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Swine Production Guidelines

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The Swine Industry in the United States

For most of the history of swine production (before about 1950), pigs were raised for both meat and fat. At that time, fat was very important in people's diets. Rendered pig fat or lard was used in cooking before vegetable oils became popular. Today, we raise pigs for meat production. Pork

meats you may be familiar with include ham, bacon, pork chops, and sausage. Lard currently is not very valuable. Therefore, modern market hogs are bred to maximize meat production and minimize body fat.

The swine industry has changed quite a bit since 1970. Before then, many farmers kept a few sows and fed the baby pigs until they reached market weight. Pigs were often a second or third source of income for farmers. At that time, most full-time hog farmers would have owned less than 200 sows.

Today, more hogs are raised on fewer farms. This is called industry "consolidation." Now, a full-time hog farmer may own many thousands of sows. Of course, one farmer can't take care of that many pigs, so people who own large numbers of pigs hire other people to manage their pigs for them.

In many instances the same company or individual owns the feed processing facility, the pigs, and perhaps the slaughter plant where the pigs are processed into hams and bacons. The same company or individual may also be involved with retail sales of pork products. A production system where one company or individual controls two or more parts of the pork production chain is said to be "vertically integrated".

There also have been changes in the way hogs are raised. Instead of raising baby pigs to market weight on the same farm where they were born, sows often are kept at one farm, nursery-sized pigs (12-50 pounds) at another, and finishing pigs at yet a third farm. This management system helps keep pigs healthy and is called "multiple-site production."

On a large commercial sow farm, sows are moved and fed by groups. Sows mated to farrow their piglets within a few days of each other are housed together all through gestation. As their farrowing date nears, they are moved as a group to a farrowing room. In this system, all sows from the first age group are completely moved out of a room before sows from the next farrowing group are moved in. The room is washed and disinfected between groups of pigs. This is called "all-in, all-out production." Keeping sows and their litters separated from other pigs on the farm helps keep piglets healthy.

A good source of information for swine production is the National Pork Board. Their web address is <http://www.porkboard.org/home/default.asp>.

BREEDS OF SWINE AND BREEDING SYSTEMS

Many breeds of swine are commonly raised in Pennsylvania. Each breed has characteristics that distinguish it from other breeds of swine. Swine producers choose to raise a particular breed of swine instead of another breed because that breed has a combination of qualities that producers want to have in their herds. For example, swine from white breeds usually make good mothers, while swine from colored breeds usually make good sires when crossbreeding.

Some of the major breeds of swine raised in Pennsylvania and their characteristics are listed below.

Breed	Description
Berkshire	Black with white on the face, legs, and tail. Erect ears.
Chester White	White with small, partially drooping ears.
Duroc	Red with partially drooping ears. Muscular. Good sires.
Hampshire	Black with a white belt. Muscular. Good sires.
Landrace	White with large, drooping ears. Very long-bodied. Good mothers.
Poland China	Black with white on the face and legs. Partially drooping ears.
Spotted Swine	Black and white spotted. Partially drooping ears.
Yorkshire	White with erect ears. Long-bodied. Good mothers.

For more information about swine breeds, visit the Oklahoma State Swine Breeds Directory at <http://www.ansi.okstate.edu/breeds/swine/>.

Purebred Breeding Systems

Producers who raise purebred swine often utilize artificial insemination in order to capture the best genetics available. Semen from purebred boars is available from many commercial boar studs around the country. Good purebred breeders pay attention to many factors when selecting breeding stock. Performance data, structural correctness, muscling and leanness are the most important.

In the past, when many producers marketed a few pigs, it was relatively easy to sell purebred breeding stock to other producers. Now, markets are fewer, but purebreds can still be sold to other purebred breeders or small commercial producers. Most large commercial producers buy purebreds from commercial breeding stock companies. If you choose to raise purebreds, buy the best ones you can afford! Purebreds also offer the opportunity to show (and sell) breeding stock at various county, regional, and state shows.

Crossbreeding Breeding Systems

Crossbred pigs have some advantages over purebred pigs because of a genetic phenomenon called heterosis (also known as hybrid vigor). Because of heterosis, most commercial swine producers use crossbred pigs rather than purebreds. What is heterosis? Heterosis usually gives crossbred pigs an improvement over the average of its parent purebreds in a certain trait.

For example, if the average litter size for a herd of Yorkshire purebreds was 11 and the average litter size for a herd of Hampshire purebreds was 9, we would expect the average litter size of Yorkshire x Hampshire crossbred sows to be 10 pigs. In reality, the average litter size might be closer to 11.5 pigs, which is higher than either of the parent breeds. Improvement of the actual litter size over expected litter size is a result of heterosis.

Generally, heterosis affects reproductive traits relatively more than growth and carcass traits. Heterosis affects several important reproductive traits in pigs. In addition to improvements in litter size, crossbred sows usually produce more milk, eat more, and farrow more vigorous pigs than purebred sows.

There are several planned crossbreeding systems that producers commonly use. Pure breeds for crossbreeding systems are selected for their ability to add some trait to the final crossbred market hog. For example, a white breed such as Landrace or Yorkshire is usually included in the crossbreeding system for their maternal traits (number born alive or milking ability). A colored breed such as Duroc or Hampshire is normally included for its growth rate, feed efficiency, or carcass traits. A planned crossbreeding system may include as few as two or as many as four breeds.



Selecting Gilts

Selecting a gilt for breeding should be done with care and attention to many factors. You may purchase gilts as feeders or at market weight. However, you may be better able to evaluate the quality of gilts if you select them at market weight. Be sure your gilt will be at least 280 pounds and 7 or 8 months old before she is bred.

Always purchase breeding stock from a reputable breeder who can show you records from the gilt's mother and other relatives.

You want to select a gilt from a large litter whose dam has consistently produced large, heavy litters at weaning. Gilts should be long bodied, structurally correct, lean, and feminine. Avoid extremely heavily muscled, short or fat gilts. If you plan to show the pigs you produce, pay attention to the balance and style of the gilt from a side view. Often (but not always) large framed, attractive market gilts that are slightly lighter muscled than an ideal market hog make the best sows. Don't select any gilts with immature vulvas, less than 12 evenly spaced teats, or teats that are too coarse, blunt, or inverted.

Performance Data

Purebred breeders should be able to provide performance data on breeding stock. This information can help you select animals which are more likely to possess the genetic traits you're looking for based on records from the animal itself, its contemporaries, or its relatives and ancestors.

