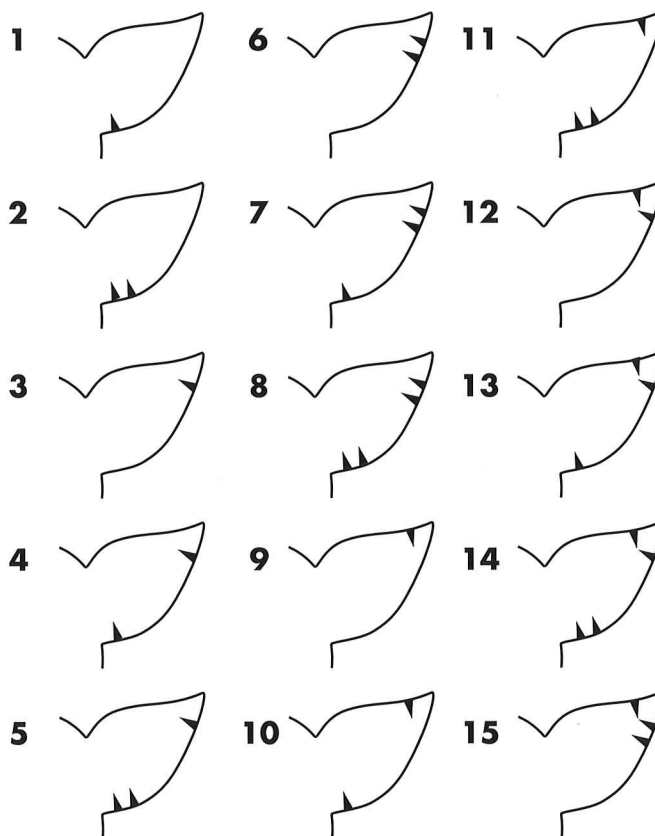
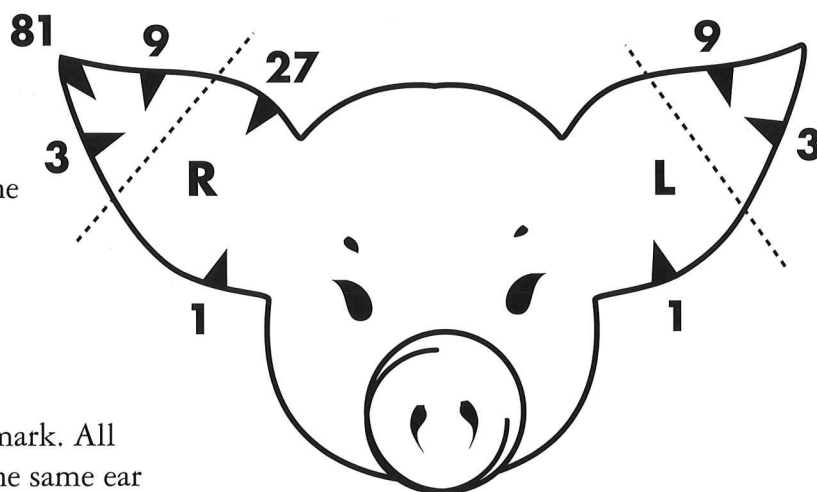
The Universal Ear Notching System is the most common method of permanent identification. The following paragraphs and diagrams explain the Universal Ear Notching System.

Litter Mark (Right Ear)

The right ear is used for the litter mark. All pigs in the same litter must have the same ear notches in this ear. The right ear is on the pig's own right.

Individual Pig Mark (Left Ear)

The left ear is used for notches to show individual pig number in the litter. Each pig will have different notches in this ear.





Chapter 11 Space Requirements for My Market Hog

Your project animal requires adequate space to achieve optimal performance. Failure to provide the necessary feed, water and living space for growing/finishing pigs will result in overcrowding and poor performance. Symptoms of overcrowding include:

1. reduced gain
2. increased feed consumption
3. tail biting
4. cannibalism

Feeder and Waterer Space

- Self feeders: one space/4 pigs (Figures 11.1, 11.2)
- Waterers: one space/15 pigs (Figures 11.3–11.5)

Building Floor Space

Pen should be narrow in width (8 feet) and long in length (24 feet)

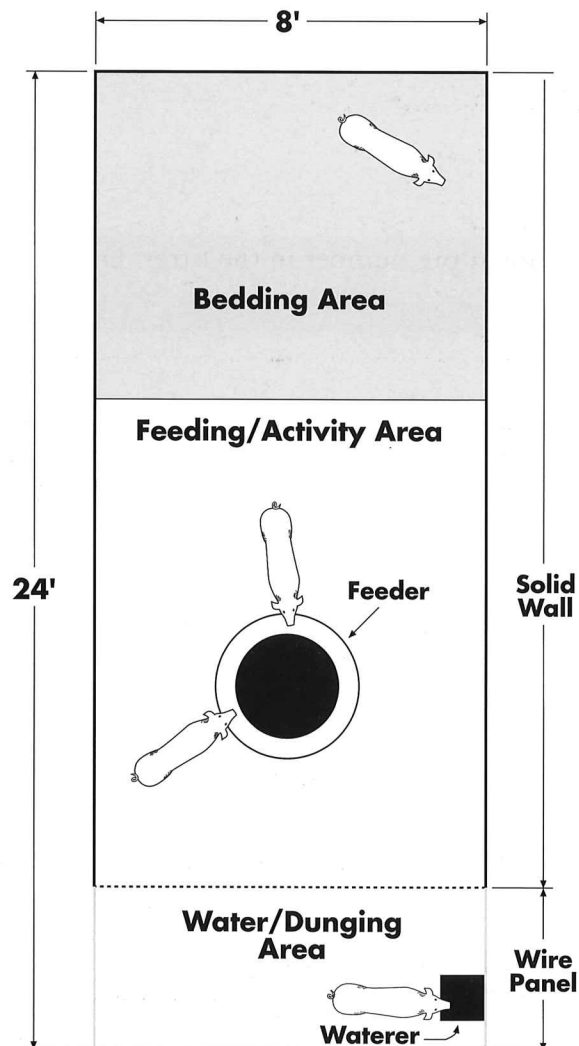
- Pigs to 40 lb; 3 sq. ft/pig minimum
- 40 to 100 lb: 4 sq. ft/pig minimum
- 100 to 150 lb: 6 sq. ft/pig minimum
- 150 lb to market: 8 sq. ft/pig minimum
- Outside Lots: 5 sq. ft. under roof/pig minimum and 6 to 15 sq. ft. per pig outside.

*Space requirements for breeding stock and nursery swine are included in Chapters 19 and 22.

When designing your swine projects' pen keep the following needs of your pig in mind.

Shape or Design of Pen

Pen shape is important because pigs "toilet train" better in rectangular pens than in square pens. If possible, design a pen that is at least twice as long as it is wide.



Manure Pattern or “Toilet Training”

- Dampen (water down) the pen in the area where you want pigs to deposit manure (dunging area), or pen newly arrived pigs into dunging area for 2 hours prior to allowing total pen access.
- Pigs will usually dung (go to the bathroom) in a wet area.
- When introducing pigs to their pen, place them in the area where they should dung.

General

- The sleeping area should be cool in the summer and warm in the winter, dry and draft free.
- If air quality in sleeping area is not good, pigs may dung there.
- If the sleeping area is too big, pigs will dung there.
- If pigs are in a dirt pen, locate water where it will drain away from the pen.
- Pigs need shade in the summer!
- Clean, fresh water should be readily available
- Fresh feed should be available
- Pigs should have access to fresh air and space for exercising.

Feed and Watering Equipment

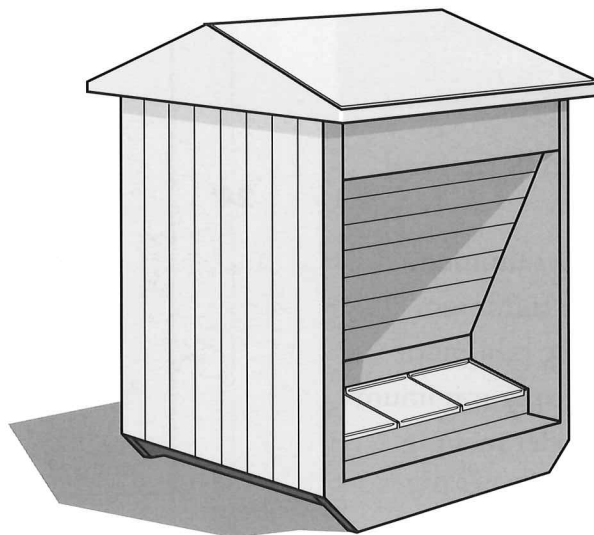


Figure 11.1
Self feeder

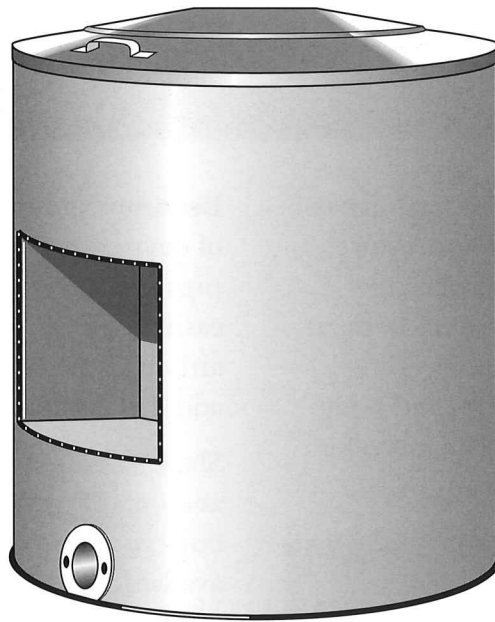


Figure 11.3
Tank waterer. 50–100 gallon capacity, 15 pigs per waterer space

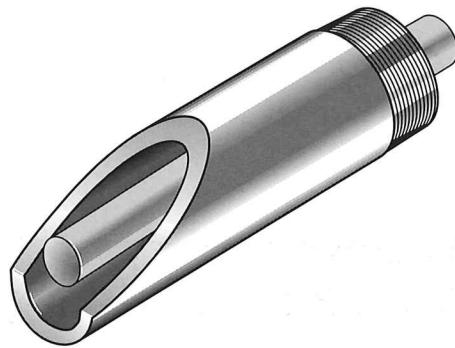


Figure 11.4
Nipple waterer. 1 for every 15 head of market hogs but at least 2 waterers per pen

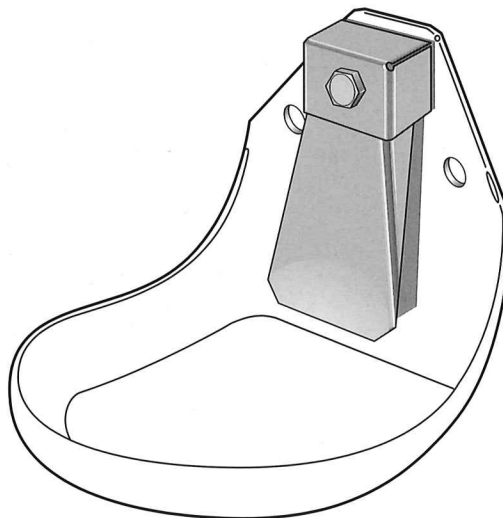


Figure 11.5
Cup waterer

Environment

A pig's environment results from a number of interrelated factors, including temperature, air movement, humidity, and insulating effects of the surroundings. The environment needed depends on the pig's age, weight, activity level, stage of production, and body condition. Suggested thermal conditions for swine are shown in Table 1.

