

# Virginia 4-H Youth Market Hog Project Guide



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Virginia Cooperative Extension

*Knowledge for the Commonwealth*



VIRGINIA STATE UNIVERSITY

# Introduction

## Swine Industry

Virginia is not a major swine producing state like Iowa or North Carolina, but the production of hogs is a very important part of our state's agricultural economy. During the late 1990's, Virginia ranked 21st in the country in swine inventory with slightly less than 400,000 total hogs and pigs. Annual sales in Virginia ranged from 567,000 to 656,000 hogs with a total annual value of \$53 million to \$83 million, depending on the average price and number of hogs sold in any given year.

Although the number of hogs produced in Virginia and in the U.S. has remained fairly consistent in recent years, the number and kind of farms that raise hogs has changed. There are fewer hog farms today, but these farms are larger and more specialized. For example, in 1987 it was estimated that 3,016 commercial farms in Virginia sold a total of 642,863 hogs. By 1999 these figures had changed to 1200 farms selling a similar total number of hogs.

There are new farm business arrangements in modern swine production as well. In the past, most hog operations were one of several enterprises on small to medium sized independent farms. **Independent swine farms** still exist today, but they are often larger and tend to specialize more in raising pigs. There are also some very large "company-type" hog farms that operate a centralized feed mill and hog farms at several locations in the region near the mill. An increasing trend is a business arrangement in which independent farmers sign a contract with company hog farms to produce feeder pigs or feed out market hogs for a fixed payment per pig. In this arrangement, which is called **contract swine production**, the farmer provides the land, facilities and equipment, and daily care of the pigs. The company provides the breeding stock or pigs, the feed, veterinary supplies, and transportation of the pigs to the farm and to market.

## The Market Hog Project

For young people who are interested, there are career opportunities in modern swine production. One of the best ways to gain experience and learn about raising pigs is to conduct 4-H or FFA swine projects. The market hog project is usually the best way to start. In subsequent projects the junior member may want to expand into production of more market pigs or even start a breeding gilt project. An advantage of the market hog project is that it does not require an extremely large amount of land area

or expensive equipment. However, since most town and city codes do not allow keeping livestock within municipal boundaries, the project should be conducted at a rural or farm location.

Adults who can assist youngsters in starting and conducting a market hog project include parents, Extension Agents, 4-H leaders, FFA advisors, and hog farmers. With help and advice from these people and hard work on the part of the participant, the market hog project can be a very rewarding experience. The overall objectives of the market hog project are to:

- Develop knowledge and skill in swine selection, production, and marketing.
- Learn to employ proper swine feeding, management and welfare practices.
- Learn about important market hog production and carcass traits, about cuts of pork, and pork nutritional value as a human food product.
- Gain understanding of the business aspects of a swine project, including expenses, revenues, and the potential for profits or losses.
- Learn the importance of keeping swine production and financial records by using the appropriate 4-H Livestock Record Book provided by the 4-H leader or Extension Agent.
- Develop a sense of responsibility and confidence in one's ability to initiate and complete a project.

## Record Books, Costs and Revenues

The 4-H leader or Extension Agent will supply project participants with an appropriate livestock record book for the market hog project. Current record books include VCE Publication 380-122, *4-H Livestock Record Book*, and VCE Publication 380-121, *Advanced 4-H Livestock Record Book*. To get the best learning experience from the market hog project, it is very important for the participant to do a good job in keeping and completing the project record book.

To some extent, a market hog project is a scale model of a livestock business. There will be a variety of project expenses starting with when the pigs are purchased and project revenues when the finished market hogs are sold. However, like any business enterprise, there is no guarantee that the revenues from the sale of hogs will exceed

expenses and result in a net profit. Actually, this is one of the key lessons learned in a market hog project. By making informed purchasing and management decisions, the chances of making a net profit on the project are enhanced and the chances of incurring a loss are reduced. Table 1 shows examples of financial outcomes with the market hog project.

## Youth Market Hog Shows

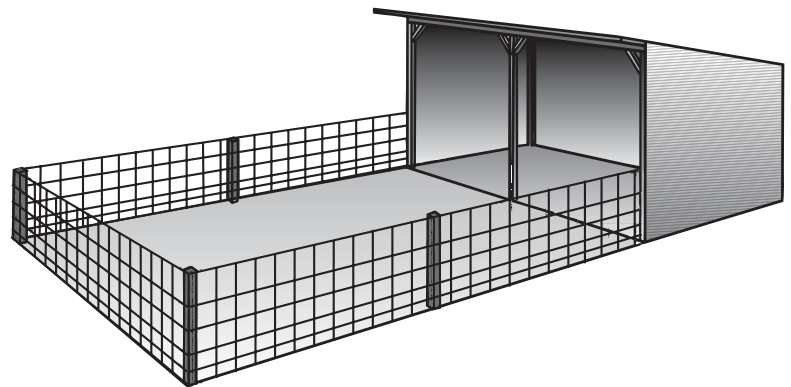
Most youth market hog projects conclude with a local or regional market hog show and sale. One advantage of participating in a youth show is the opportunity to exhibit the project hogs that resulted from the participant's care and hard work. The participant also benefits from the opportunity for friendly competition with other project members and the potential for monetary prizes if their hogs place well in the show. While participation in shows is recommended, it is certainly not a requirement for participation in the market hog project.