The first performance data you may encounter are individual data from the gilt herself. Individual data may include the size of litter that gilt was from, her litter's weaning weight, the number of days it took her to reach a certain weight (for example, days to 250 pounds, which gives an indication of growth rate), her average daily gain, or ultrasound data for backfat and loin eye area. Ultrasound data is normally taken around market weight of 230 to 250 pounds.

The second type of data that you could see is a comparison of a certain gilt to other gilts from the same farm born about the same time. These data are often given as ratios with 100 as the average. For example, if a gilt had a ratio for days to 230 of 105, she reached 230 pounds 5 percent faster than the other gilts in her contemporary group (group of gilts born about the same time and raised together).

The third type of performance data that may be available are called Expected Progeny Differences (or EPDs). EPDs take into account the records of not only the gilt you are considering, but her dam, sire, and other known relatives. EPDs offer a way to compare the genetic potential of two animals in actual pounds (litter weight EPD), inches (Backfat EPD), pigs (Number Born Live EPD), or whatever the unit of measure of a given trait. For example, if gilt A has an EPD for days to 250 of 0 and gilt B has an EPD for days to 250 of -1, the progeny of Gilt B would be expected to reach 250 pounds one day faster than the progeny of Gilt A. Of all available performance data, EPDs are the most accurate predictor of genetic potential.

Health Considerations

The health status of your gilts can play a big role in the success of your breeding operation. Ask the breeder for information on the health status of the herd, biosecurity practices, and vaccines given. Ask about the most common health problems in the herd. Observe animals for signs of poor health. Coughing (an indication of respiratory disease), scratching (an indication of mange), or crooked noses (sign of atrophic rhinitis) in a herd can be cause for concern.

Every swine farm - especially breeding stock farms - should have a biosecurity system. One of the major parts of a good biosecurity system is not to allow visitors into facilities where diseases may be easily spread. So, if you go to a breeding stock farm to select a gilt for your operation, don't be surprised if you are not allowed to visit the farrowing facilities, for example. You could be asked to shower and wear clothes provided for you before you see any pigs at all. These practices are in place not because the producer does not trust you, or has something to hide, but are rather an effort to keep his or her pigs from contracting new diseases.

When you get your breeding stock home, you'll want to keep your pigs as healthy as possible. Good biosecurity practices will help you accomplish this goal. Good biosecurity includes the following:

- Isolate new animals to avoid infecting pigs you already have on the farm with new diseases.
- Place a foot bath with disinfectant at the entrance to your barn, or wear disposable boots.
- Avoid wearing the same clothes from farm to farm.
- Don't allow people who have recently been around other pigs to be near your pigs.
- Control rats, mice, and birds which can carry diseases to pigs.

Selecting a Boar

Decide early on if you will breed your gilt to a live boar or if you will use artificial insemination. Each has advantages and disadvantages.

A live boar requires the least management ability on your part. If you have only one or two gilts, buying a boar - especially a good boar - could be very costly. Boar prices from small seedstock producers may average \$250 to \$450, depending on the breed, quality, and current market conditions. In contrast, boars used for artificial insemination may cost many thousands of dollars. Also, a certain percentage of young boars will not breed without training, if at all. If this is your first breeding project, consider buying a bred gilt, or ask the breeder from whom you purchased the gilt if he or she would consider breeding the gilt for you before you take it home. Perhaps you could borrow a boar, but for biosecurity reasons, few producers will be eager to loan one to you.

If you are buying a boar, use the same selection criteria you would use to purchase a gilt. A good breeding boar should have a tight sheath, and show signs of aggressive breeding behavior at or before six months of age.

Artificial insemination allows you to use some of the top boars in the world - even if you have only one or two sows. However, you must be a dedicated manager if you want to be successful. If you decide to use artificial insemination, order catalogs from semen suppliers as soon as you get your gilt home, if not before. Select the boar you want to use based on the projected market for your feeder pigs. For example, if you plan to sell registered purebreds or retain gilts as replacements, look for boars with superior performance data. If you plan to sell or raise club pigs, look for "Show Pig" sires (some of which may not be purebreds). Semen supplies on many top boars are booked months in advance, so you'll want to place an order as soon as possible. You'll learn how to predict semen delivery dates in the section on artificial insemination. Cost of semen (including shipping) to breed a single gilt may be \$75 to \$150. However, semen prices from top show pig sires will be higher during certain months when demand is highest.

FACILITIES

Don't buy any pigs until you have a good place to keep them. In some areas, people are not allowed to keep farm animals. Find out if local regulations restrict where you can keep your pigs. Also find out if there are special laws or rules you must follow to care for your swine.

Keeping Pigs Comfortable

Pigs don't grow very well when they are too hot or too cold. Comfortable pigs will sleep on their sides with their legs outstretched. Adult hogs are most comfortable and grow best when the temperature is between 55° and 70°F. Baby pigs require temperatures between 85°F and 90°F to keep from chilling. As baby pigs get older and larger, their temperature requirements decrease. Six to seven week old nursery pigs can do well at 70°F.



Pigs show you that they are comfortable if they sleep stretched out on their side.

The best way to tell if a pig is comfortable is to watch the pig when it is sleeping.

Pigs that huddle, pile up, or sleep on their stomachs are usually too cold. Cold pigs will use most of their feed to keep warm instead of growing. If the place where you keep your pigs is too cold, provide straw or other bedding so the pigs can lie in it and keep warm. It may help to lay boards over the pen and stack straw bales on the boards to create a warm spot in the pen for pigs to sleep in. Placing a heat lamp in the pen, such as hover, will help keep just-weaned pigs warm in cold weather.

During hot weather, pigs may breathe with their mouths open if they are too hot. When pigs are too warm, they will grow slowly because they don't eat enough feed. Provide shade to keep pigs comfortable in the summer. Exposing pigs to long periods of sun in the summer could give them sunburns or cause sunstroke.



Pigs do not have sweat glands, so they lie in the mud to cool off.

A good, cheap source of shade for pigs kept outdoors in the summertime is a frame of poles covered with straw, cornstalks, or plastic feed bags. Trees will give shade, too. Fans are often necessary in closed indoor facilities to keep pigs cool in the summertime.

Pigs do not have sweat glands, so they do not sweat when they are hot like people do. Instead, to cool off, pigs like to lie in the mud or in water. Some pigs like to play in their water bucket or the automatic waterer. During very high temperatures, you may want to spray water on your pigs to keep them cool.