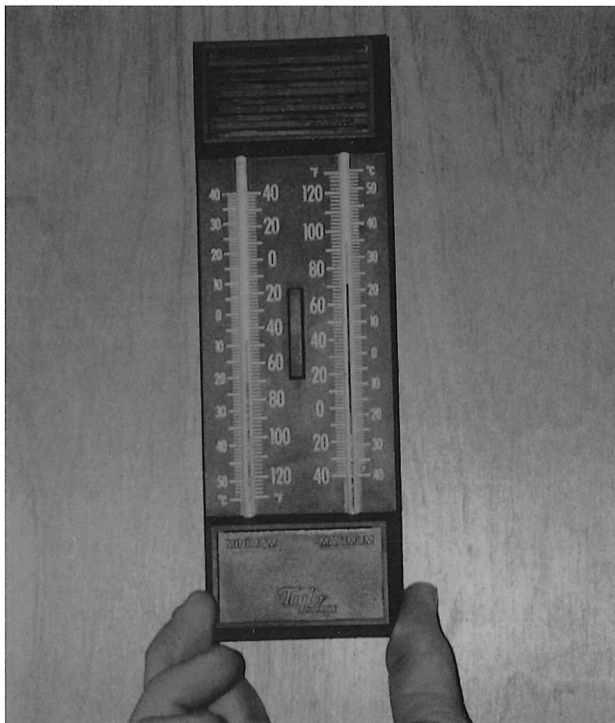


Figure 11.6
Monitor room temperature for comfort

Because older pigs can tolerate a wider range of environmental conditions than younger pigs, their welfare can be provided for more easily. Pen design and spacing are less critical, although many confinement units have adopted common standards.

Shade should be provided in pastures, fields, and outside pens. Trees and other natural objects can provide adequate shade if available. Facilities to provide shade can be constructed so they can also serve as protection from the wind and cold during the winter. Shades with open sides allow air movement during the warm and hot months; during the cold months solid sides can be added for additional protection.

Ventilation rates in enclosed facilities will require seasonal adjustment. In cold weather, a sufficient rate of air movement to remove water vapor, contaminants, and odors is necessary. During hot weather, higher ventilation rates are needed to provide cooling.

Fans can keep the air moving during hot weather. High temperatures can also be reduced in buildings by using evaporative coolers or by fogging water into the fan's air stream. Sprinklers have been used successfully to provide cooling in outside pens. Concrete "wallows" offer a place for pigs to lie in water, yet prevent muddy areas that may result in odors and fly breeding.

Table 1. Preferred Thermal Conditions for Swine

Type and weight	Preferred range ^a	Lower extreme ^b	Upper extreme ^c
Lactating sow and litter creep area for piglets	60 to 80°F for sows; for piglets 90°F	75°F creep area	90° for sow; 90°-100°F
Prenursery, 10 to 30 lb	80 to 90°F	60°F	95°F
Nursery, 30 to 75 lb	65 to 80°F	40°F	95°F
Growing, 75 to 150 lb	60 to 75°F	25°F	95°F
Finishing 150 to 220 lb	50 to 75°F	5°F	95°F
Sow or boar	60 to 75°F	5°F	90°F

^aBased on NRC(1981); DeShazer and Overhults(1982); Hahn(1985)

^bThese represent lower extremes in air temperature when pigs are held in groups. Bedding is recommended when air temperature approaches the lower extreme.

^cExcept for brief periods above these air temperatures, cooling should be provided by means such as evaporatively cooled air or spray cooling for growing pigs, or a water drip for lactating sows.

(Swine Care Guidelines for Pork Producers Using Environmentally Controlled Housing)

Manure Disposal

Wastes must be managed in a manner that will maintain sanitary conditions for the pigs, prevent fly breeding, minimize odors, and protect ground water quality (See Figure 11.10). Fly eggs will not hatch when manure is completely dry, nor when it is in a flowable liquid form. A manure handling, storage, or disposal system should quickly convert manure, urine, and other wastes to either a very dry form or a very wet form. The very dry and wet forms also minimize odors.

The density of the hog population will help to determine the degree of waste management necessary. If farrowing and growing are carried out in fields or large open areas, manure disposal on a day-to-day basis is essentially a natural function. Some scraping and manure collection in lots may be necessary to maintain a nuisance-free and healthy environment.



Figure 11.7
Improper storage of manure. Wet, uncontained storage leads to odor, run-off potential, and rapid multiplication of flies and insects.



Figure 11.8
Clean, comfortable environment

Confinement facilities require waste handling and holding facilities to contain manure, urine, runoff, and wash water. The waste material can be spread on cropland or pastures from the holding facility. Local or county ordinances regarding manure disposal and runoff must be followed.

Odor—Odor from swine farms have always been a part of the business. As swine units have become larger and more intensified the problems associated with odor have increased. Managing the odor produced by your pork project is an additional responsibility that must be addressed in today's environmentally sensitive society.

Sources of odors in and around swine buildings include:

- Wet, manure-covered floors
- Dirty, manure-covered hogs
- Spilled, moldy feed
- Improper disposal of dead pigs
- Manure pits under barn floors
- Incomplete combustion in incinerators
- Dust from feeders and hogs
- Stored manure awaiting land application

Odors created from manure are caused by decomposition. The two principle compounds that cause odor are sulfur (Hydrogen Sulfide) and those containing nitrogen (Ammonia). The factors that affect the amount of odor produced are:

- Number of hogs
- Temperature
- Diet
- Air flow
- Dust level

The best method of reducing odor is by following sound management practices, i.e., common sense. Keep facilities clean. Take time to pick up and keep things neat.



Figure 11.9
Dirty pen; poor dunging pattern

Water Quality

We all depend on clean air and water. The water supply we use for both personal use and for livestock comes from surface water (lakes, streams, and rivers) or groundwater. Groundwater is an important source for most

livestock operations. It provides drinking water for half of the U.S. population and almost the entire rural population. Contamination of groundwater is a concern because it is such a vital nutrient.

Both manure and fertilizers have been used extensively to increase crop production in order to feed the growing world population. However, improper application of these substances to farmland can result in contamination of ground and surface water. When soils containing manure nutrients and fertilizers move into water, negative things can happen.

- Nitrate nitrogen and ammonium nitrogen are produced through the biological breakdown of manure. Nitrate nitrogen in water can be harmful to humans. The Public Health Service has set the drinking water standard at 10 parts per million (ppm) of nitrate. Doctors recommend using bottled drinking water when nitrate levels exceed this amount.

- Manure can harbor dangerous bacteria such as giardia and cryptosporidium. These pathogens are a risk for seafood, seafood eaters and swimmers.
- Bacteria in manure can sicken fish and other organisms, making them more vulnerable to the stream's changing chemistry.
- High ammonia levels are very destructive. They can actually kill certain species of fish.
- Solids from soil erosion decrease the water quality and disrupt the food chain by harming microorganisms, invertebrates and insects larvae.

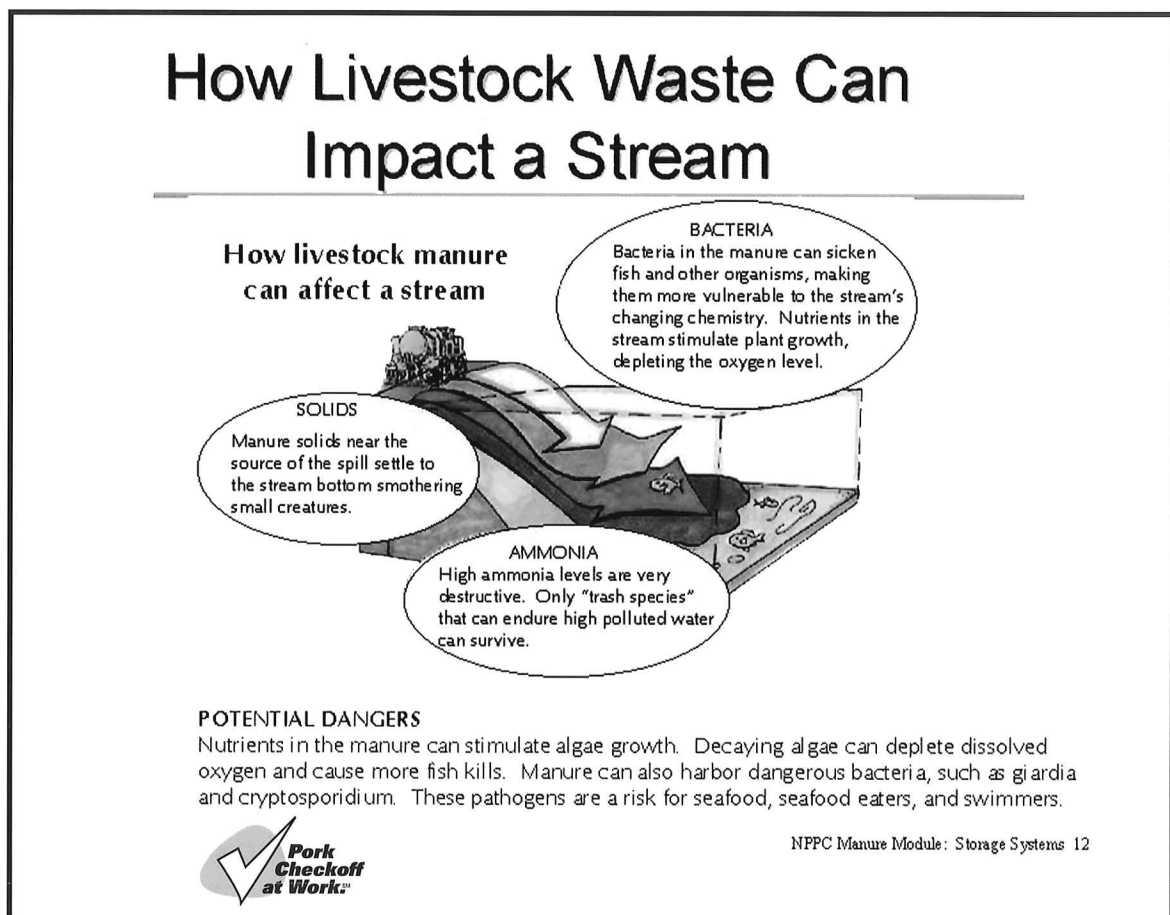


Figure 11.10



Chapter 12

Showing Your 4-H Market Hog

Show day at the county and state fairs is your project's "moment of truth." It is at this point that all you've learned, how you've managed, and how well you control your animal are all tested. After spending all that time, energy and money, you certainly want to have your pig relaxed and well groomed before you enter that show ring.

Fitting and Showing

Proper fitting and grooming of a pig cannot all be done on show day. You need to start working with your pig far enough in advance so that you and your pig can get to know each other and so that the pig will respond to you.

Before the Show Training

1. Starting at least a month before the swine show, take the animal out daily for a walk and teach it to respond to guidance by a cane or whip. Such exercise also conditions the muscles, improves feet and leg soundness, and firms the finish. This helps your pig to show better.
2. Endeavor to get the animal tame enough so that you can put your hands on it at will. At the same time, do not make a pet of the animal.

3. When driving, cover 100 yards or so. If a show ring is not in use, take the animal inside to accustom it to the environment.
4. When driving your pigs, do not excite or frighten them.
5. Practice showmanship with your parents or a friend, pretending they are the judge.

Grooming

1. Start brushing the pig daily. Brush from front to rear and slightly downward.
2. Wash the animal about one week before the show. Use a mild soap or detergent. Be sure all the soap is removed so the skin will not be irritated. Also be extra careful not to get any water into the ear canal of the pig.
3. Two or three days before the show, clip the hair on the ears and tail. Clip hair on both the inside and outside of the ear and all of the hair on the tail except the switch (the last two inches). Trim the underline, starting just above the teat line and working down. Also clip long hairs about eyes, nose, and sides of mouth. **Clipping is optional.** Many judges do not consider this when evaluating showmanship. Clipping the ears, tail, and underline is acceptable. However, clipping hair on the body of the pig is **not acceptable**.