## The First Step — Have Your Hog Confinement Facility Ready

Before you obtain your pig or pigs, it is recommended that all facilities and equipment needed for the pigs be in a good state of preparation. Elaborate facilities are not essential for a successful project, but some basics are required to confine the pigs and to provide them with a healthy environment for good growth. On commercial farms,

growing market hogs are often housed in mechanically ventilated barns in pens equipped with concrete slatted floors, nipple waterers, and steel feeders that are filled mechanically. The slatted flooring allows manure and wastewater to drain through to a manure collection pit, keeping the pen and pigs clean and dry. Floor space needed for finishing market hogs raised in pens with slatted flooring is 7½ to 8 square feet for each pig kept within the pen. Other open flooring materials for finisher pens constructed over manure collection pits include wooden slats, woven wire grating flooring, or steel rods welded to steel framing.

Less expensive housing can be just as effective for raising pigs in the market hog project. In some situations existing barns or sheds may be adapted to house project pigs. When considering new construction for market hog projects, an open front shelter with a single slope roof and an outside lot is simple and reasonably inexpensive to build (Figure 1). The sleeping and loafing area of this type of facility provides shade during hot weather and protection from cold drafts during cold weather. The building is most effective if it is constructed over a solid concrete or heavy



**Figure 1.** A Simple "Open-Front" Shelter and Pen Suitable for Youth Market Hog Projects.

**Table 1.** Example of Financial Results in a Market Hog Project

Costs	Example A	Example B	Your Current Estimate
Purchase cost per 80 lb feeder pig	\$60 (\$0.75/lb.)	\$60 (\$0.75/lb)	_____
Feed cost for 520 lbs feed per pig	\$39 (\$0.075/lb)	\$52 (\$0.10/lb)	_____
Equipment repair per pig	\$5	\$5	_____
Veterinary supplies per pig	\$5	\$5	_____
<b>Total costs per pig:</b>	<b>\$109.00</b>	<b>\$122.00</b>	_____
<b>Revenues*</b>			
Sale revenue per 250 lb market hog	\$125.00 (\$0.50/lb)	\$115.00 (\$0.46/lb)	_____
Net profit or (loss) per pig	\$16.00	-\$7.00	_____

\*Revenues can be considerably higher if prize monies are awarded at youth market hog show events.

wooden floor. Ideally, the open front is oriented to face south. During cold seasons the building should be enclosed on three sides, but in the summer the upper solid portion of the rear wall should be removed to allow natural ventilation air to flow through the rear wall and open front of the building. A fenced enclosure may be attached to extend out from the shelter. This enclosure may have a concrete pad or earthen base, but in either case it should slope away from the sleeping quarters for good drainage. A concrete lot base should slope about  $\frac{3}{4}$  inch per foot of floor length away from the enclosed shelter. Fencing around the lot may be welded hog fencing panels, woven wire or board fencing. It is important to recognize that hogs have natural rooting behavior. To prevent hogs from rooting out of the lot, the fencing at ground level must be strong and secure. Minimum recommended space allowance for these types of facilities is 6 to 8 square feet of floor space per pig under roof and 8 to 12 square feet per pig in the attached lot. More lot space will facilitate manure drying.

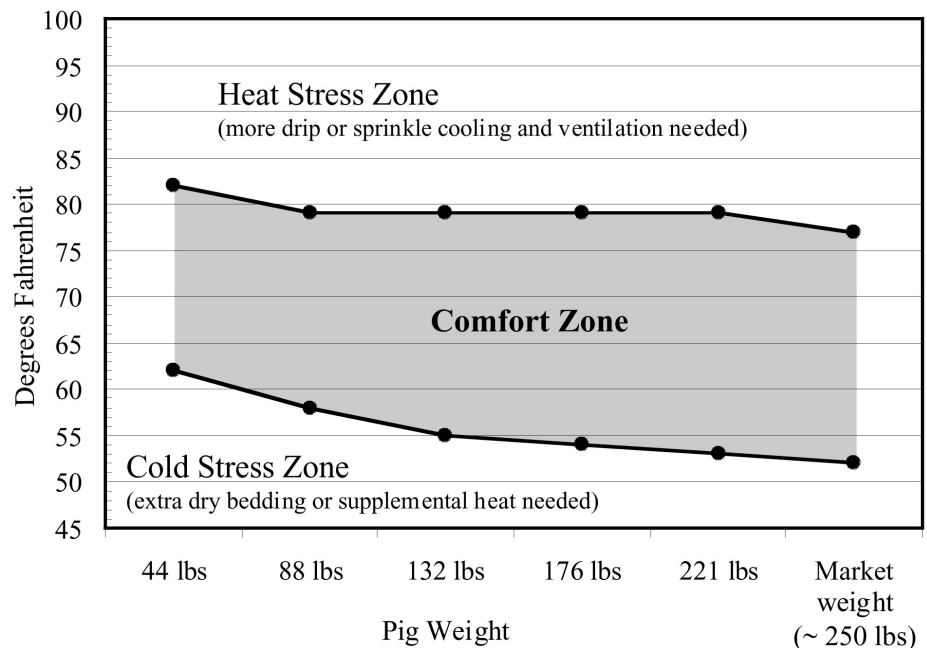
Under any housing condition, it will be important to scrape and remove **manure** and soiled bedding from the pens. Manure should be properly disposed of by periodically spreading on crop or grassland so that surface run-off does not occur. Manure mixed with bedding material and piled can produce rich compost that makes excellent fertilizer for gardens and other plantings.