Breeding, Gestation and Boar Housing Needs

Gilts, sows and boars can be housed in conditions similar to those used for market hogs. As long as they have a warm or well-bedded dry place to lie down, mature pigs can tolerate cold temperatures well.

Commercial swine producers often house gestating sows in gestation crates which are individual pens for each animal. Under this system, each sow or gilt can be fed separately, without competition from other animals. Before the wide-spread use of gestation crates, most producers kept sows grouped in pens. You can use either system.

Gilts and sows penned together will establish a "pecking order". If housed in cramped conditions or with too many gilts and sows to a pen, the pigs at the bottom of the pecking order stand a good chance of not getting enough feed. If you pen several sows or gilts together, watch for pigs that appear to be losing body condition. If you notice a sow getting pushed away from feed, you can do one of several things. First, you can remove the pigs at the bottom of the pecking order, and put them in another pen where there is less competition. Or, you can feed your sows twice as much feed once every two days. In this system, the "boss" sows get full, leaving feed for the bottom ranking sows to clean up. If you are feeding your sows directly on concrete flooring, you could also spread the feed out further so that all pigs get a chance to eat.

If you use pens, it is probably best to house boars and gilts or sows separately, except of course when you are breeding a sow. Boars (especially young boars) will be more apt to breed if kept away from the sows until breeding time. Make sure the flooring of the breeding area is not too slippery. If a boar has poor footing, he may not mount a sow because he is afraid of slipping.

Regardless of the penning system you use, pay attention to ventilation. When pigs breathe smelly, stale air, they may get sick. Provide a good source of fresh air, but keep your pigs out of drafts that could make them sick.

Farrowing Housing

Penning during farrowing time is more critical. It is best to farrow sows in farrowing crates, but farrowing pens will work acceptably well. The most important thing is to have a place where the piglets can get away from the sow and stay warm. Sows are most comfortable at temperatures between 65 and 70 degrees, so try to keep the farrowing area at this temperature. Newborn piglets require temperatures of 85 to 90 degrees. Farrowing crates have areas on each side of the sow where piglets can get away from the sow. Heat lamps should be hung over these areas to help keep baby pigs warm. Farrowing pens usually have one corner of the pen closed off to the sow with a heat lamp available for baby pig comfort.

One note of caution. Broken heat lamp bulbs can cause fires if used with bedding. Always keep heat lamps out of the reach of sows and piglets. In addition, make sure they are secure enough so that they do not fall down and potentially cause a fire.

Ventilation is critical to farrowing areas as well. In an effort to keep farrowing rooms warm in the winter, producers tend to restrict cold air entering the farrowing room or area. As a result, the air gets stale, and piglets and sows can get sick or not perform as well as they should.

Nursery Housing

Large producers wean pigs at 3 weeks of age or less. Unless you have top quality nursery facilities, you will be better to wait until pigs are at least 4 weeks old before weaning. Older weaned pigs require a less ideal environment to prosper.

Temperature requirements of newly weaned pigs are not as high as that of newborn piglets. By six weeks of age, pigs can do well in temperatures of about 70°F, or less if bedding is available. If you are weaning into an outside pen, make sure it is well bedded. Provide a hover with a heat lamp in cold conditions. Some producers simply remove the sow from the farrowing crate or pen and leave the weaned piglets in the farrowing area until they reach 8 or 10 weeks of age.

Keeping Your Pigs Clean

Pigs usually pick one spot in their pens to use as a bathroom. They will try to leave their urine and manure in the same general place and keep the rest of the pen clean. Try to keep the pens of your swine clean to reduce the chance of disease. Some swine barns are built with open flooring to keep manure from piling up. If yours is not, you will need to scrape the manure from your pen often to keep it clean. Unless you have slotted flooring in your farrowing crate, you will generally have to clean manure away from the rear of it daily. Some places have laws controlling what to do with manure, so find out if there are special rules you must follow in your area.



Pig pens should be kept clean to prevent pigs from getting sick.

Handling Equipment

In addition to finding a place to keep your pigs, you also will need equipment to move, transport, feed, and water them. Have a good loading ramp to move pigs in and out of your facilities. You can get loading chute designs from your extension agent. If you feel a loading chute is too expensive, have an area of the pen or pasture where the pigs can be cornered for easier loading. Use sorting panels or boards to move sows, boars and piglets from place to place on the farm.

SWINE REPRODUCTION AND BREEDING

Sows and gilts can be bred either naturally or artificially. Your facilities, time, and number of sows or gilts can determine which method you use.

A sow's estrous cycle averages 21 days, but can be as short as 18 days, or as long as 23 days. This means she should be in heat, or receptive to mating roughly every 3 weeks. During most of the cycle, follicles are developing on the sow's ovaries. Each follicle will ovulate one egg. Twelve to 15 follicles (or more) develop on each ovary during each estrous cycle. As the time of standing heat approaches, the follicles get larger and larger, releasing estrogen that causes the outward behavioral signs of heat you see. Each follicle ruptures, releasing an egg into the oviduct where each egg is fertilized by a single sperm. Fertilized embryos then travel to the uterus. If the sow is successfully mated, the best indication of pregnancy is the absence of another heat period about three weeks later.

Gilts normally begin estrous cycles at around five to six months of age. Often some period of stress, such as a truck ride or the fighting that occurs after mixing with strange pigs, can trigger a gilt's first heat. Largest litters are expected if gilts are bred on their second or third heat, but make sure they weigh at least 280 pounds and are 7 to 8 months old.

Sows in good physical condition can normally be expected to be in standing heat four to eight days after weaning. If sows are thin, it may take somewhat longer.

Mating sows: Natural mating vs Artificial insemination

Natural mating is relatively simple if you have a boar that is aggressive, willing, and able to mate. In natural mating, the boar does the heat detection and determines if the sow or gilt is in heat. Some producers simply leave the boar in the pen with sows and allow the boar to mate sows whenever they are in heat. Many producers practice "hand mating" where they bring the boar into a pen of sows or gilts once or twice each day to allow him to check sows for heat. Once the boar mounts a sow or gilt in standing heat, you can make sure the mating takes place by manually guiding the boar's penis into the sow's vulva. An average mating will take five to 10 minutes after which the boar will dismount. The boar should then be removed from the pen until the next heat check or mating.