Youth Show Issues—Clipping

The art of presentation has driven exhibitors to clip and shave hogs to emphasize leanness and muscling as well as to mask age. However, shorter hair on a carcass presents a challenge for the packing industry. Short hairs cause problems when de-hairing carcasses after scalding; the paddles in a carcass tumbler that are designed to remove hair are unable to grab and pull the hair effectively. In addition, the singe flame used to remove the hair left after tumbling is not effective in removing hair from clipped hog carcasses. The result for the packer is slow line speed and an increased labor requirement to manually skin carcasses. This causes a significant reduction in carcass value, raises carcass inspection issues, and results in lower income potential at the packer level when dealing with clipped hogs.

In addition to the reduction in carcass value and increased labor requirements for processing clipped hogs, the clipping process can result in unnecessary stress for the hog, making the hog susceptible to sunburn, insect bites and other skin irritations.

On the horizon for show exhibitors is the need to balance the presentation of a winning show pig with the production of a carcass that meets packer expectations and consumer demand, rather than the goal of winning a purple ribbon at any cost.

Adapted from "Youth Show Issues" by Ronald O. Bates and Brian Hines, Michigan State University, Moorman's ShowTec Technical Bulletin.

4. Inspect the feet. If they need trimming, trim at least two weeks prior to the show. If you do it one or two days before the show and you happen to get the hooves too short, the pig may be lame.
5. It is also very important that you have all your show equipment ready prior to the day the fair starts.

Equipment Needed

1. whip or cane
2. small clippers
3. soap
4. water hose
5. stiff brush
6. hurdle
7. small brush to put in your pocket on show day
8. sprayer
9. grain
10. bedding for the pen
11. feed pans and waterer
12. health papers—contact your local veterinarian at least two weeks before the fair. You may be required to have health papers to enter the fairgrounds with your animal. Some fair regulations require testing for pseudorabies.

In transporting your pigs, make their ride as comfortable as possible by using bedding such as wet sand or shavings. For summer hauling, be sure air can circulate to prevent the animal from getting too warm. Do not feed just before you haul your pigs.

Fair Waterer

A popular method for providing continuous access to water at the county fair is shown. The PVC pipe is attached to side wall or fence. Water is placed in the PVC pipe container and allowed to gravity flow to the attached nipple waterers.

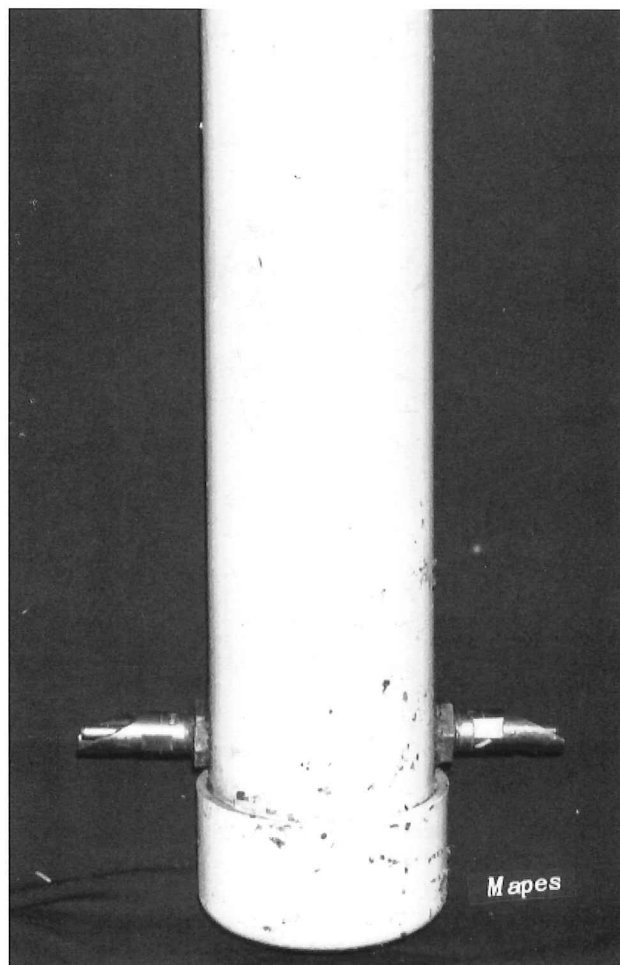


Figure 12.1
PVC waterer

Waterer Specifications

2 feet tall PVC pipe
4–6 inch diameter.
 $\frac{1}{4}$ inch thick pipe
Stainless steel nipples (1 or 2)
PVC cap for bottom

This system allows the market hog more floor space and assures accessible water for the market hogs at all times.

At the Show

After arrival, water and rest your pig about six hours before feeding.

If the weather is hot, use a fan; if necessary, sprinkle the pigs lightly with water. Bedding used should be either sand or wood shavings. If the weather is cool, or the sun is extremely hot and your barns are open, use a tarp to control ventilation for the pigs' optimal comfort.

Preparations Immediately before the Show

Feed your pigs lightly (half feed or less) at least two hours before the show. A limited feeding will keep your pig active and alert. Proper "fill", or the right amount of water and feed eaten, is an important part of fitting and showing.

Groom your pigs. If the weather is hot, fill your sprayer with water and heavily mist your pig; then brush it down, giving it a more even appearance.

Do not use oil or powder on your pig. The oil will hold in body heat and stress your pig. Powder will rub off on competitors, their pigs and even yourself.

Your animal should be thoroughly clean. Wash your pig the day before or the morning of the show. This should be done early, as other exhibitors may want to use the wash rack.

When the pig is ready, get yourself ready. Wear clean and neat clothing in the show ring.

Know your pig and the important information about it, including farrowing date, weight, and number of teats on both sides (if a gilt).

Just before going into the show ring, give your pig a small drink of water. If you give it too much water, your pig will be too big in the stomach area and will not show well.

Be ready to leave for the show ring as soon as the class is called.

Showing

- Have a small brush in your back pocket, so that if your pig lies down or gets dirty in some way you will be prepared to brush him off.
- Drive the pig as calmly as possible to the show ring. Keep calm, avoid rushing, be alert, and try to enter the ring when there is no confusion at the gate.
- Keep your pig clear of other animals in the ring. Take all caution to prevent fighting between animals.
- After entering the ring, drive the pig to the back side of the arena and make every effort to keep the pig from approaching the gate through which he entered. Try to stay away from corners and groups of pigs.
- Alertness in the ring is extremely important. Keep one eye on the judge and one eye on your animal at all times.
- Your posture should be that of slightly crouching over with cane or whip close to animal, but avoid overaggressiveness and overshadowing.
- Always keep the animals between yourself and the judge.

- Do not stroll too far from the judge, but at the same time avoid running your hog over him. The best show is made 15–20 feet from the judge. The showman should attempt to show the best view of the pig whenever possible.
- When the judge approaches for close inspection, assist him by stopping your pig from the front end with your cane or whip.

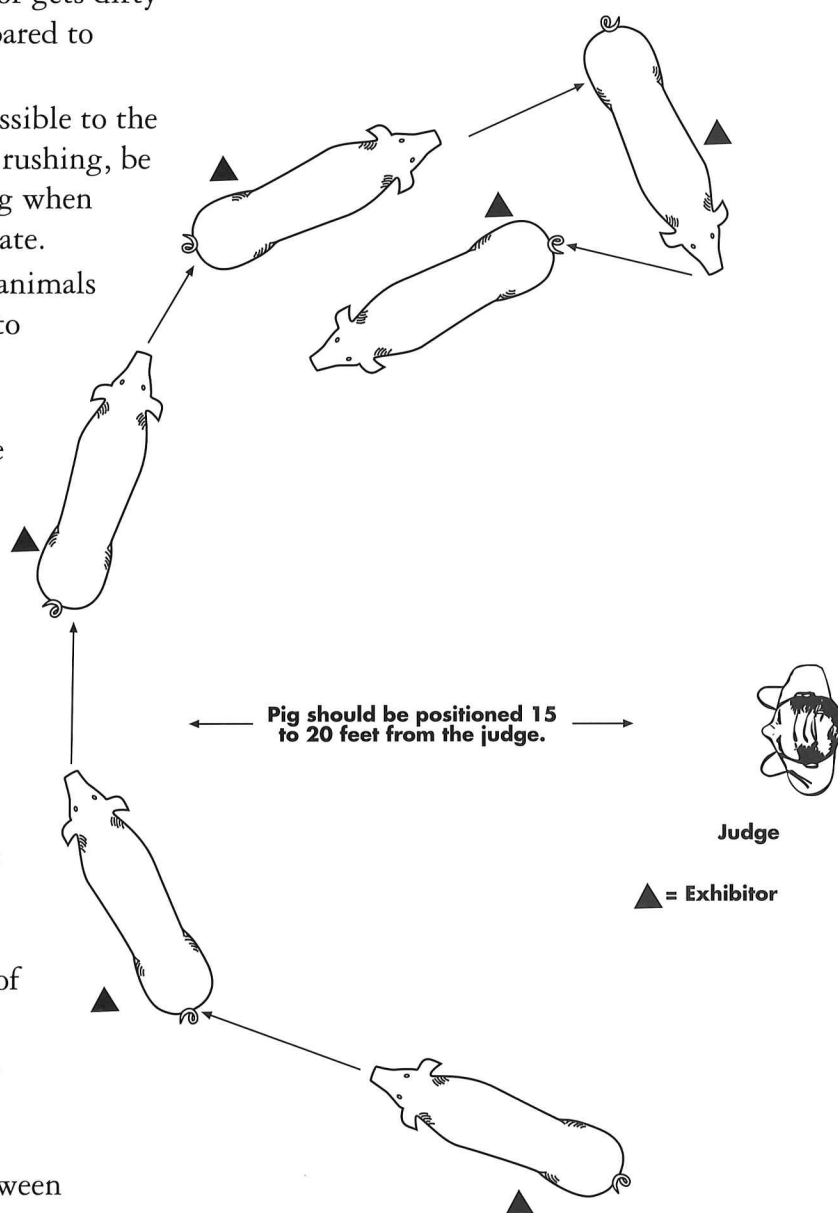


Figure 12.2
Show ring

- Stay close to and drive the pig from the neck and shoulder area by tapping lightly with the cane or whip. Never tap on the back or rump, as this may cause the tail to droop, and may also bruise muscle tissue.
- Acceptable areas to “Tap” a pig with show whip or cane are shown in figure 12-3. Proper training prior to the show should have resulted in the pig learning to move and turn by merely seeing the cane or whip. Pigs are one of the most intelligent domesticated animals and learn very quickly to respond to **visual placement** of the cane or whip. However, if your pig does need to be tapped in order to respond, these are a few areas on the pig that are acceptable.
- Switching hands is preferred if you use them at the same ability.

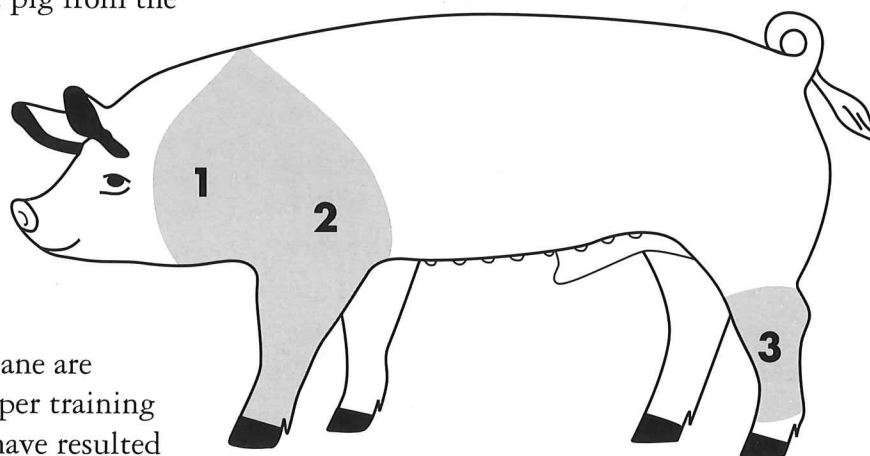


Figure 12.3
Acceptable areas for “tapping pig”

1. Jowl and neck region
2. Shoulder and front leg region
3. Rear hock region (be sure it is a **light** tap in this region).