One point to consider with housing management is that hogs and pigs are sensitive to environmental temperature and air quality (ventilation). Growing-finishing market hogs (45 lb to market weight) can tolerate a wide range of temperatures. However, excessively cold or excessively hot temperatures will cause stress, poor growth, and more health problems. As the market hog grows, it becomes less sensitive to colder temperatures but more sensitive to hotter temperatures. Figure 2 shows the **lower critical temperature and upper critical temperature** for market hogs at different stages of growth. As hogs are exposed to temperatures progressively colder than the lower critical temperature, they must use more feed energy to maintain body temperature. Hogs stressed by cold temperatures grow slower and convert feed to body weight less efficiently. Exposure to very cold temperatures

for extended periods of time may weaken the hog's immune system, making it more likely to develop respiratory or intestinal health problems.

Preventing cold stress during the market hog project may involve supplying supplemental gas heat if the hogs are housed in a totally enclosed facility. However, this can be costly and is not practical in cases where lower-cost open-front housing is used for the project animals. In this situation, providing wind protection for the hogs on three sides, a roof overhead, and clean, dry bedding in the sleeping area are adequate to prevent cold stress. Dry bedding on top of a solid concrete or wooden floor in the sleeping and loafing area does an excellent job of keeping growing hogs warm in cold seasons. Good bedding materials include straw, wood shavings, peanut hulls or similar materials. Removing damp, soiled bedding and replacing it with fresh dry material is an important practice during cold weather. Damp bedding has poor insulation value and does not protect hogs from cold temperatures. Housing several pigs together during cold weather has an advantage over single pig housing because the animals can huddle together to conserve body heat.

On the other extreme is heat stress. When hogs are exposed to temperatures progressively higher than the upper critical temperature, they become lethargic and eat less feed. As a result, the hog's growth is much slower during very hot weather. In cases of extended periods of high heat stress, hogs may stop eating and growing entirely. Because hogs have a very limited ability to sweat, providing water for wet skin cooling can be very effective.



**Figure 2.** Market Hog Temperature Zones

Mister nozzles, sprinklers and drip nozzles are used on commercial farms to allow the hog to wet its skin. Similar devices can be set up for small-scale market hog projects. Only a very small amount of water needs to be applied to the pig or pen floor. It is not water directly, but the evaporation of the water that cools the hog. Good **ventilation** improves the evaporation process and removes gases and odors such as ammonia that can build-up in the facility. Summer shade is critical too because hogs sunburn quite easily. If possible, avoid the use of mud holes in earthen lots to cool hogs. Mud holes can be unsanitary and make project pigs difficult to clean for youth shows.

Some basic feeding and watering equipment will be needed to conduct the project (Figure 3). A variety of **self-feeder** types and sizes for hogs are available from livestock supply dealers. Feed is placed into the feeder

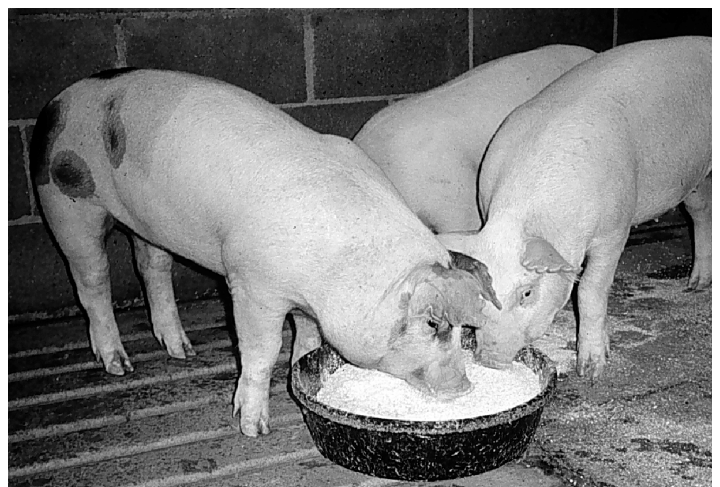


3c. Project pigs being watered using a metal trough (1/2 of a hot water heater tank).

**Figure 3 (a - e).** Examples of Various Watering and Feeding Equipment



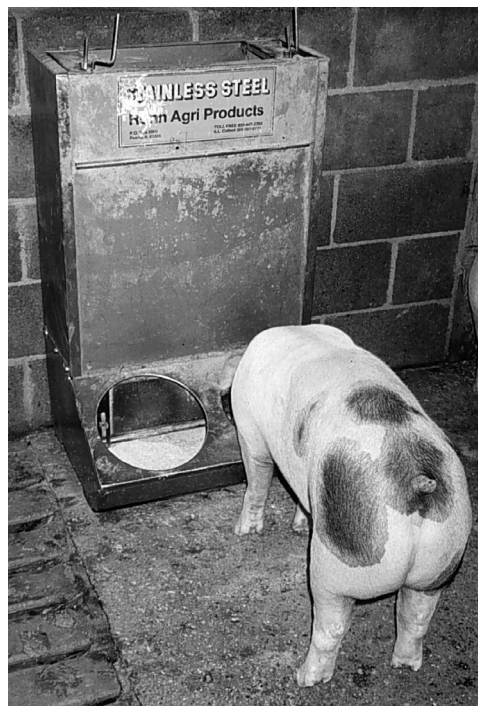
3a. A 55-gallon drum fitted with a drinking dispenser for pigs.



3d. Project pigs being hand fed daily using a rubber hog pan.



3b. A nipple waterer in use.