For best results, gilts or sows should be hand mated at 12-hour intervals at least two services. If you know a sow has just entered standing heat and she has not yet been bred by a boar, you can wait 12 hours before the first mating. Boars should not be used more than 5 services per week. Always use a solid hand hurdle when handling a boar. Older boars can be very aggressive and can hurt you with their teeth if you're not careful.

Artificial insemination requires more planning and preparation on your part. Boar semen for AI is usually shipped fresh, not frozen, and is fertile for five to seven days after collection. For maximum conception rate and litter size, fresh semen should ideally be used within 3 days of collection. To complicate matters, you must order semen to arrive when you expect your sow or gilt to be in heat - sometimes months ahead of time. Semen suppliers generally collect semen only two days per week - usually Mondays and Thursdays. Fresh semen is shipped next day air, which means it should arrive at your doorstep on a Tuesday or Friday.

Ordering semen for sows is simpler than for gilts. You'll have control over weaning time, and can expect your sow to cycle 4-8 days after weaning. Thus you should plan to wean sows about four days before you expect your semen to arrive. Order two "doses" or vials of semen for every sow you intend to breed.

Be sure to order insemination rods along with the semen. Rods are disposable, so order one for each service. Rods come in several shapes. One commonly used type is spiral shaped which simulates the corkscrew shape of a boar's penis. The end of another popular type looks like a foam marshmallow with a slight groove around the middle. Both the marshmallow and corkscrew types are connected to a flexible tube approximately 20 inches long through which the semen passes. Several "hybrids" of the two types are currently available. The type you choose is a matter of personal preference; all will work well.

Semen is often packaged in bottles, bags or tubes that resemble toothpaste tubes. The pointed end to the container will be sealed. Store semen in the cooler in which it came. Keep semen in the dark as much as possible since light can damage sperm cells. Semen storage temperature should be at room temperature or slightly below. A basement is a good place to store semen until it is used. Once each day, gently mix the semen, but don't shake it. Mixing distributes the nutrients in the semen container and helps the sperm cells live longer. Shaking or rough handling can damage sperm cells.

When your sow comes in heat, plan to inseminate her twice - 12 and 24 hours after the beginning of standing heat. For instance, if you've ordered semen to arrive on Friday, you should have weaned your sow on the previous Monday. You could expect your sow to begin standing heat sometime Thursday through Sunday. For the sake of this example, let's say she begins standing heat Saturday morning. You should breed her on Saturday evening and Sunday morning.

If you plan to breed gilts, you must have a record of at least one heat before you order semen. Then you must hope she cycles at nearly 21 day intervals, and order semen for her next expected heat. Gilts should be inseminated 12 and 24 hours after the beginning of standing heat. For example, if you expect your gilt to come into heat on a Thursday, order semen to be delivered the previous Tuesday. If she begins standing heat Wednesday evening, plan to breed her Thursday morning and Thursday evening.

Actual mating of a sow using artificial insemination is not difficult. Collect the following materials you'll need to inseminate a sow: Semen (stored in a small cooler at room temperature and out of the light), scissors (to cut the sealed end of the semen tube or bottle), and an insemination rod. If inseminating outdoors in cold weather, wrap a towel or dishcloth around the semen container to help maintain semen temperature until it enters the reproductive tract.

If a boar is available, move him to an adjacent pen. Straddle the sow's back or lean across her back to make her stand still (a second person could do this). If she doesn't stand still, she may not be in heat. Insert the tip of the insemination rod into the sow's vulva. Tip the back end of the rod down toward the ground and insert the rod until you meet some resistance. The resistance should be the cervix. If you have the corkscrew type of rod, turn the rod to the left about 2 turns or until you can't pull the rod back out with a slight tug. If you have a marshmallow type rod, push a bit further until the rod springs back when you tug it lightly. The groove around the marshmallow should seat itself into the interlocking rings of the cervix.

While keeping pressure on the back, remove the semen tube or bottle from the cooler, and cut off the tip of the sealed pointed end. Insert the opened semen container into the end of the rod and twist 1/2 turn to make sure it is seated properly. Bending the rod, lift the semen container above the level of the sow's back so that, if it wanted to, the semen could drain into the sow.

Now comes the tricky part. If the sow is in a good standing heat and properly stimulated by back pressure, the contractions of her uterus should (and sometimes will) pull the semen into her reproductive tract in a matter of a few minutes. Sometimes however it takes several minutes for these contractions to begin. Be patient. Gently stroking the sow's underline can help to stimulate the process.

If the semen does not seem to be flowing on its own, gently squeeze the semen container and watch for semen flowing back out of the sow past the rod. Ideally, there should be no back flow. If semen is coming back out of the sow, stop the insemination, reposition the rod, and start again. If gently squeezing the semen container does not get semen flowing into the sow, reposition the rod and start again.

It can take as little as two minutes for the sow to accept the semen, or as long as 20 minutes. Eight minutes is about average. When the semen container is empty, leave the rod in the sow for another minute or two, then gently remove the rod from the sow. A small amount of back flow is typical when removing the rod. Discard the rod and semen bottle. Never re-use a disposable insemination rod.

What happens if you are using AI and your sow or gilt comes back in heat 21 days later? Some semen suppliers will allow you to order semen for 3 weeks later on the expected recycle date. If your sow or gilt shows no early signs of coming back into heat, you can cancel the semen order at the last minute. Be sure to ask if you can do this when you are ordering your semen. Of course, if your sow or gilt cycles late, you'll have to order more semen and wait until the next heat period to re-breed your sow.

Vaccinations

All gilts and boars should be vaccinated for some common reproductive diseases before breeding. Leptovirus (causes abortions) and parvovirus (causes mummified fetuses) can be purchased in the same bottle, and should be given twice, 4 and 2 weeks before breeding. Erysipelas vaccine can be given in the same vaccination. Sows and mature boars should be given a booster dose of vaccine at least once per year before breeding. Other vaccines can be given in response to specific disease problems as they occur.

Nutrition

Sows, gilts, and boars should be on a limit-fed gestation diet at breeding time. Average intake should be about 5 pounds per day - slightly more for gilts, depending on body condition. The diet is commonly corn-soy based and should be around 13 to 14 % crude protein, fortified for swine with vitamins and minerals.

GESTATION AND FARROWING MANAGEMENT

During gestation, sows and gilts must maintain or increase their own body reserves while providing for the needs of their unborn litters. The farrowing process and lactation place extreme demands on the sow. Sows don't need much special care during most of gestation. However, reducing stress during the first month or two of gestation can help to increase litter size by reducing the number of fertilized embryos that die and are reabsorbed by the sow. Sows and gilts can be housed individually or in pens like market hogs. As long as they have a dry place to lie down (well-bedded if in cold weather), gestating sows are normally comfortable.