“Bad” Places to Tap Pig

Area on pig

Ham

Why undesirable

- Is a “high-priced” cut area. Could have a potential bruise area that would need to be cut out of the carcass.
- Is not good to get in the habit of hitting an animal in a “high-priced” cut area.
- If you hit a pig in the ham, the pig will usually tuck-in his ham and arch his top. This makes the pig look undesirable or not at its best). In the show ring the animal will not look its best if you tap the ham.

Loin

- Is a “high-priced” cut area. Could have a potential bruise area that would need to be cut out of the carcass.
- Is not good to get in the habit of hitting an animal in a “high-priced” cut area.

- When you want the pig to move to the left, you should be on the right side of the pig. The pig will then turn away from you and the cane or whip.
- Do not be rough with your animal at any time—do not, for instance, strike it sharply with a whip or hit it on the end of the nose with a cane.
- There is much satisfaction in exhibiting winners, of course, but one should always be a good sportsman. Above all, learn from your experiences, whether you win or not.

Show Ring Ethics

One of the most visible components of 4-H is livestock shows. Much of the public's contact with 4-H is at the county fair where show ring events draw large crowds. What the audience sees reflects on the total 4-H program and the entire livestock industry. How are you contributing to that image?

The desire to win at “any cost” has tarnished the record of 4-H members personally and livestock shows in general. Why have YOU chosen to show an animal? What motivates some to act dishonestly in the show ring?

Competition can be a positive tool to help develop important skills in your life if you keep it in perspective. Many 4-H alumni who showed animals during their 4-H years attribute part of their success in their careers to the diverse skills gained as a 4-H member. Decision making skills and critical thinking techniques are used to select your animal and choose a feeding program. Answering the judge's questions in a confident manner helps you gain poise which is beneficial in many other situations. Good sportsmanship is a characteristic we all need. Certainly

self-esteem is affected in the show ring by lots of people watching and applauding your performance!

Is your only goal to win or do you want to get more out of it than that? Your ability to think while paying attention to the judge, your animal and other exhibitors is an important skill. Keeping a level head and staying composed will be good practice for other challenges in your life. Many long lasting friendships are developed from showing animals.

Proper training of your animal for the show ring should only include techniques that offer no risk of injury or pain to the animal. Aggressive use of the cane or whip may cause bruises to the muscle tissue which could result in unwanted carcass trim. If a TV camera were present when you are working with your animal, would you do anything differently than you normally do? Putting in many long hours of practice with your animal is the only way to achieve that polished, confident look, with the animal giving complete response to your commands.

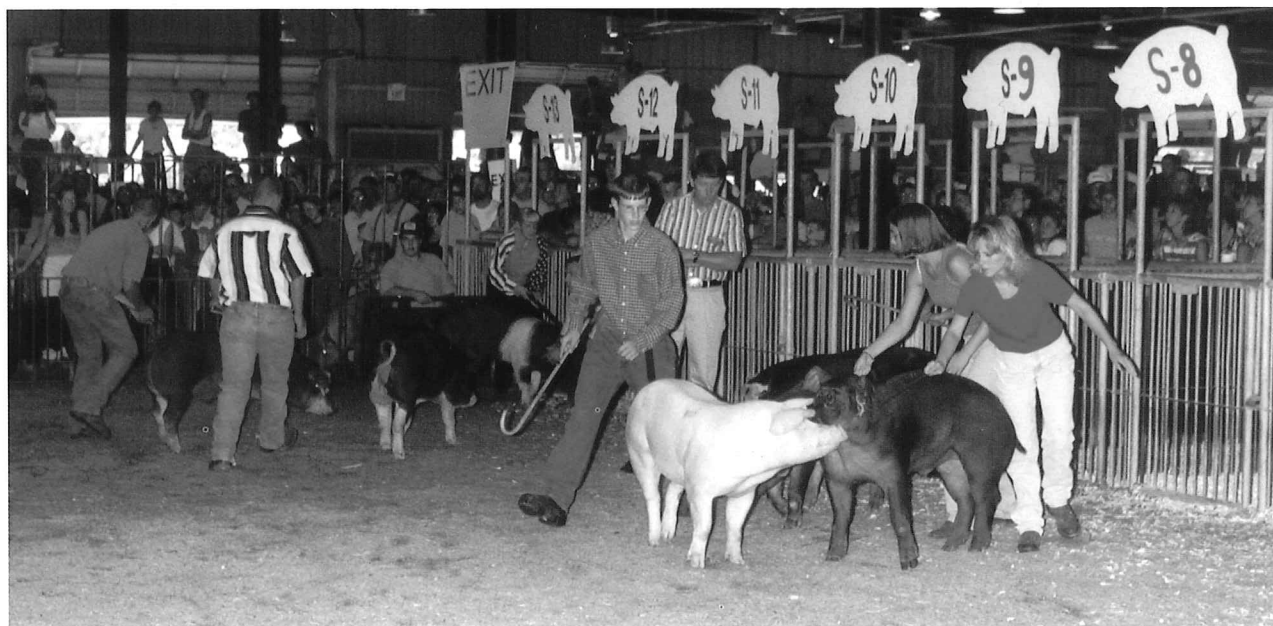
The effect on animals from unethical practices can be harmful or even fatal. If your animal goes to slaughter and residues are found in the tissue, the animal will be rejected. How does this reflect on you and the animal industry?

Newspaper articles turn yellow, trophies will break and people forget who won. Your moment in the spotlight with a champion is short lived. Think about what will stay with you after the thrill of “winning” has worn off. What do you hope people will remember you for?

The bottom line is that using unethical techniques to train, feed, or show your animal is wrong. If you see it happening, don't turn your back. Tell a committee member or show official.

Tips for Exhibiting at the County Fair

1. Hogs that have not been penned together at home should not be penned together at the county or state fair.
2. A county or state fair offers several activities that can distract the exhibitor from caring for their swine project. Keep your project an important focal point.
3. Keep pens and aisleways clean. The county fair may be the first or only impression many people have of 4-H and FFA projects or agriculture. Be sure that:
 - pens are clean
 - animals are clean
 - animals are fed regularly
 - animals are watered frequently
 - old or uneaten feed is cleaned out before new feed is added. Usually animals eat less away from home.
 - someone is watching for signs of heat stress in animals (i.e., heavy breathing, panting, etc.)
4. Temperature control is a great concern! If hogs are really hot, do the following:
 - a) Sprinkle cool water on their shoulders, neck, head and nose.
 - b) Take hog to wash rack (if wash pens are fairly close), rinse in cool water and return to clean, dry pen. (Wet pens can add to the heat stress of most hogs). **CAUTION:** Cold water put on the entire body of an extremely hot pig could cause shock. Be sure to “cool off” the head, neck, and shoulders before putting cold water on the hog’s back.
 - c) Water hogs at least 4–5 times a day on extremely hot days. Do not leave water in pens because hogs will spill the water, and make a mess of their pen.
5. Be a good neighbor. Be careful not to spill water in pen next to your own.



6. Start early enough to prepare animals for the show so that you will not be in a hurry and cause your animal to become excited. An excited exhibitor with an excited animal has a greater chance of injuring themselves, their animal, or a fair visitor.
7. Represent agriculture. You and your project will represent to people who are not well acquainted with agriculture where their food originates. When visitors are traveling through your barn be helpful in answering their questions about pork production.



Chapter 13 Selling the Project Animal

A Junior Market Livestock Sale is held in conjunction with most county fairs so that 4-H members can sell their finished market animals. (This, of course, is another “moment of truth” for all your project work.) The sale management may be under the Cooperative Extension Service, FFA organization or Senior Fair Board.

Become acquainted with the rules and procedures and cooperate with those in charge of the auction. There will be weighing and preliminary requirements to meet, ear-tagging, sale order placement, and so on. Pay attention to announcements that come from the show manager and be prepared to enter the sale ring at your appointed time. Be prompt and have the pig clean and groomed as you did for the show.

When you enter the sale ring, circle your pig so all may see it. Do this so that you are in the center and the pig is to the outside. Your time in the ring may be as short as a minute or as long as 10–15 minutes. Whatever the time, always be alert and cheerful.

Also, there is usually considerable promotion, and many adults and representatives of the business community offer premium prices as a means of rewarding the 4-H member for his/her extra effort. It is important that 4-H members make contact with these buyers prior to the sale so that they know their support is appreciated. This small amount of effort before the sale is a matter of courtesy, and by it, you may in turn be rewarded by being offered a greater amount at the sale. After the sale, regardless of the amount you received, write to the buyers and thank them for their patronage.

Writing a Thank You Note

August 31, 20XX

Dear Mr. and Mrs. Jones,

Hello, my name is Andrea Smith and I was writing to thank you for buying my pig at the 20XX Clinton County Jr. Fair. This was my first year to show at the fair, and you have helped make it a wonderful experience.

I have put all of my money into a savings account, which I plan to use towards my future.

I am looking forward to taking another market hog project next year. I have learned a lot while taking this project. Mostly I learned responsibility and how to take care of my pig every day.

Thank you for supporting the 20XX Clinton County Jr. Fair. You have helped make it a successful year and I hope you will continue your support.

Sincerely,

Andrea Smith

August 30, 20XX

Dear Mr. and Mrs. Jones,

Thank you for coming to the Clinton County Jr. Fair Sale and purchasing my market hog. I plan on saving the money to help pay for college. My parents have taught me how to sign a check and we went to the bank and opened a savings account for me.

This was my third year taking a hog project and I can't wait until next year. I had a lot of fun and learned a lot while taking care of my hog. I also learned how to keep good records about how much feed my pig ate and how many pounds it gained.

Thanks for supporting the Jr. Fair sale by buying my hog. I really learned many things this year and I'm glad that people like you help support programs like 4-H for kids like me.

Sincerely,
Andrea Smith

August 31, 20XX

Dear Country Springs Coop,

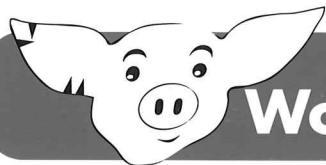
I am writing to thank you for purchasing my hogs at the 20XX Sandusky County Jr. Fair. I have been involved with the Jr. Fair for eight years and it is buyers like you who really help to keep the Jr. Fair going strong.

Since I started taking market hog projects I have been placing the money in a savings account to help pay for college. I hope to attend college to study animal science and continue working in the field of agriculture.

Over the past eight years of being involved with market hog projects in 4-H, I have learned the importance of keeping good records in order to raise healthy hogs. Most importantly, raising swine has taught me hard work, responsibility, and organizational skills.

Thank you for supporting the 20XX Sandusky County Jr. Fair Livestock Sale. You have helped to make this year one of the best yet! I hope you continue to support the Jr. Fair far into the new millenium.

Sincerely,
Dee Davis



Chapter 14 Working Safely with Swine

Many livestock producers have never stopped to consider why animals behave as they do and, more importantly, what this behavior may mean to their personal safety. Animal handling practices are often inherited from watching others and from our own experiences growing up on the farm. Too often, this results in unsafe animal handling and restraint practices.