3e. A project pig using a 2-hole self-feeder.

from the top and flows by gravity and agitation by the hogs into a trough at the base. When using self-feeders, the growing hogs have voluntary access to feed at all times. This is referred to as **full feeding** and most commercial hog farms feed growing market hogs in this manner. A small self-feeder with two feeding spaces at the trough works quite well for a market hog project with up to 10 pigs in the pen. To save money, an old self-feeder may be obtained and repaired for use in the project. It is important that self-feeders are checked daily and feed flow adjusted regularly. Feeders not kept in proper adjustment may result in restricted feed flow and reduced feed consumption, or excessive feed flow leading to excessive feed waste by the hogs.

Homemade wooden or metal troughs or large heavy pans may also be used to feed project pigs. With this kind of equipment, the participant hand feeds the project pigs each day according to appetite. If there are many pigs within the pen, it may be necessary to feed in several containers or the dominant pigs may consume more than their share of daily ration.

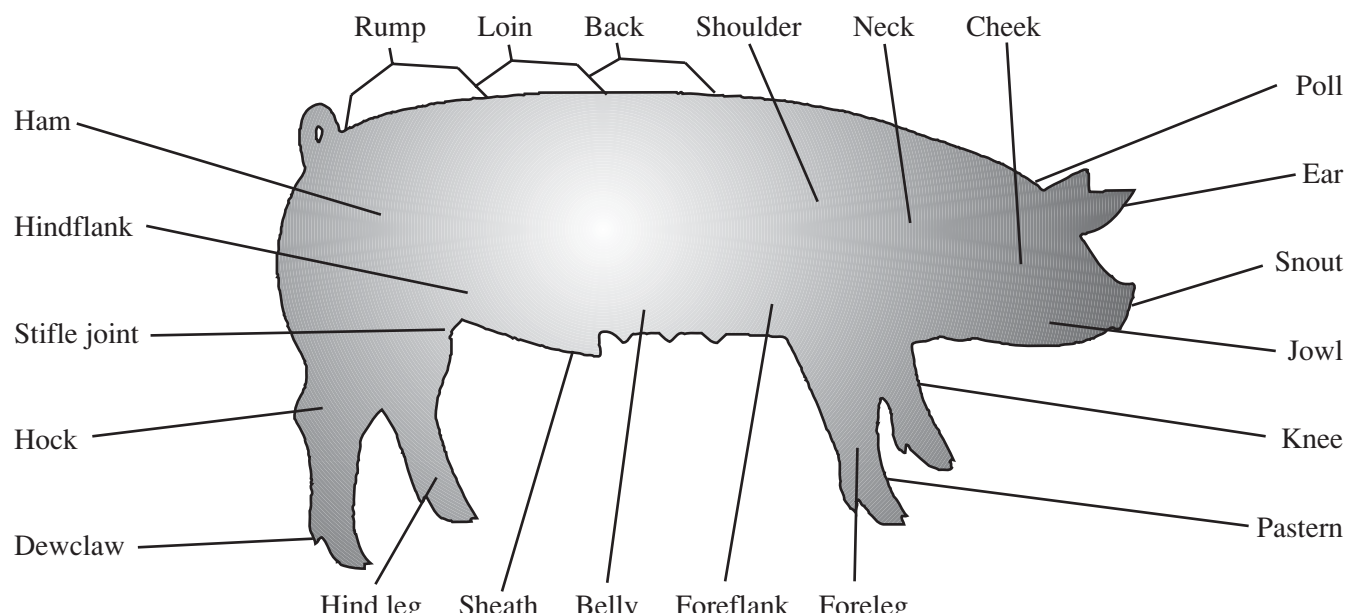
The most popular water dispensers on commercial hog farms are nipple waterers. These are plumbed onto water lines and secured in the pen so that a pig can drink at any time. Cup and bowl type waterers are also available. A less elaborate method is use of troughs that are filled daily with fresh water. A barrel may also be fitted with a cup or nipple waterer to allow pigs to drink as needed. Whatever system is used, it is very important that pigs have access to clean drinking water at all times. It is natural behavior for pigs to play and root in the water source, especially during

hot weather. For this reason, the water source should be located in the pen for proper drainage of spilled water.

# Project Pig Selection and Procurement

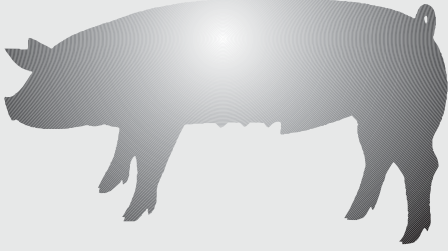
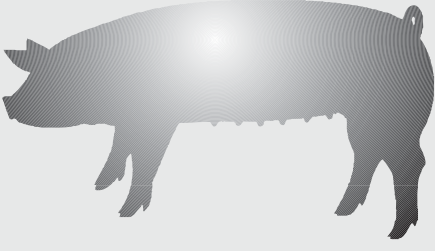
Selection of pigs to conduct a youth market hog project should begin with a general understanding of the parts of a hog (Figure 4) and the type and kind of finished market hog that is most desired by the commercial pork industry. A good guideline to follow is “Symbol II” which represents the characteristics of an excellent finished market hog (Table 2). At the conclusion of the project, a finished market hog should weigh about 235 to 270 lb and produce a **carcass** that weighs within a range of 175 to 205 lb. The muscling in the finished hog should be deep and thick but the external fat depth should be moderate to thin. The muscling and fat traits of hog carcasses are often determined by measuring the depth or cross-section area of the **loin muscle** and the depth of **backfat** over the loin muscle. In fact, at many pork packing plants, these traits are measured and used to determine the price that commercial farms receive for hogs.