Gestation nutrition

Sows and gilts are normally limit-fed during gestation. This means giving each sow a certain amount of feed each day to maintain or slightly increase body condition. You don't want your sow to be too thin or too fat at farrowing time, so pay attention to body condition. If your sow or gilt seems to be getting fat, reduce the amount of feed by one or two pounds. If she seems thin, increase the amount of feed by a pound or two. If housed in gestation crates in climate-controlled facilities, gestating sows can be fed as little as 4 pounds of feed per day. However, gilts housed in pens or any gestating female kept in cold conditions may need 6 or 7 pounds per day. The feed given to gestating sows is normally about 14 percent crude protein and should include some high-fiber feedstuff like oats, barley, or alfalfa hay to keep gestating sows from becoming constipated. Since feed intake is normally limited, the vitamin and mineral content of the feed should be higher than that of finishing feed or lactation feed. Clean fresh water should be available at all times.

Preparation for farrowing

As the farrowing date approaches, you need to make some special preparations to avoid problems for your sow and litter. First, make sure your farrowing facilities are thoroughly clean and disinfected. You want your new piglets to arrive into a clean environment, as free of disease as possible. About two weeks before farrowing, worm your sow and treat her for lice and mange. About one week before your sow's expected due date, wash your sow and move her to the clean, dry farrowing facility. Continue feeding her gestation feed until she farrows, but reduce the amount fed for about 2 days before farrowing. Sows experience less problems farrowing and begin eating feed sooner after farrowing if they are hungry when they give birth.

As farrowing time approaches, the piglets send hormonal signals to the sow that farrowing time has come. These signals prompt a sow to exhibit easily seen behaviors just before farrowing. First, you will notice that your sow is extremely restless. She may get up and lie down very frequently. Second, you may notice nest-building behavior. A sow will paw at the floor, root, and chew straw vigorously. In addition, she will begin to express milk from her udder. These signs of impending farrowing may be seen up to a day or only a few hours before the first piglet arrives. When you see these signals, connect the heat lamps and check your sow frequently.

The Farrowing Process

If at all possible, attend the farrowing. If you are present, you may be able to save a piglet that otherwise would have died. You can also assist the sow if necessary. Piglets are expelled from the sow because of strong muscular contractions of the sow's uterus. When a sow is farrowing, you can often see her staining during contractions.

Piglets can be born head or rear legs first. When a piglet is born, make sure its nostrils and mouth are free from mucous so it can breathe properly. Often the umbilical cord will remain attached to the sow for several minutes. If it does not loosen on its own, you may gently pull the cord until it breaks loose from the sow. You may cut the umbilical cord about 4 inches from the pig's navel and spray the cut end with .5 percent iodine solution to reduce the chance of navel infections. Dry the piglet off with straw or a towel and place it under the heat lamp. It should eventually find its way to the sow's udder and begin nursing.

After the last piglet is born, the sow will expel the "afterbirth" - or placenta. These are the tissues that surrounded the piglets during gestation. Occasionally, the last piglet is born wrapped in the placenta. If the placenta is wrapped around the piglet's head, the piglet will likely suffocate without immediate help. After farrowing, the sow should grunt softly and present her udder for the piglets to nurse. If you have kept the litter away from the sow, introduce the piglets and make sure each gets to nurse.

Problems at farrowing

Some mother pigs (especially gilts) will express curiosity at the first piglet and get up to inspect the new arrival. Others will pay no attention to the piglets. A few will act viciously toward piglets - trying to bite them when they get close to her snout. If the piglets seem to be distracting your sow, place them in a bedded basket under a heat lamp until farrowing is completed. If your sow gets up anytime during the farrowing process, make sure all piglets are accounted for when she lies down again. Sows can easily crush newly born piglets.

Farrowing time and the interval between piglets varies considerably among sows. Some will farrow an entire litter in just an hour or two. Others make take four or five hours. If more than an hour passes between piglets, consider assisting the sow. If you arrive part way through farrowing, and find a few dry pigs with full stomachs and the sow has not yet expelled the placenta, the sow may also need assistance. If available, a 2 cc injection of oxytocin will re-start uterine contractions in a sow that has gone too long between piglets. If oxytocin does not help, the sow could be finished farrowing or there may be a piglet stuck in the birth canal. If so, you may need to assist the sow by manually pulling the piglets out. If you don't feel comfortable doing this, call a veterinarian.

If you choose to pull piglets yourself, be sure the sow has not completed farrowing. If she is still straining, and there is no sign of afterbirth, a piglet may be stuck. To check for a stuck piglet, wash and disinfect your hands and arms then place your arm in a thin plastic sleeve. (You can obtain sleeves from a veterinarian.) If you enter a sow without the protection of a plastic sleeve, you could catch an infection through a cut or scratch in your skin. Lubricate the outside of the sleeve with liquid soap before reaching in a sow. Gently reach up the birth canal. You may have to reach two feet or so to encounter the problem. If you feel a piglet, determine which end of the piglet is closest to you. If the pig is presented head first, grasp the piglet by placing your thumb in the piglet's mouth and pull on the lower jaw. If you encounter hind legs, pull both hind legs at the same time. Pull the piglet the whole way out and make sure it is alive and breathing before you reach for the next pig. If you pull one piglet, you may have to pull the remainder of the litter. Generally, if you have to reach into a sow, she should be treated with antibiotics to prevent infection. Consult a veterinarian for proper treatment.

Lactation

Lactation is the process of making milk. Sow's milk provides the best nutrition there is for young pigs. It is high in protein, energy, vitamins, and minerals that baby pigs need to grow and thrive. The first milk from the sow during and after farrowing is called colostrum. This special milk contains antibodies against diseases the

sow has encountered and protects piglets from those diseases for about the first three weeks of life. It is very important that each piglet receives one good meal of colostrum to get off to a good start.

Piglets will select a single nipple within the first day or two to which they return during each nursing event. After the first day or so, sows settle into a nursing pattern at about two hour intervals. At nursing time, the sow rolls onto her side, and begins grunting softly. The piglets hustle to their nipple, and begin nuzzling the sow's udder. Soon the sow begins milk let-down for a short time during which the pigs nurse. After nursing, the piglets may nuzzle the udder some more, then wander off until the next nursing time. As the piglets grow, the nutrient content of the milk is reduced slightly, but the sow produces more of it.