Although most animal accidents are not fatal, many men, women and children are needlessly injured each year because of a lack of safety awareness. Broken bones, crushed and mashed limbs, missed days of work and school and unnecessary medical expenses are some of the results of animal related accidents.

Individuals may work carefully around animals most of the time, but they are injured in an animal accident because of preoccupation, haste, impatience or anger. It is during these moments that a livestock handler really needs to understand animal behavior.

Swine are generally colorblind and have poor depth perception.

This results in extreme sensitivity to contrast, which may cause the animal to balk at shadows or rapid changes from light to dark. Swine also are cautious when moving from one type of floor surface or ground cover to another. Allow time for their senses to get acclimated to the new environment.

Livestock with newborn offspring exhibit a maternal instinct. They are usually more defensive and difficult to handle. When possible, let the young stay as close to the adult as possible when handling.

Most swine have a strong territorial instinct and develop a sense of "homeland" in their pens. They develop a very distinctive, comfortable attachment to these areas. An example of the homeland instinct is the well worn paths created in most pastures and between pastures and buildings, water troughs and feed bunks. Forceful removal from a homeland area can cause animals to react unexpectedly.

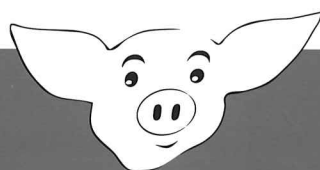
Considering these animal traits, it is easy to understand why animals often hesitate when going through unfamiliar gates, barn doors, and handling and loading chutes. In addition, shadows, yelling and rapid changes in

lighting can further excite animals and make their behavior unpredictable. Similar problems occur when animals are moved away from feed, separated from the herd or approached by an unfamiliar person.

Animals are extremely sensitive to noise and are easily frightened or spooked. In their attempts to move away from

the direction or source of the noise, they may crash into or through objects, including people, because of their colorblindness and poor depth perception. Be cautious around animals that are blind or deaf on one side. They favor that side and can suddenly swing around to investigate disturbances. If standing too close, a person could easily be knocked down and trampled.

Young farm animals can form relationships simultaneously with other animals and with human handlers. Animals respond to the way



**Livestock with young
are usually more
defensive and difficult
to handle.
...let the young stay as
close to the adult as
possible when handling.**

they are treated and draw upon past experiences when reacting to a situation. For example, a newborn raised on a bottle or bucket may develop a very strong affection for the person feeding it and feel comfortable around people. However, animals that are chased, slapped, kicked, hit or frightened when young will naturally fear being approached.

Animals are often said to be “stubborn” because they balk or refuse to enter an area. Once this has happened, the animal is likely to refuse the next several times as well and may become a little more excited and dangerous with each refusal. It is important to take the time to prepare for moving animals. Many livestock producers are tempted to move animals without the necessary planning and equipment/facilities (such as hurdles, gates and panels) and often end up in a battle with the animal that could lead to an injury.

In addition to unique vision characteristics, sensitivity to noise and a strong territorial instinct, animals have physical and mental sensations similar to those of humans that can cause them to react fiercely to handlers. Animals experience hunger, thirst, fear, sickness, injury and strong maternal instincts. They also develop individual behavior patterns such as kicking or biting. The handler should be aware of these behaviors and take necessary precautions. Safety precautions include using personal protective equipment such as safety glasses, gloves, long trousers, steel-toed shoes or boots, shin guards and a hard hat, depending on the activity and type of livestock being handled.

Handlers should also be concerned with zoonotic diseases, which are illnesses that can be transmitted between humans and animals. Leptospirosis, rabies, brucellosis, salmonellosis and ringworm are especially important. A livestock producer can contract zoonotic

illnesses by being bitten by the animal, handling an infected animal or disposing of infected tissues. To reduce exposure to disease, use basic hygiene and sanitation practices, which include prompt treatment or disposal of infected animals, adequate disposal of infected tissues, proper cleaning of contaminated sites, and proper use of personal protective equipment.

Facilities can play a major role in preventing accidents. Good facilities provide a means of controlling animals while allowing easy access for routine chores—all in a safe environment. To help prevent accidents, keep walk and work surfaces properly lighted and clear of debris and obstructions. To reduce the risk of falls, provide slip resistant footing for workers and livestock with roughened concrete ramp and floor surfaces.

Most animal related accidents are the result of “people-problems”. Poor judgment and lack of understanding are major causes of accidents involving animals. Plan ahead to allow plenty of time to move animals, so there is no need to hurry. Do not try to manhandle animals when you are angry. Some handlers may exhibit a feeling of superiority over animals, which is foolish when one considers the size of some farm animals.

Other common problems should also be avoided, such as horseplay (people play), improper lifting of young animals, prodding an animal that has no place to go, tying a person to an animal, attempting a task without enough help, not providing proper and safe facilities, and not wearing personal protective equipment.

What can livestock producers do to increase their level of safety when handling animals? Although there is certainly no magical formula, common sense is a key ingredient.



Chapter 15 Selection of Breeding Stock

Swine Breeding Projects

A swine breeding project is one of the most challenging, but also one of the most rewarding. The knowledge, capital and time the project requires is much more than found in a market animal project. The member should start by visiting with an owner-operator of a swine production farrow to finish operation. Their advice and insight will help answer questions and provide the project member a clearer picture of what this project entails.

The member should start with obtaining an open gilt, a bred gilt or sow. Two or more

sows offer a greater challenge and may be considered as the member gains more experience. A swine breeding project requires top management which starts with good record keeping. Breeding, feed, health, financial, performance and environmental records are all very important requirements of a swine enterprise. The project member should realize up front that these records **must** be filled out on a day to day basis. This is true for both seedstock producers and those in commercial pork production operations.



Figure 15.1
Ideal bred sow

Production Options

Begin a swine project with the number of pigs you can adequately handle. Increase the size of your project each year as you gain experience and have available space. Again, it is very important to keep records on all pigs for project evaluation.

Advantages of becoming involved in the raising and breeding of swine include the following:

1. Initial investment can be modest.
2. The swine project can be adapted to a wide variety of management situations and resources.
3. The enterprise can have a rapid turnover and a steady cash flow. For example:
 - (a) Two litters per sow per year (12 to 20 pigs per sow per year)
 - (b) Feeder pigs for sale at 10 to 12 weeks
 - (c) Market hogs for sale at five to six months
 - (d) High market salvage value on culled breeding animals
4. Hogs are efficient converters of feed, making it possible to market home-produced grains through hogs for more money.
5. Types of enterprises to consider depend on the project member's workload, the kind of shelter available and the financial resources available.

Enterprises to consider may include:

- (a) Feeder pig to finish (easiest to manage, requires considerable operating capital)
- (b) Feeder pig production (requires less operating capital and more careful management)
- (c) Farrow to finish (a combination of a & b, which reduces market fluctuation risk)

To start your swine breeding project, you need to consider several management factors that are essential to developing a successful program. First, you need to decide whether you want to develop a purebred or commercial production system and then select animals to meet your goals. Once you have decided what your goals are in this project, you must manage your breeding herd by providing the proper nutrition, health program and environment.

Choosing a Production System

The swine breeding project will involve several decisions that need to be made prior to the purchase of your first gilt or sow. Purebred or commercial? Confinement or pasture? Feeder pig production or farrow to finish? Closed herd or open? Once these questions have been answered it's time to go shopping.

Purebred

Purebred: A breed or line of swine that have been selected for a specific purpose over a period of time: Purebred breeders identify and select animals that meet desired production and physical qualities and try to fix these traits in their animals. A purebred is often associated with a formal registration procedure requiring extensive pedigree (history) information. Involvement in the purebred swine business can be highly rewarding as you form and mold highly predictable genetic packages into superior animals. Self satisfaction comes through the accomplishment of producing genetically superior animals which **you make** possible through wise breeding decisions. To top it all

off, there is satisfaction in working with other swine breeders who have similar interests, ambitions and goals. Being involved in a Jr. breed association will open many doors to information and opportunities to which many livestock youth would never otherwise be exposed. Please refer back to chapter 2 for a listing of Breed Associations for further information.

Crossbred

Crossbreeding is mating animals from different breeds or lines. Pork producers use crossbreeding to produce hybrid vigor (heterosis) and to combine the attributes of various breeds for commercial production of pigs.

The crossbred female is the basis for more than 95 percent of commercial swine produced in the United States. This is because the crossbred, compared to the purebred, female will normally produce more pigs at birth with greater livability and produce more milk, which equals heavier weaning weights. Crossbred offspring also grow faster to market weight as a result of heterosis. The percentage improvement obtained by crossbreeding is shown in table 1. Heterosis exists when crossbred offspring perform better than the average of the parental breeds or lines. The performance of a cross between breeds may be more or less than the best parental breed, so it is very important that the correct breeds are chosen for the trait in which improvement is desired.

Table 1. Average percent heterosis advantage for various swine traits.*

Trait	First cross using purebred females as parents	Multiple cross using crossbred females as parents
	%Advantage of offspring over parents	
Number pigs born alive	0.5	8.0
Number pigs at 21 days	9.0	23.0
21 day litter weight	10.0	27.0
Days to 220 lb.	7.5	7.0
Feed per pound gain	2.0	1.0
Backfat	-2.0	-2.0
Loineye area	1.0	2.0

*Ahlschwede, W.T. et al. 1988. Crossbreeding systems for commercial pork production. PIH-39, Pork Industry Handbook.

Selection of Breeding Stock

Gilts

The success of a swine project is based on a sound foundation, the sow herd. The sow herd contributes half of the genetic makeup of growing-finishing pigs. This factor makes it very important that careful selection of females be placed as a priority of the herd. Gilts should be selected based on both their genetic (genotypic) background and on their visual (phenotypical) appraisal. Emphasis should be placed on:

Growth rate

Litter size

Leanness

Soundness (structural and reproductive)

Disposition (attitude with people & other pigs)

Records—sow's, expected progeny differences (EPD's), breeding values (BV's)

Visual appraisal is very important! The best records on a gilt mean very little if she cannot pass a **soundness evaluation**. Soundness means being free from flaws or defects. There are three areas of particular concern: 1) reproductive, 2) mammary and 3) skeletal.