In addition to producing a lean, heavy muscled carcass, good market pigs are expected to perform well in the finishing pen. That is, they are expected to have a fast **growth rate** and reach market weight at a young age. For good profitability, market pigs should convert feed to body weight efficiently. This trait is measured as the feed-to-gain ratio. A lower **feed-to-gain ratio** indicates a more



**Figure 4.** Parts of a Market Barrow

**Table 2.** Symbol II. A Standard of Performance for Finished Market Hogs

	Symbol II Barrow	Symbol II Gilt
		
Live weight:	260 lbs.	260 lbs.
Carcass weight:	195 lbs.	195 lbs.
Loin muscle area:	6.5 sq. inches	7.1 sq. inches
Backfat depth at 10th rib:	0.8 inches	0.6 inches
Age at market weight:	156 days	164 days
Feed-to-Gain (feed efficiency):	2.4	2.4
Breeding:	Terminal crossbred	Terminal crossbred

efficient pig because it requires less total feed to reach market weight. For example, a pig that consumes 600 lb of feed to gain 200 lb of weight has a feed-to-gain ratio of 3:0 (3 lb of feed per 1 lb of pig gain).

Project participants may select **gilt** pigs, which are young females, or **barrow** pigs, which are castrated males, as their project pigs. **Boars** (intact male pigs) are not fed as market hogs because meat from mature boars can produce objectionable odors when cooking. Having a mixture of gilts and barrows in the project is acceptable but there are usually differences in the performance of gilts and barrows. On a full-feeding program, gilts will eat slightly less feed on a daily basis than barrows. As a result, gilts have a slightly slower rate of growth so it takes a few more days on feed for gilts to reach a desired market weight than barrows. An advantage that gilts have over barrows is that they tend to remain leaner throughout the feeding period. At market weight, gilts usually produce carcasses that are heavier muscled with less backfat depth than barrows.

The **breed** of pig selected for the market hog project is mainly a matter of personal preference and availability. As shown in Figure 5, traditional breeds of hogs in the U.S. that are typically used as breeding stock on hog farms today include Yorkshires (white in color with erect ears), Landrace (white in color with drooping ears), Hampshire (black in color with a white “belt” around the shoulder and front legs), and Durocs (red in color with semi-erect ears)(Figure 5). White breeds tend to excel in maternal traits such as production of large litters of piglets and good milk production. The colored breeds tend to excel in feedlot

and carcass traits such as fast growth, good feed-to-gain ratio, heavy muscling and low backfat depth. Project participants can obtain additional information on these four major breeds by writing the National Swine Registry, P. O. Box 2417, West Lafayette, Indiana (e-mail: [nsr@national-swine.com](mailto:nsr@national-swine.com)). Information on other breeds of swine (and other livestock) may be found on the internet at the Oklahoma State University breeds web page (<http://www.ansi.okstate.edu/breeds/>).

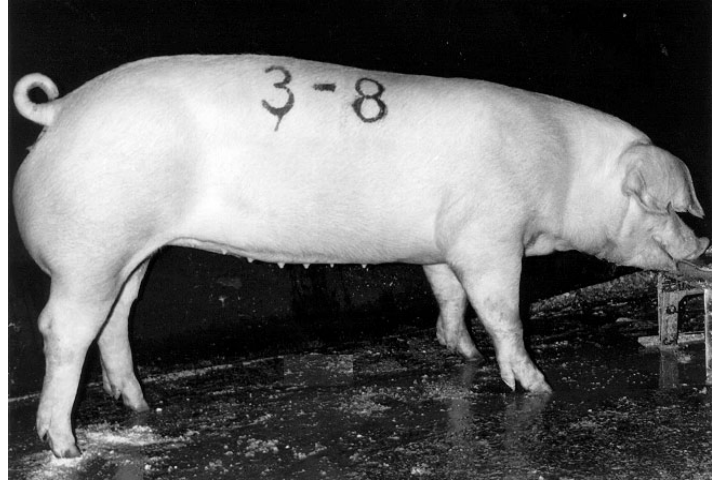
Swine breeding stock companies that produce selected lines of composite breeds or **hybrid** lines are another important source of breeding stock for commercial hog farms. These businesses manage farms that produce specialized breeding stock that is sold to commercial hog farms for the production of market hogs. **Maternal breeding lines** are usually selected from white colored breeding lines and the young females are sold to commercial farms as replacement breeding gilts. These animals are selected to excel in reproduction and good mothering to produce piglets on commercial hog farms. Replacement breeding boars are selected from **terminal breeding lines** that excel in growth and carcass traits and are sold to commercial farms. At commercial farms the terminal line boars are mated to maternal line gilts and sows to produce good quality crossbred market gilts and barrows.