Piglets will select a single nipple within the first day or two and will return to that nipple when they nurse.

Lactation problems

Sometimes sows experience problems with lactation. Sows with uterine infections, elevated temperature, and hard, red, swollen udders, usually don't produce enough milk for their litters, and the piglets could starve. This syndrome is known as mastitis, metritis, and agalactia or MMA. Sows with MMA should be treated promptly by a veterinarian if their temperature increases to 103.5 degrees F, or if they refuse to eat within 24 hours of farrowing.

Lactation Nutrition

The nutrients needed to produce milk for a litter of baby pigs can come from one of two places: feed eaten by the sow, or the sow's body reserves. Ideally, most of the nutrients needed for producing milk should come from feed. If the sow uses her body reserves, she may be too thin to return to estrous and be re-bred after weaning.

Lactation feed should be high in energy and protein. Fortified corn-soy diets similar to those fed to growing and finishing hogs are generally used. Protein should be kept at about 16%. In order to produce milk, sows need lots of fresh water. Make sure your sow has access to clean, fresh water at all times, either through an automatic waterer, or in a feed trough mounted in the front of the farrowing crate.

Starting lactating sows on feed

Within 12 hours after farrowing, sows should be offered a pound or two of feed. Sometimes the feed is mixed with a small amount of water. Some sows prefer wet feed to dry feed. Sows should be fed two or three times per day, increasing the amount of feed by 1 pound per feeding until the sow is eating her maximum amount one week after farrowing. Maximum daily feed intake varies among sows, but about 6 pounds of feed plus 1/2 pound per piglet in the litter is about right. Large sows may eat up to 18 pounds per day but some first litter sows will only consume about 8-9 pounds. Unless your sow is nursing a small litter, you want her to eat as much feed as possible. Sows should have their first bowel movement within two days of farrowing. If no bowel movement is observed and the sow is not eating well, pay attention to her temperature - she could have MMA.

Temperature regulation

Temperature regulation and ventilation of the farrowing quarters is important for sows to be comfortable, eat properly, and remain healthy. The difficulty arises because sows are most comfortable and eat best when the temperature is about 65°F. New-born piglets on the other hand need temperatures in the 90°F range. If we keep the room temperature at a level where the sow is comfortable, the piglets will be chilled. Likewise, if we keep the room at a temperature where the piglets are comfortable, the sow will be too hot.

One answer to this dilemma is to keep the room temperature at about 65 to 70 °F and provide supplemental heat for the piglets with heat lamps. One or two heat lamps should be hung above the side areas of a farrowing crate or in the closed off portion of a farrowing pen. The distance the heat lamp should be suspended above the piglet's sleeping area can be determined three ways. First, place your hand at floor level under the heat lamp. Your hand should be comfortably warm, but not too hot. Second, you could place a thermometer on the floor under the heat lamp. The thermometer should register a temperature of about 90°F. Third, watch the piglets. If piglets are lying in a pile directly under the heat lamp, they are cold and you should adjust the heat lamp downward. If the piglets do not lie directly under the heat lamp at all, it is too close to the floor and should be adjusted upward. If piglets lie scattered around under and near the heat lamp, but are not lying in a pile, heat lamp adjustment is about right. A small amount of bedding (such as straw) may be used in addition to the heat lamp to help keep piglets warm. Remember to place heat lamps carefully to avoid fire hazards.

Ventilation of the farrowing room is also important to the health and comfort of sow and litter. In cold weather, you may want to keep the room or building closed up to preserve heat and eliminate drafts. This strategy encourages poor ventilation by not allowing enough fresh air into the farrowing area. If you smell ammonia, or if you see condensation on the walls or ceiling, you should increase the amount of air movement in the room. In hot weather, you'll need to allow for some way to move air so that the sows stay cool.

In some farrowing rooms, fans turn on and off when the temperature gets too hot or too cold and automatically keep the room at the correct temperature. If you are farrowing sows in less elaborate facilities, you may have to install a small ventilation fan or manually open and close doors or windows to keep the room at the correct temperature and air quality acceptable.

PIGLET MANAGEMENT

Baby pig processing

Within 24 hours of birth, you'll need to perform some management activities on your piglets, collectively called piglet processing. These activities include clipping teeth, ear notching, administering iron shots and antibiotic shots, docking tails (optional), and castration. Equipment you will need:

- Ear notchers
- Small side-cutting pliers
- Iodine solution (7 or 10%)
- 18-20 x 1/2 inch needles
- Syringe
- Sharp scalpel
- Pencil and paper
- Injectable iron
- Injectable long-lasting antibiotic

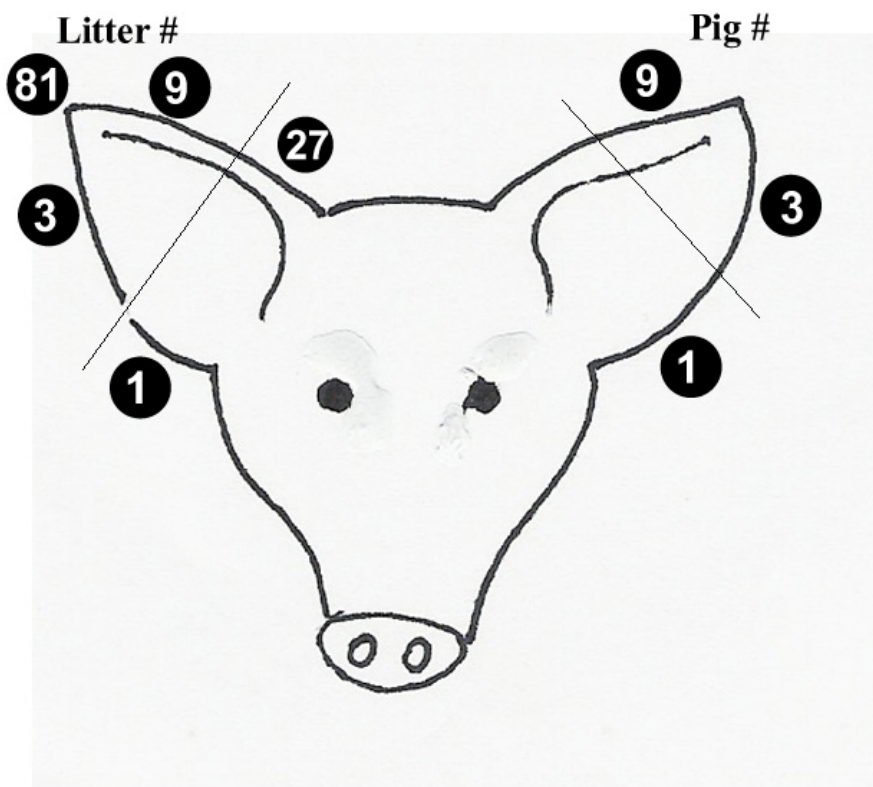
Piglets are born with eight sharp teeth, two on each side, top and bottom. These teeth are used by the piglets to fight with each other for a place at the sow's udder. Sometimes the teeth can injure the sow's udder during nursing and cause the sow to avoid nursing altogether. Or, piglets can injure each other when fighting over a nipple, and open a route for infection. If excessive fighting is observed in a litter, the teeth can be removed to reduce the chance for injury to the sow or other pigs in the litter. If you choose to remove these teeth, use a small, sharp pair of side-cutting pliers. Hold the piglet by its head and insert your forefinger in the corner of the pig's mouth, taking care not to get bitten in the process! Insert the pliers over the tips of two teeth at once and snip off the sharp points. To remove all eight teeth, you'll need to make four cuts per piglet. Pliers should be washed and disinfected between litters.