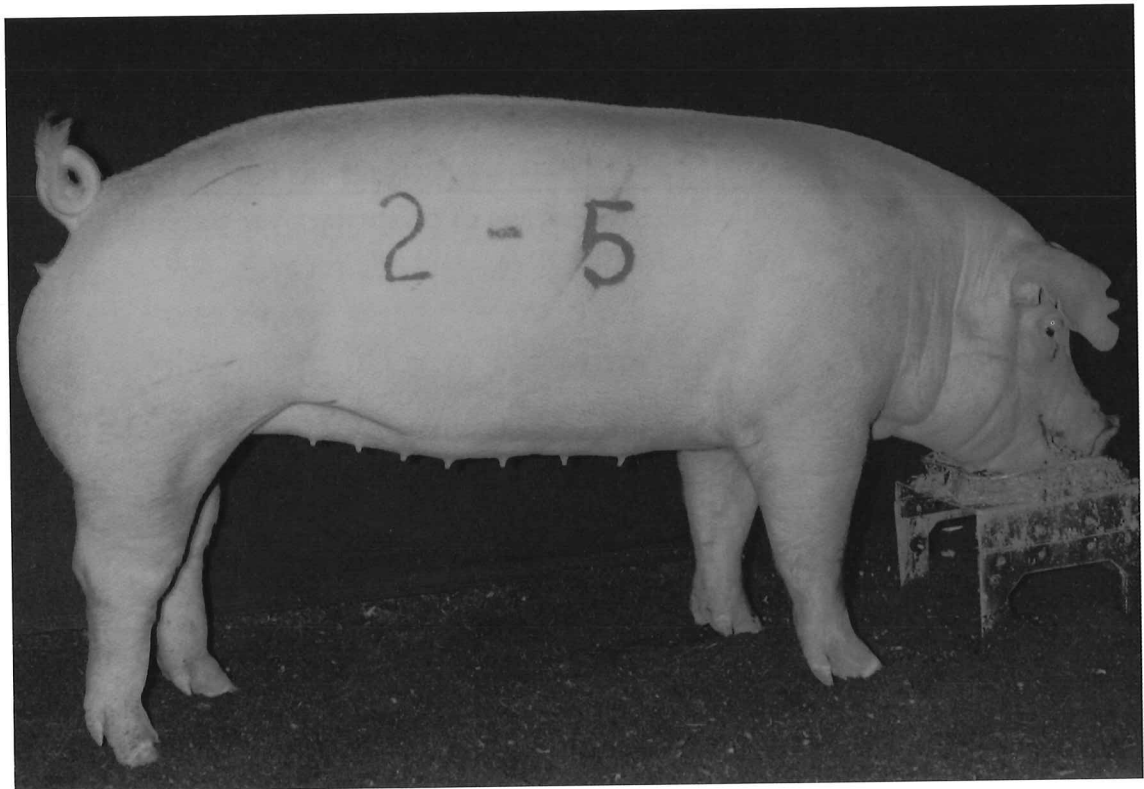


Figure 15.2
Desirable gilt

Mammary soundness. Gilts should possess a sufficient number of functional teats to nurse a large litter of pigs. There should be at least six, well-spaced, functional teats to a side. Gilts with inverted or scarred nipples should not be saved. (New concrete, rough floors and corrosive chemical compounds on the floors of farrowing houses can cause abrasions to gilts'

underlines which result in nonfunctional teats.) As a gilt approaches puberty, her underline should become more prominent, indicating normal development. **Skeletal soundness.** Gilts with feet and leg problems which will interfere with normal breeding, farrowing and nursing functions **should not be saved.** (Chapter 3 figures 3-10, 3-11).

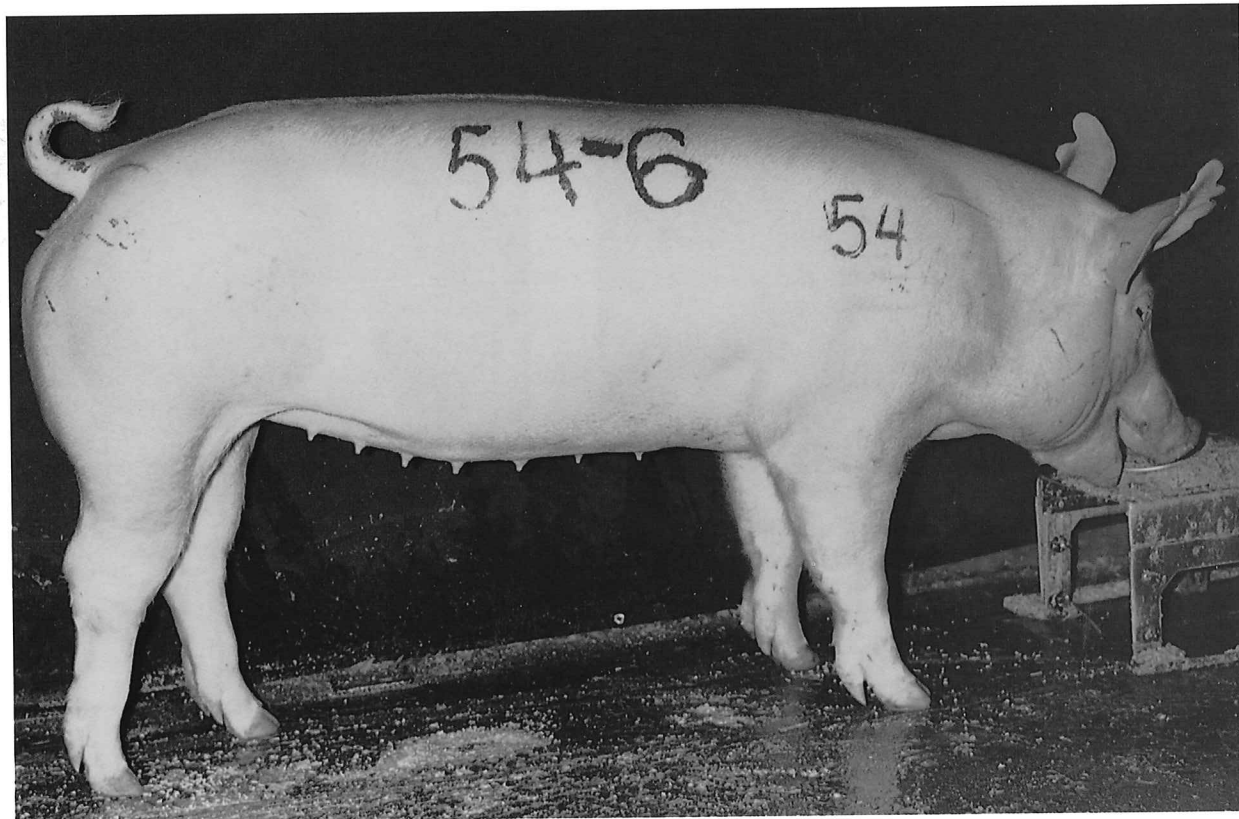


Figure 15.5
Prominent underline

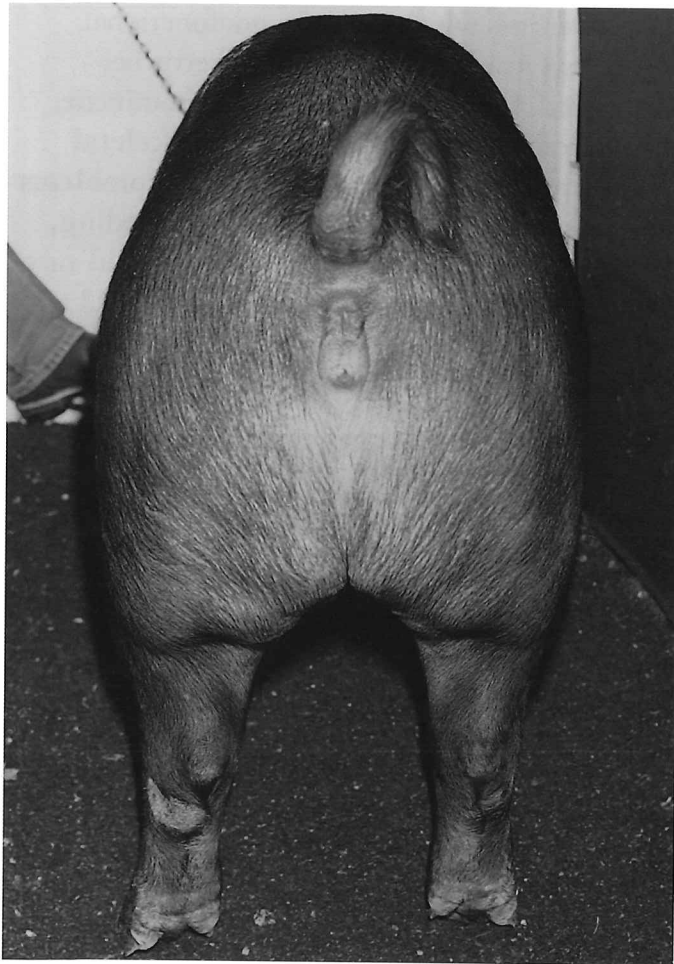


Figure 15.3
Desirable/normal vulva

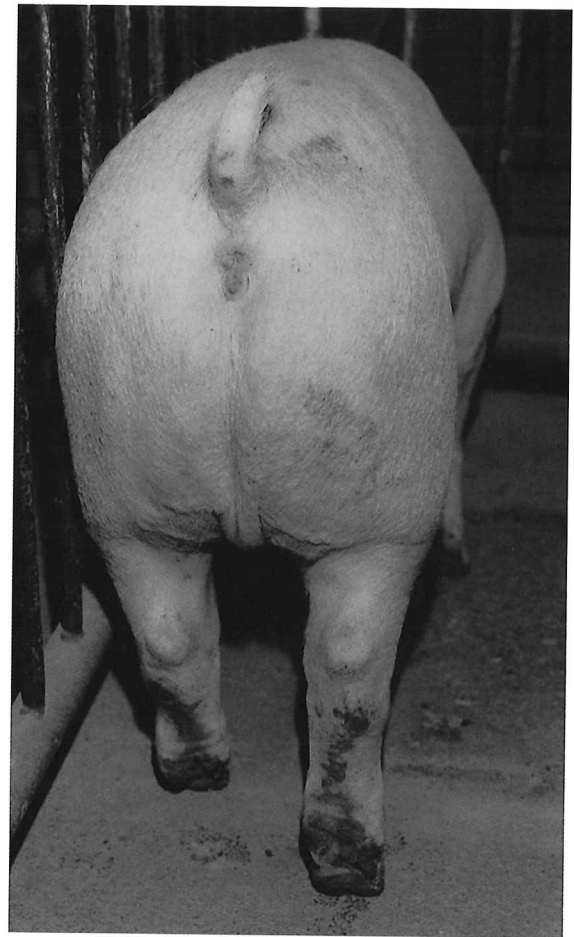


Figure 15.4
Small vulva

Reproductive soundness. Gilts should exhibit normal reproductive development, both anatomically and behaviorally. The external genitalia (vulva) should be normally developed.

Most anatomical defects of the reproductive system are internal and not visible. Gilts with small vulvas (figure 15.4) are indicative of infantile reproductive tracts (not fully

developed) and should not be kept. Replacement gilts should begin to show signs of puberty at least a month prior to anticipated breeding. Sows which have difficulty farrowing, are slow farrowing, or have damaged reproductive tracts (uterine prolapse, or uterine infection) should be culled. Reproductive failure is the number one reason for removal from the herd.