On commercial hog farms most of the hogs produced for market are terminal crossbreds. This means that their **dam** or mother was a maternal type purebred or crossbred sow and their **sire** or father was a terminal type purebred or crossbred boar. Once they reach market weight, all gilt and barrow pigs produced from terminal crossbreeding

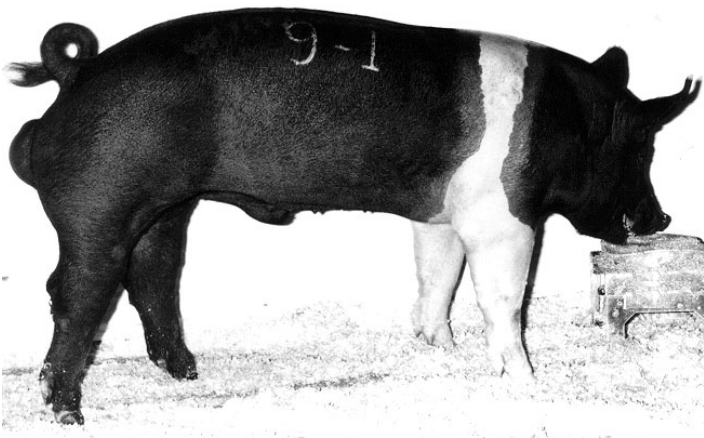
**Figure 5.** Example Breeds and Company Hybrid Lines



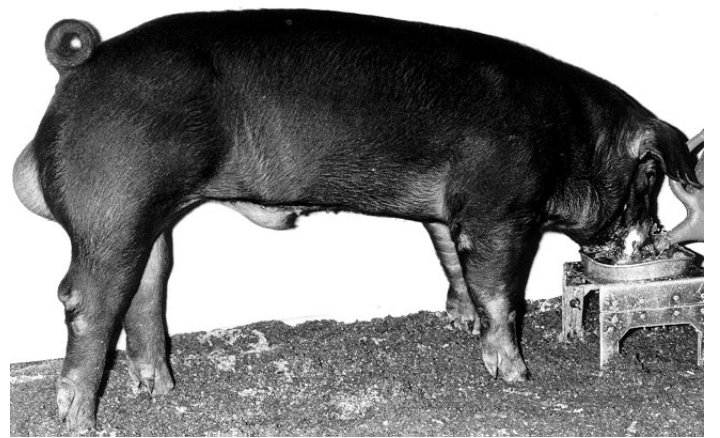
5a. Yorkshire gilt.



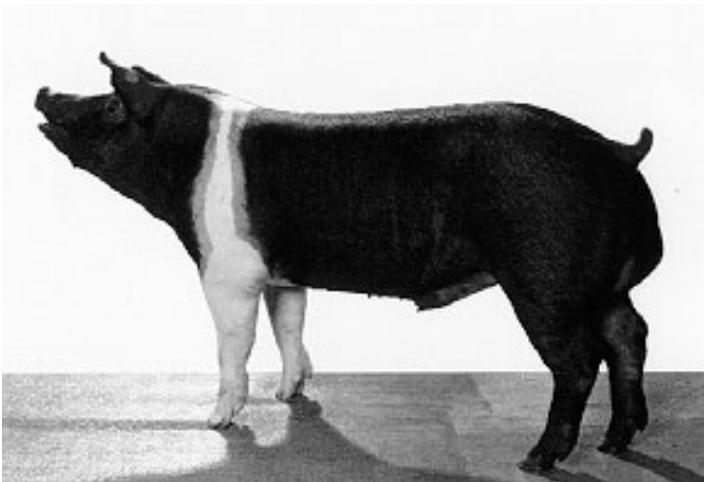
5b. Landrace gilt.



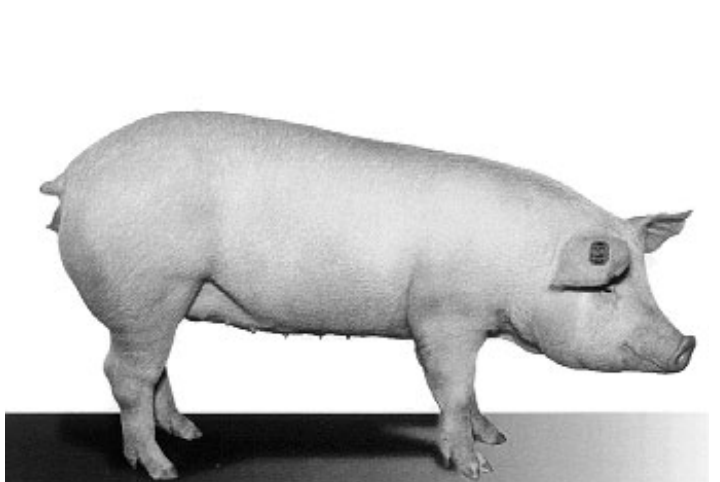
5c. Hampshire boar.



5d. Duroc boar.

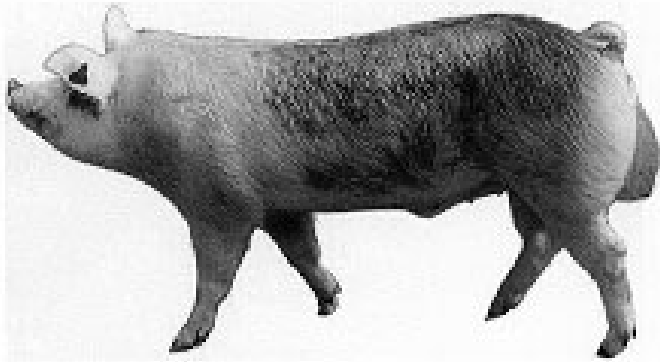


5e. Pig Improvement Company® Line 327 mQ terminal boar.