Ear notching is the preferred means of pig identification. You need to know how to read ear notches before you ear notch your first litter of piglets. The pig's right ear is the litter number ear. A notch in the right ear indicates the litter number for each year or farrowing season. For example, a "2" notch in the right ear would be the second litter. All piglets from the same litter should have identical litter number notches in their right ear.

The left ear is the individual pig number within the litter. For instance, the first pig in a litter will receive a "1" notch, the second pig will receive a "2" notch, and so on. (You do not have to notch pigs in the order they were born, but some producers notch all male piglets - or female piglets - first). Ear notches are read litter number first and pig number second. A pig notched 8-10 would be the tenth pig in the eighth litter. It would be known as "eight dash ten".

Ear notches are given with a special pair of ear notching pliers. Be sure to cut notches deep enough so that they will be easy to see when the piglets grow up. The notches will bleed a little bit, but will scab over and heal very quickly. Ear notching pliers should be cleaned and disinfected between litters to avoid transferring infection. You may spray the new notches with iodine solution. Record the sex of each pig and its ear notch number if you plan to register the litter.

To create specific numbers with ear notches, the ear is divided into four quarters labeled outside bottom, outside top, inside top, and inside bottom. "Inside" refers to the half of the ear closest to the pig's midline. "Outside" is the other half. "Bottom" is the half nearest to the pig's head. "Top" is the half nearest to the tip of the ear. It is important to remember that there should never be more than two notches in any of the four ear quarters. Notches in the quarters are as follows:



Outside bottom = 1
Outside top = 3
Inside top = 9
Inside bottom = 27 (Right ear only)
Tip of ear = 81 (Right ear only)

Notches are added to create whatever number you need. For example, if you need to create an "8" notch, you'll need two "3" notches and two "1" notches (3+3+1+1=8). If you need a "9" notch, you only need to place a single notch in the inside top ear quarter. A "10" notch would require the "nine" notch and a single "one" notch (9+1=10).

Baby pigs are often deficient in iron, so they are routinely given iron injections at processing time. Injectable iron can be obtained from a veterinarian and should be injected into the neck muscle, to the side, and about one inch behind the ear. Injections should be given with a clean 18 or 20 gauge, 1/2 inch long needle. Dosage depends on the product used. Iron generally comes in one of two concentrations: 100 mg and 200 mg per cc. The 100 mg product should be used at 1 cc per piglet, and the 200 mg product at 1/2 cc per piglet. Some producers give a second iron injection when piglets are 7-10 days of age. Iron also can be purchased in an oral powder, but piglets must be old enough to eat it. If you inject the iron, you can make sure the piglet gets the proper dosage, and you can give iron to very young pigs that are not old enough to consume the oral powdered form.

Many producers also inject 1/2 cc of long-lasting antibiotic at processing to help pigs fight infections early in life. Contact a veterinarian for specific products, dosages, and withdrawal period. Use the same size needle you used for administering iron.

Commercial producers routinely dock piglet's tails at birth to reduce the chances of tail biting during the finishing period. If you choose to dock tails, use the same pliers you used for clipping teeth. Quickly snip half to 3/4 of the tail off and apply iodine to the stub. Make sure you disinfect the cutter between removing teeth, and docking tails.

Any male pigs that won't be used for breeding should be castrated. The reason for castration is that the hormones produced by the testes in boars after they reach sexual maturity can cause the meat from these pigs to have a strong flavor that is very offensive to some people. Castration is best done when piglets are about 7-10 days of age. Be sure to check each pig for signs of a hernia (swollen or mis-shaped testicles) before attempting castration. If you suspect the pig has a hernia, do not attempt castration.

Using a sharp scalpel, make a vertical incision over the center of each side of the scrotum, directly above each testicle. Force the testicles out of the scrotum through the incision, and pull them away from the body cavity. Cut the cords that attach the testicles to the body as near to the body cavity as possible. The remainder of the cords should retract back into the pig's body. Spray the open wound with iodine solution. Newly castrated barrows may swell for a few days, and then heal.

Scours

Piglets sometimes develop scours, or diarrhea, when nursing a sow. Several types of scours can occur. Some are serious and can cause piglets to dehydrate and die. Other types of scours are less serious. Generally, scours during the first two weeks of life can be life-threatening because piglets become dehydrated. Scours occurring in the first two weeks can be a result of poor ventilation, drafts, or unclean conditions. Prompt treatment with oral antibiotics is often called for. Consult a veterinarian if young piglets begin to scour.

Scours may also occur about the time pigs begin to eat feed. It is unclear if this mild diarrhea is due to an allergic reaction to plant-based feeds or a change in the bacterial populations in the pigs' intestines. Normally no treatment is needed for this type of scours.

Creep Feeding

Sometime after piglets reach two weeks of age, they will begin investigating other sources of feed besides sow's milk. Some producers begin creep feeding at this time to help pigs digestive systems become accustomed to the plant products they will be eating the rest of their lives. If you are planning to wean pigs at an age of greater than three weeks, you do not need to purchase expensive creep feed. The feed you are giving the sow will do nicely. Simply place a small amount of feed in a shallow pan or tray in an area where the sow can not reach it. Throw away any left-over feed each day and replace it with fresh feed. Piglets will investigate the feed and begin eating small amounts. By weaning time, they will know how to eat something besides sow's milk.