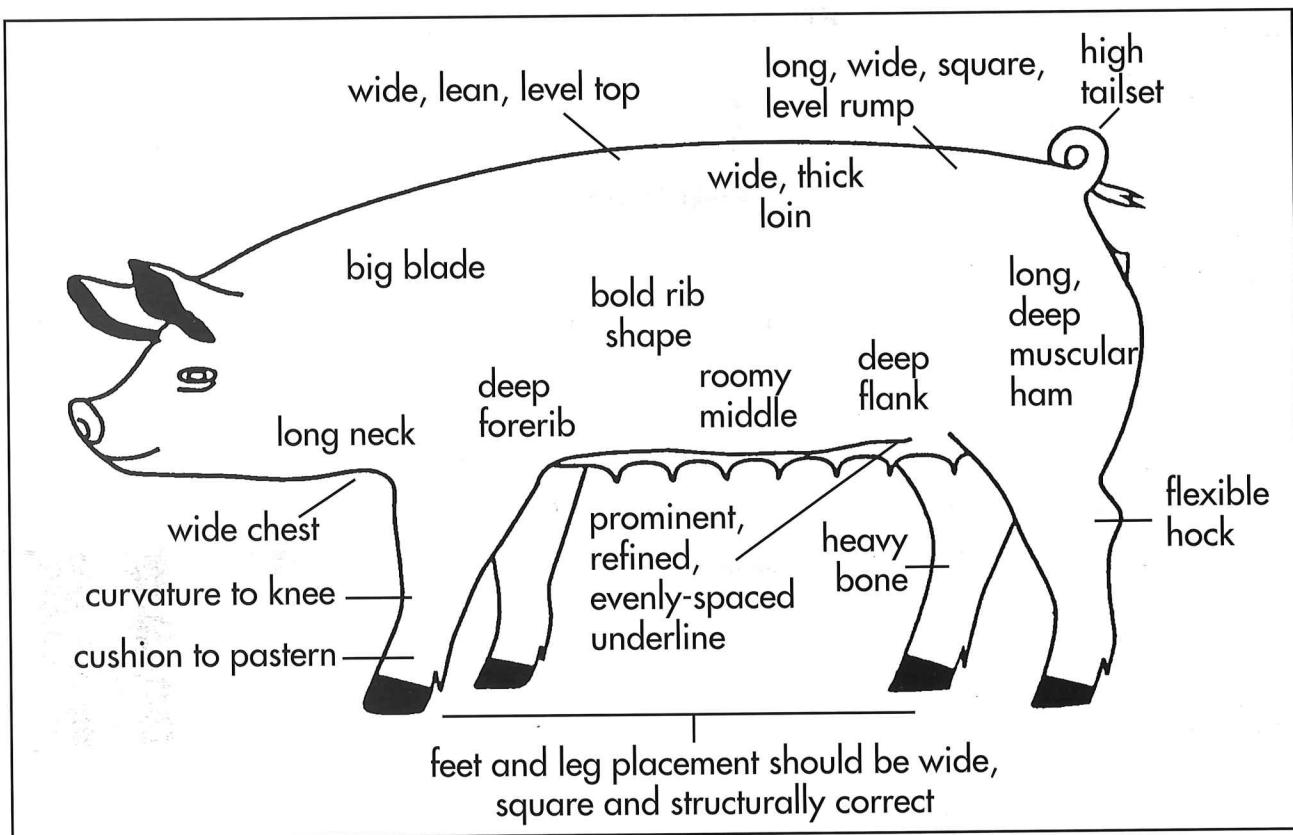


Figure 15.6
Characteristics of an ideal breeding gilt

The Components of the Female Reproductive Tract

1. Brain

- Senses the external and internal environment of the female and regulates behavior and the reproductive process.
- Controls learning
- Is the ultimate control center for reproduction.

Hypothalamus

- Sorts the signals from the boar: smell via the nose, sight via the eyes, touch, and sound. With the appropriate signals, the hypothalamus activates, controls, and integrates the nervous and hormone systems.
- Secretes gonadotrophic releasing hormone (GnRH) that regulates luteinizing hormone (LH) and follicle stimulating hormone (FSH) secretion from the anterior pituitary gland.
- Secretes other hormones that influence growth, metabolism and the animal's response to stress.

Pituitary glands

- Glandular anterior lobe - Secretes LH (which matures follicles and induces ovulation) and FSH (functions in follicle selection and growth).

Neuronal posterior lobe

- Secretes oxytocin, which stimulates milk letdown and contractions of the smooth muscles of the uterus.

2. Ovaries

- The female gonad.
- Produce estrogen and progesterone, the principal female hormones.
- Produce ova (eggs).

- Undergo cyclical changes in hormone production and anatomy.

Corpora lutea

- Ovarian structures that produce progesterone during diestrus and pregnancy.
- Formed by luteinization of ovulated follicles.
- Maintained if the female becomes pregnant; in the cycling, nonpregnant female degenerate to form the corpora albicantia (CA).

Follicles

- Each follicle usually contains one ovum (egg).
- Produce estrogen.

3. Oviducts (Fallopian tubes)

- The ovarian end is funnel-shaped.
- Tubular structure that permits passage of the egg to the uterus.
- Site for fertilization of eggs by sperm.
- Provides a "protected" environment for the egg and early embryos.

4. Uterus

- Paired tubes or horns connected to the oviducts.
- Glandular lining (endometrium) nourishes the embryo and developing fetuses.
- Controlled by reproductive hormones.
- Enlarges at sexual maturity and during estrus; shrinks during diestrus.
- Contracts during farrowing to expel piglets and placentae.

- Source of Prostaglandin: plays a role in the regression of corpora lutea.
5. **Cervix**
 - Contains numerous glands that supply mucus to the vagina.
 - Has many ridge-like folds that lock the boar's corkscrew penis or AI rod.
 - Tight and constricted during diestrus and pregnancy; slackens during estrus and opens during farrowing.
 6. **Vagina**
 - Connects the cervix with exterior via a short vestibule; guides the boar's penis during mating.
 - Nonglandular; undergoes cyclical changes with the estrous cycle, has numerous cell layers during estrus but less than six during diestrus or pregnancy.
 - Forms birth tract during farrowing.
 7. **Vulva**
 - External genital organ of the female pig.
 - Reddens and swells in response to estrogen associated with estrus.
 8. **Urinary bladder**
 - Sac for urine storage; connects to the kidneys via ureters.
 9. **Urethra**
 - Discharges urine from the body.
 - Can be traumatized by the boar's penis during mating.
 - Discharges urine from bladder, connects bladder and vagina.
 10. **Infundibulum**
 - The fimbriated end of the infundibulum surrounds the ovary and "captures" the egg at ovulation.
 11. **Ampulla**
 - Thin-walled portion of the oviduct, aids in ova transport to the site of fertilization.
 12. **Ampulla-isthmus junction**
 - Junction in the oviduct where fertilization of the ova by sperm occurs.
 13. **Isthmus**
 - Tubular section of the oviduct that facilitates sperm transport from the uterus and fertilized egg (zygote) transport to the uterus.
 14. **Uterotubal junction**
 - Regulates the movement of sperm into the oviduct and movement of the zygote into the uterus.
 - Obstructs movement of bacteria from the uterus into the oviduct and body cavity.

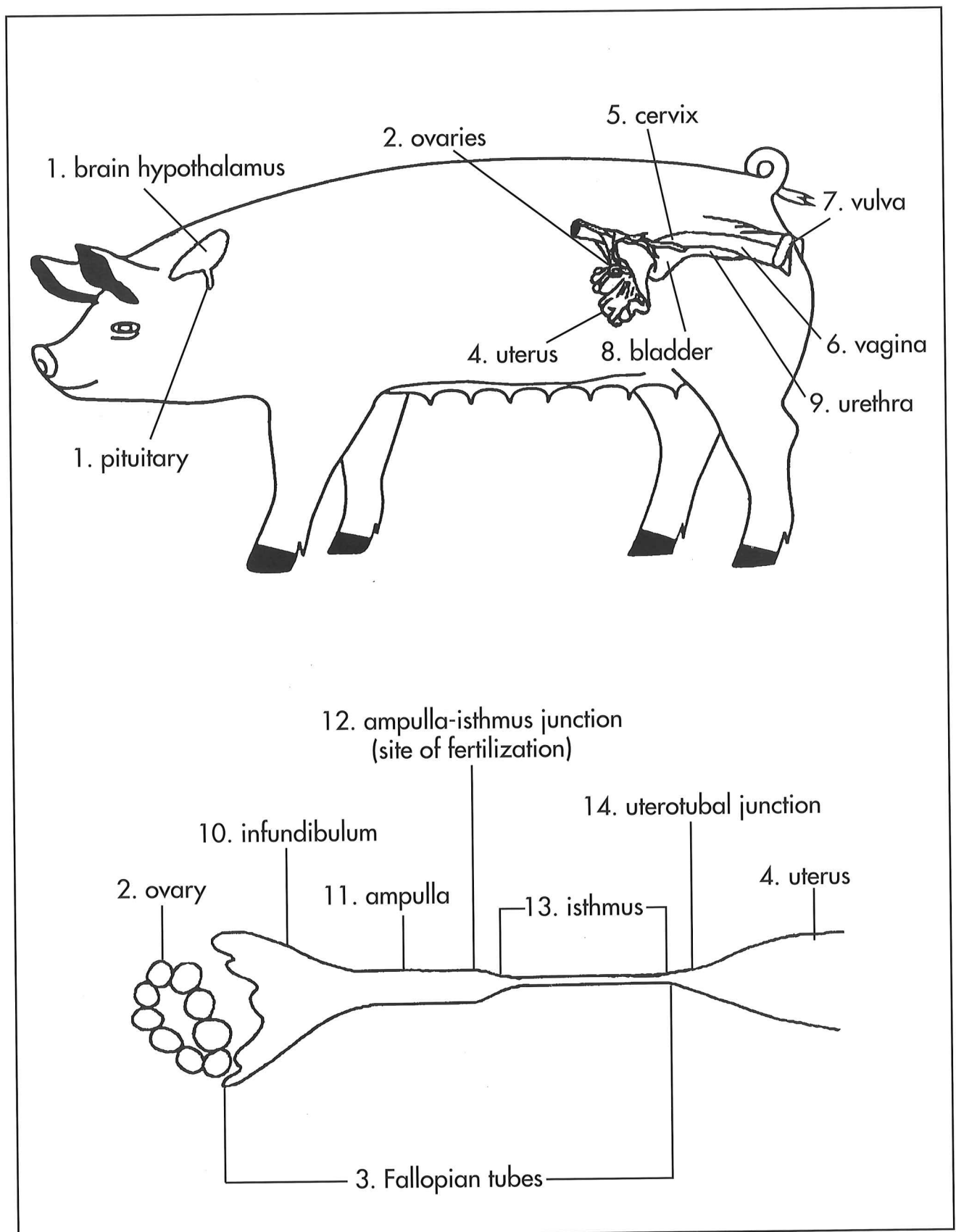


Figure 15.7
The reproductive tract of the female pig

Gilt Selection Calendar

When	What
Birth	<ul style="list-style-type: none"> • Identify gilts born in large litters. Hernias, cryptorchids and other abnormalities should disqualify all gilts in a litter for replacements. • Record birth dates, litter size, breed composition and identification. • Equalize litter size by moving pigs from large litters to sows with small litters. Pigs should nurse before moving. • Keep notes on sow behavior at time of farrowing and check: (a) disposition, (b) length of farrowing, (c) any drugs such as oxytocin administered, (d) condition of udder, and (e) extended fever.
2–5 weeks	<ul style="list-style-type: none"> • Wean litters. Feed balanced, well-fortified diets designed to optimize growth and development. • Screen gilts identified at birth by examining underlines, and reject those with fewer than 12 well spaced teats. If possible, at this time select and identify as replacement gilt candidates about 2–3 times the number needed for replacement.
180–250 lbs.	<ul style="list-style-type: none"> • Evaluate gilts for growth, leanness, and soundness. • Select for replacements the fastest growing, leanest gilts that are sound and from large litters. Save 25–30% more than needed for breeding. • Remove selected gilts from market hogs. Place on restricted feed. Increase mineral fortification levels. • Give fenceline contact with boar. (When gilts are 150 to 170 days of age). • Observe gilts for sexual maturity. If puberty records are kept, give advantage to those gilts that have cycled most frequently when final culling is made.
Breeding	<ul style="list-style-type: none"> • Make final selection when the breeding season begins and keep sufficient extra gilts to offset the percentage of nonconception. • Make sure all sows and gilts are ear-tagged or identified. • Start breeding at second or third estrus (6–8 months of age)

Boar Selection

The performance level of a swine herd is determined by two things: genetics and environment. The genetic contribution is determined by the boars and gilts selected and the breeding scheme involved. The environment, (weather, housing, feeding management, etc.) will enhance or hinder the performance traits.

It is every bit as important to focus on the health and genetic background of the boar as it is the gilts. The boar will actually have more effect on the herd as a whole than the gilts. A boar will contribute 50% of his genetics for every pig that is sired by him.

When selecting your new boar or ordering semen for Artificial Insemination (AI) follow a genetic improvement program that balances the traits you desire. Keep in mind that visual appeal is important but must co-exist with performance, carcass and quality traits.

A sound genetic improvement program should include four features:

1. Accurate, complete performance records including individual animal identification.
2. A history of the boar and preferably his ancestors genetic merit in these traits: growth rate, feed efficiency, carcass merit and reproductive performance.
3. An index value indicating the boars rank compared to his herd of origin and also within his breed or lineage.
4. Structural and breeding soundness evaluation. The best records in the world won't mean anything if the boar is not capable of breeding. (Refer to chapter 2 on structural evaluation).