5f. Pig Improvement Company® Camborough 22 gilt





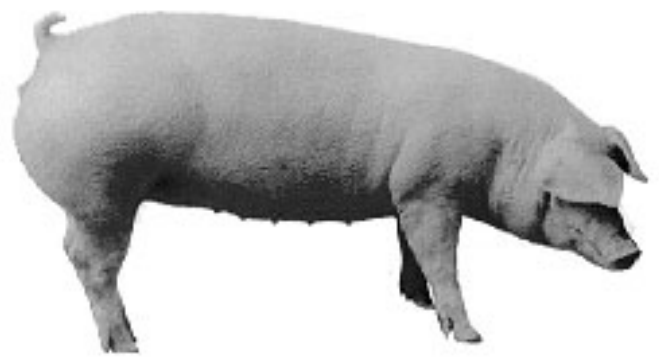
5g. National Pig Development (USA)® Hamline boar.

systems are sold as market hogs. Replacement females are not kept for breeding with this system. Usually **crossbred** pigs tend to perform a little better than **purebreds**. This is referred to as **heterosis** or hybrid vigor. Heterosis is a term indicating that crossbred animals tend to have slightly better performance than the average performance of the individual sire and dam breeds that produced the offspring. Market hogs produced from the mating of dark colored terminal breed boars and white colored maternal breed sows usually have pale or light colored hair coats. This is advantageous for the pork processing plant because hair removal from dark colored hog carcasses is more difficult and may slow down the processing line.

### Obtaining the Project Pigs

Most market hog project participants today do not live on or work at a hog farm. Consequently, locating pigs to purchase for the market hog project can be a challenge. However, many operators of commercial hog farms are willing to sell a limited number of feeder pigs to young people interested in learning more about pigs by conducting the market hog project. Local 4-H and Agricultural Extension Agents or livestock market operators may be able to suggest farms that are potential sources of pigs. With the guidance of parents or adult leaders, project participants should contact commercial pork producers and explain their interest in purchasing young market pigs to conduct the market hog project. If the producer is interested and has pigs available, an invitation to come visit the farm to evaluate the pigs may be extended. Groups of participants from the same livestock club or area may cooperate in a group purchase of project pigs from a commercial hog farm.

Breeder farms that specialize in breeding and selling market pigs as potential show pigs are another possible source of project pigs. In fact, such farms may hold special “club pig” sales for participants to purchase project pigs with the intention of exhibiting them in a show at the conclusion of



5h. National Pig Development (USA)® Landrace gilt.

the project. Organized feeder pig sales may also offer a potential source of project pigs for individuals or groups.

Regardless of the source, careful consideration should be given to the purchase price of the project pigs. Feeder pig purchase represents the single highest variable cost component of the market hog project (see Table 1). Emphasis should be placed on negotiation of a fair price based on current commercial feeder pig and market hog prices.

### Size of Pigs Purchased

In commercial production, a typical feeder pig weighs about 40 to 60 lb. Pigs of this weight are certainly appropriate to start a market hog project. However, there are other considerations if participation in a show or exhibition is planned as the conclusion of the project. In this case, the proper beginning weight depends on the show date when the pigs should be at the proper market weight (usually about 235 to 270 lbs.). Table 3 provides suggested beginning project pig weights for different time periods before the date of a market hog show.

**Table 3.** Beginning Pig Weight Guide for Youth Hog Shows\*

Days before market hog show	Desired beginning project pig weight	Desired pig weight for market hog show
120 days	40 to 55 lb	235 to 270 lb
105 days	65 to 80 lb	235 to 270 lb
90 days	90 to 105 lb	235 to 270 lb
75 days	115 to 130 lb	235 to 270 lb
60 days	140 to 160 lb	235 to 270 lb

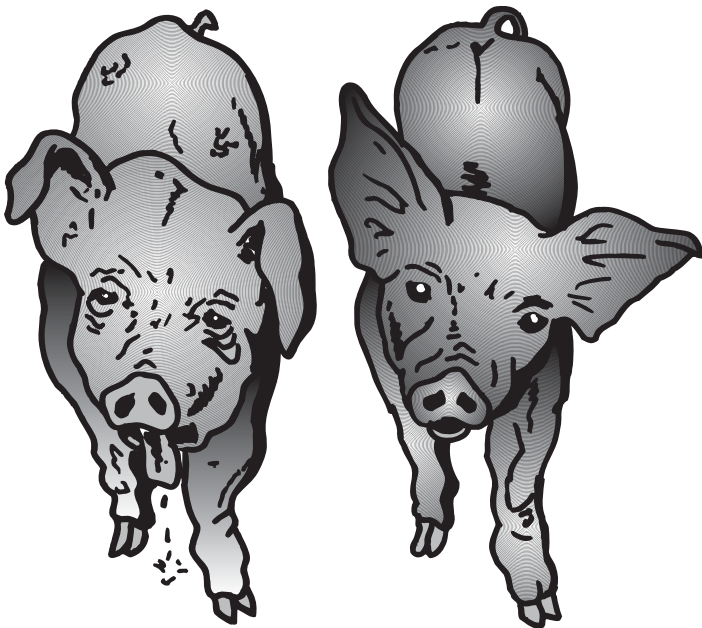
\*Guide assumes healthy pigs on full-feed with an average growth rate of about 1.7 lbs. per day. Pigs with health problems or exposure to prolonged heat or cold stress will grow at a slower rate.