Pigs to be weaned earlier than three weeks of age may benefit from pelleted, commercially available creep or starter feeds. Providing an automatic waterer or water in a shallow pan will help pigs learn to drink on their own.

Weaning

Weaning time can be stressful for young piglets. They must quickly make the transition from sow's milk to plant-based feed such as corn and soybean meal, and learn how to drink water on their own. Piglets between 4 and 6 weeks of age make these transitions more easily than piglets weaned earlier than four weeks of age.

Some producers simply remove the sow from the farrowing pen or crate at weaning time, and allow the piglets to live in the area to which they have become accustomed. Other producers move weaned pigs to a special nursery facility. Whichever you choose, make sure the piglets have a draft-free place to stay warm. Bedding and an enclosed box or hover can be used in cold weather. Fresh feed and water (in a pan or from an automatic waterer) should be available at all times. Watch your newly weaned pigs closely for the first few days to make sure they are eating and drinking. If they are too cold, they will sleep in a pile and their hair coat will be shaggy. Optimum temperature of the sleeping area for a four week old pig is 80-82 degrees F.

Weaned pigs may not gain much weight the first week after weaning. However, if you weigh your pigs at weaning and again one week later, they should have gained at least three or four pounds each.

Nutrition of weaned pigs

The nutritional requirements of weaned pigs change rapidly from the time piglets are three weeks old until they reach 45 or 50 pounds. You need to adjust the nutrients in the diet based on the weight and size of your pigs. This is easiest to accomplish in small operations by purchasing commercially available starter feeds. Feeds for newly weaned, young pigs should be about 20-22% crude protein and contain easily digested products similar to those found in sow's milk. Highly palatable ingredients such as whey and rolled oats are common in high quality starter feeds. Feeds for pigs heavier than 30 pounds normally contain more plant products such as corn and soybeans found in diets of older pigs and sows. Protein concentration for 40-50 pound pigs should be about 18%. Nursery feeds are more expensive than the feeds needed by sows or finishing pigs, but nursery pigs don't eat as much of them. Feed conversion during the nursery period should be about 1.8 pounds of feed per pound of gain, so average feed intake from 15 to 50 pounds will be about 60 pounds per pig. Nursery and starter diets are often medicated to help pigs cope with the stress and disease challenges associated with weaning.

PIG MARKETING

Feeder pig marketing

Sometime during gestation or lactation you need to give some thought and effort into where you will sell your feeder pigs. Some potential markets are: at a auction barn or graded feeder pig sale, to other individuals, or keeping feeder pigs to raise to market weight.

At these markets, you receive the highest price bid on your pigs, less sale commissions and trucking costs. If you have a small group of pigs (less than 10), you may not receive as high a price as someone with larger groups of pigs. It usually pays to sort your pigs by size and sell similar sized pigs together. Pigs are sold on a "per hundred weight" basis. Smaller pigs usually bring more per hundred weight than larger pigs, but the total value of larger pigs should be more. Track feeder pig prices from sale reports before you send pigs to an auction to estimate the potential value of your feeders.

Privately selling feeder pigs to individuals is another marketing option. In this scenario, you'll negotiate a price with the potential buyer and transact the sale privately. You can use reported auction prices as a base from which to start negotiating. If you are selling feeders to be used for breeding stock or high quality show pigs to 4-H members, your asking price may be somewhat higher.

Sow marketing

At some point in the life of your sow, she will fail to breed or become too old or large to make re-breeding an option. Many sows have fewer and fewer pigs as they age past their 6th or 8th litter, and are candidates to be culled. Older, larger sows often will not fit into a conventional farrowing crate, have nipples too large for newborn pigs to place in their mouths, or have rows of nipples spread too far apart for baby piglets to nurse the top row. All of these are reasons to cull a sow.

Sows can be sold through conventional livestock marketing channels such as a local auction barn. Larger sows are generally worth more per pound than smaller sows. Sows should not be sold until their udders have dried up after weaning. "Wet" (lactating) sows are generally discounted at auctions. Most cull sows are destined for the production of sausage.



To insure meat quality, certain practices should be followed from the time a piglet is born.

Quality Assurance

Things you do to a live pig can affect the safety of the pork it produces. While most people associate the quality assurance issue with market hogs, it is also important to realize that cull sows will be slaughtered for food as well. Both injectable and feed-grade antibiotics can help pigs get over being sick. However, if the pig is slaughtered before the antibiotics have had time to clear the pig's system, the pork from the treated pig could contain antibiotic residues. Antibiotic residues are illegal and can be a public health hazard.

All antibiotics have an approved withdrawal time. Withdrawal time is the minimum time that must pass between when the antibiotic is given to the pig and slaughter. This time period allows the antibiotic to clear the pig's system. Some antibiotics can be used safely until the pig is slaughtered. Others must be

discontinued for several days before slaughter. It is up to you as a pork producer to make sure you observe the proper withdrawal times for any antibiotics given to your pigs.

The withdrawal times for medicated feeds (feeds containing antibiotics) are printed on the feed tag. Check tags of any medicated feeds fed to pigs because some feed-grade medications have withdrawal periods up to 2.5 months! If you give your pigs medicated feed, write down the name of the medication, the level of medication in the feed, and the dates when you started and stopped feeding it.

Injectable antibiotics should be used only when a pig is sick, and then only under the supervision of a veterinarian. If you must treat a sick pig, ask your veterinarian what withdrawal times must be observed. Record any injections given, which pig it was given to, the date, and where you injected the pig. All injections should be given in the neck muscle, in the area between the ear and shoulder blade.

The way you physically treat live pigs also can affect pork quality. If you handle pigs roughly, they could have bruises that will show up on the carcass after slaughter. Bruised meat must be cut off and thrown away, lowering the value of the carcass. To avoid bruised carcasses, be especially careful when loading and unloading pigs. Never hit a pig hard with a solid object. Also check pens, trucks, and alleyways for sharp or protruding objects that could puncture or bruise the pig.

The National Pork Producer's Council offers a program to certify pork producers in proper management techniques to assure pork quality. The program outlines ways that producers can be sure the pork they produce is wholesome and safe. There are three levels to the program. Levels one and two can be completed by reading a book. The third level must include instruction from a veterinarian, extension agent, or agriculture teacher.

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