The breeding program used will likely dictate the breed, crossbred or composite boar needed. Boars or semen can be purchased from purebred breeders and commercial breeding organizations. Both can be good sources of genetics.

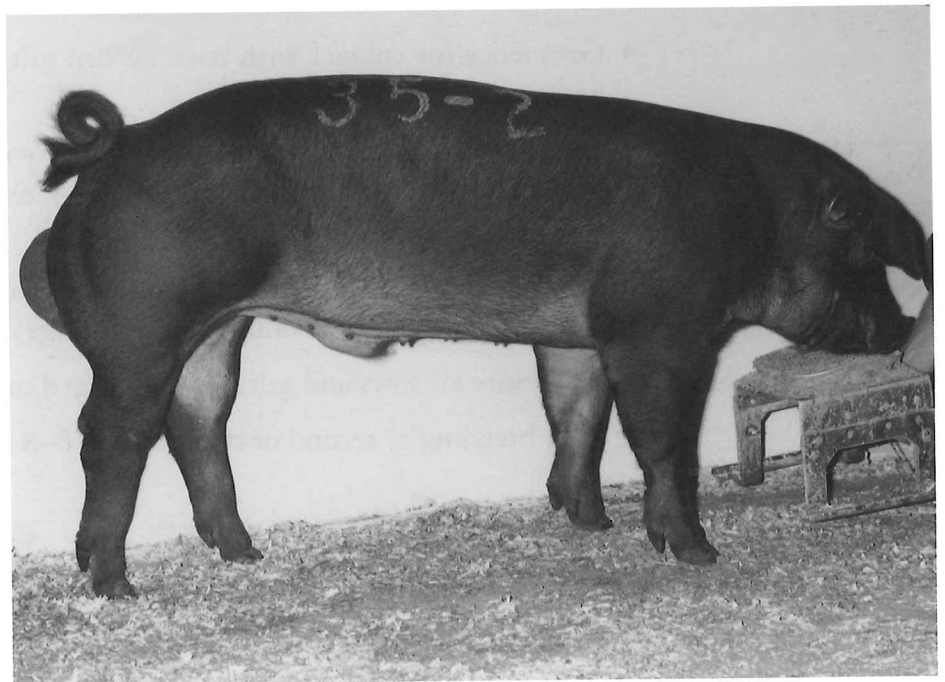


Figure 15.8
Ideal boar

Age of boar - Select and purchase boars at 6 to 7 months of age. Don't use young boars just because they appear to be large enough. Boars should be purchased at least 2 months prior to intended breeding. This will provide you

time to isolate and check for health concerns. This is also a good opportunity to test mate boars to gilts and evaluate for breeding performance.

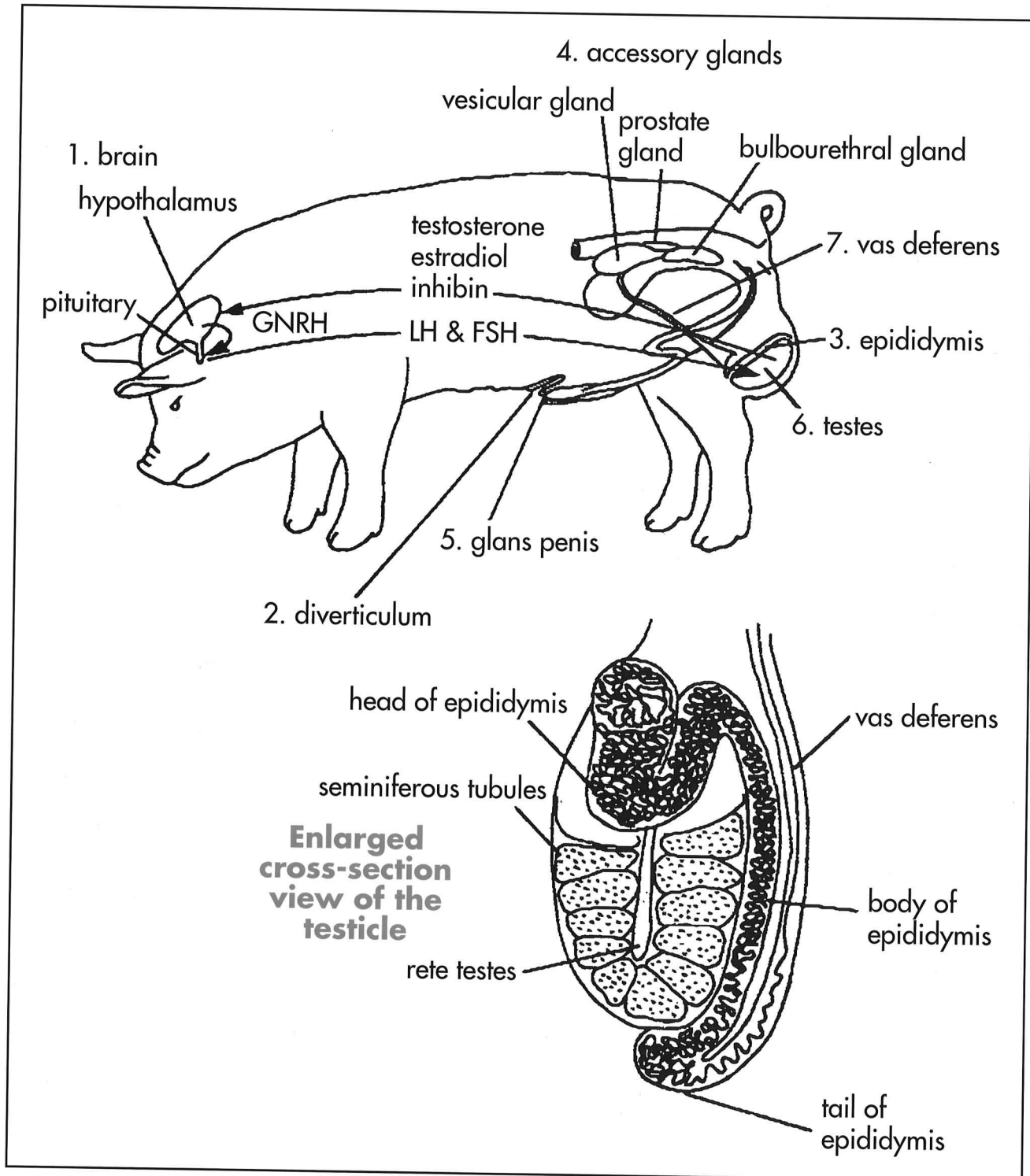


Figure 15.9

Top: the reproductive system of a boar. Bottom: boar testes

The Components of the Male Reproductive Tract

Keys to Figure 15.9

1. Brain

- Senses the external and internal environment of the boar and regulates behavior and the reproductive process.
- Controls learning in the boar.
- Primary hormonal organ that controls reproductive processes by secreting hormones that stimulate and regulate sperm production.

Hypothalamus

- Receives signals from the nose (e.g., odors of breeding females in heat) and signals from the eyes (e.g., sight of females in heat) that cause the boar to respond immediately with changes in his sexual behavior.
- Secretes gonadotropin releasing hormone (GnRH) that regulates secretion of luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the anterior pituitary.
- Secretes corticotropin releasing factor (CRF), which controls secretion of adrenal corticoids. Secretion of high amounts of CRF increases during some forms of stress, and may reduce sperm output and inhibit secretion of GnRH.

Pituitary gland

- Glandular anterior lobe -Secretes luteinizing hormone (LH) and follicle stimulating hormone (FSH), which stimulate the Leydig cells of the testes.

Neuronal posterior lobe

- Secretes oxytocin, which causes smooth muscle to contract and propel semen through the penis at ejaculation.

2.) Diverticulum

- Appears to serve no useful purpose.
- Can become filled with urine, semen, and secreted fluid, which can kill sperm.

3.) Epididymis

- Formed by the merging of the efferent ducts.
- Carries sperm out of the body.
- Secretes chemicals that mature the sperm cells.
- Sperm are concentrated in the head of the epididymis.
- Sperm are stored in the tail of the epididymis until ejaculation.

4.) Accessory glands

- Secrete the fluid and gel that comprises about 90% of the volume of ejaculate, which:
 - maintains appropriate pH and salt balance.
 - provides nutrients for the sperm.
 - provides a transport medium for the sperm.

Vesicular glands

- One of three accessory glands that secrete fluid in semen, the vesicular gland secretes the largest amount of the three glands.

Prostate gland

- One of three accessory glands that secrete fluid in semen. The prostate gland secretes the least amount of the three glands.

Bulbourethral glands

- Larger in the boar than in other livestock species.
- The source of the gel fraction in semen.

5.) Glans penis

- Contains many nerves and is very sensitive.
- Responds to the pressure and temperature of the female reproductive tract.
- Must be properly stimulated for a normal ejaculation.
- Retracts into the prepuce or sheath when the boar is not sexually active.

Penile urethra

- The tube or duct that carries semen from the site of production through the middle of the penis to the tip where it is ejaculated. This duct also carries urine from the bladder.

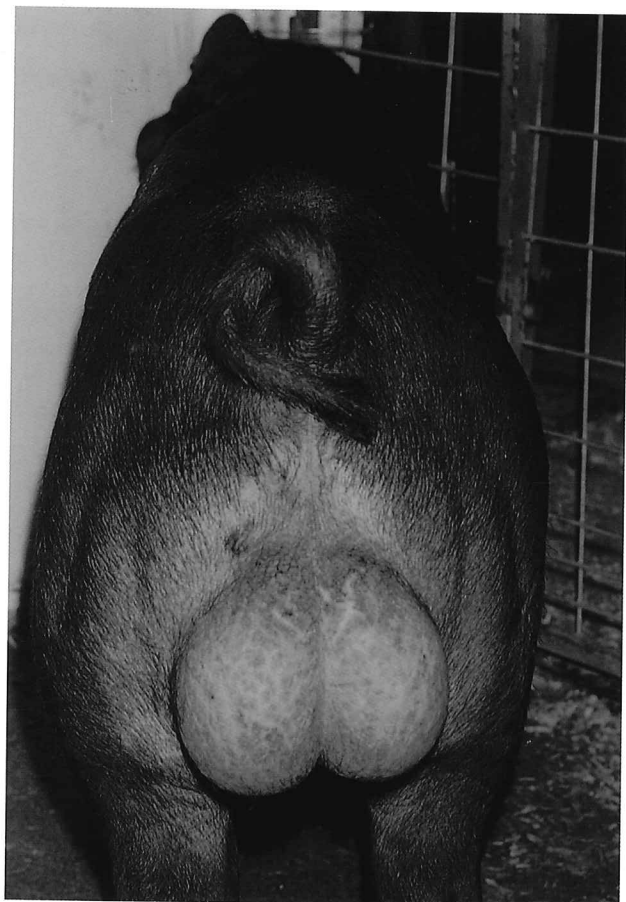


Figure 15.10
Desirable testicles

6.) Testes

- Produce hormones, including testosterone, which is the principle hormone that stimulates sperm production and male behavior.
- Produce sperm

Seminiferous tubules

- Where sperm originate through meiosis.

Rete testes

- Transport sperm out of the testes.

Scrotum

- Contains the testes.
- Hangs outside the body to keep the testes cool.



Figure 15.11
Small, undesirable testicles

7.) Vas deferens

- Heavily muscled tube through which sperm move rapidly as they are being ejaculated.
- Contracts vigorously in response to hormones (oxytocin and prostaglandin $F\alpha$) during ejaculation.

- A vasectomy involves cutting and tying each vas deferens so that no sperm can be transported out of the body.

Bladder

- Empties into the urethra near the junction with the vas deferens.
- Collects and stores urine.