## Choosing Healthy Project Pigs

It is important to begin the market hog project with pigs that are in a healthy condition. Healthy pigs handle the stress of moving to a new environment and get off to a better start in the finishing pen. Although there is no guarantee that any pig is free of disease or health problems, careful observation can indicate unhealthy pigs that should be avoided when selecting project pigs (Figure 6).

Healthy pigs have bright, clear eyes. They are alert and can move about the pen freely and quickly. The feet and leg joints of healthy pigs are smooth and do not show signs of swelling or severe abrasions. Their skin and hair coats are smooth and sleek. Healthy pigs can consume feed and water aggressively, are full bodied and do not show any signs of being undernourished. The stools of healthy pigs will appear semi-soft to firm.

Unhealthy pigs may have a dull appearance to the eyes and there may be dark tearstains along the inside corners of the eyes. These stains could indicate drainage and tearing that is associated with **respiratory disease** problems. Other signs of respiratory problems include frequent sneezing, coughing or wheezing. The hair coat of an unhealthy pig is often coarse and rough. The joints may be swollen or enlarged indicating inflammation or arthritis in the joints. Unhealthy pigs tend to be sluggish, do not feed aggressively, and may appear thin and undernourished. Pigs that have watery or bloody fecal stains below the anus are exhibiting diarrhea associated with **gastrointestinal disease** and should be avoided when selecting project pigs.



**Figure 6.** General appearance of unhealthy and healthy project pigs.

Even if the pigs appear to be in good health, the source farm should provide information on the health history and management prior to the time of purchase. Try to move the pigs from the source farm to the project facility with as little stress on the pigs as possible. Then pay careful attention to detail to assure that the pigs find the new feed and water sources and adjust to their new environment. This is important for a healthy start.

## Regular Management and Feeding

### Preventive Health Management

Once healthy pigs are obtained to start the market hog project, regular care and management will be needed to keep the pigs healthy. It is much less costly to prevent health and disease problems with good management than to treat disease problems once they occur. Maintaining a good housing environment by keeping the pen clean and sanitary with frequent manure removal is important in this regard. Also, preventing stresses such as exposure to excessively high or low temperatures, and providing proper ventilation will help prevent the occurrence of disease. Good quality feed and unlimited fresh drinking water also prevent stress and the likelihood of disease.

Usually feeder pigs will have received any required vaccinations as young piglets on the farm of origin. But, the original owner of the pigs should be consulted on what vaccinations were given and when. Assuming no additional vaccinations are needed, the focus should be on preventing internal and external parasites.

**Internal parasites** include various types of internal worms that can naturally infect pigs due to oral ingestion of worm eggs from the pig's environment (pen floors, dirt lots, etc.). Once ingested, internal parasites go through several life-cycle changes as they mature. They compete with the pig for nutrients and may cause tissue damage. Pigs that are heavily infested with internal parasites grow slower and are less resistant to disease and stress.

Large roundworms, also called ascarids, are the most common internal parasite of pigs. Sometimes mature roundworms can be seen in the fresh feces of growing pigs. They appear as long (about 10 to 12 inches), tubular shaped worms that are beige to creamy white in color. Other important types of parasitic worms that can infect pigs include the nodular worm, whipworm, lung worm, stomach worm, threadworm and kidney worm.

Controlling internal parasites usually involves treatment with a commercial **de-wormer** product. There are a variety

of products available and almost all products will effectively control roundworms. However, certain products are broader spectrum and control several types of worms including roundworms. Table 4 shows various types of de-wormer products approved for pigs, along with their brand names and kinds of parasitic worms each will control. When choosing a de-wormer, the project participant should consider types of worms controlled, cost and best method of administration for their situation.

The decision to treat project pigs with a de-wormer can be based on the history of internal parasites at the source farm or a fecal exam performed by a veterinarian. Pigs exposed to soil or manure from other hogs are likely to have been exposed to internal parasites. Treating such pigs early in the project will be of more benefit than treating near the end of the project.

The main **external parasites** that affect pigs are hog lice and mange mites. Adult hog lice are small crab-like insects about 1/4 inch long. They cling to the hair shafts, the skin and in the skin folds of pigs, especially along the neck and behind the ears. Lice do not burrow into the skin but irritate the pig by chewing into the skin to feed on blood and body fluids. Adult female hog lice lay eggs that are attached to the hair shafts of the pig. Although there are several species of lice found in nature, swine are the only host for the hog louse species. They do not infect other kinds of animals.

Mange mites are much smaller than hog lice and cannot be seen by the naked eye. These tiny creatures burrow into the skin of the pig, mate, lay eggs, and make new burrows

in the skin for the young mites. Pigs with mild infections of mange mites may not show any serious symptoms, but heavily infected pigs will itch severely and will frequently scratch themselves against any solid surface. In severe cases the skin will become rough and scabbed over.

Hog lice are easier to control than mange mites because they live on the surface of the skin. A variety of insecticide dusts, sprays, dips or pour-ons that are labeled to control lice are available at livestock supply stores. There are also several sprays, dips and pour-on materials available for mange mite control, but they must be applied in a manner that penetrates into the skin burrows where the mites are located.

Project participants may want to consider labeled injectable drugs that control both internal parasitic worms and both types of external parasites. These include products with the drugs Ivermectin or Doramectin. Trade names for these types of products include Ivomec®, Dectomax® and Double Impact®.

### Safety and Pork Quality Assurance

On commercial hog farms and in youth market hog projects, it is important to remember that it is actually a food product, and not just a pig that is being produced. To insure that pork from project hogs is safe and wholesome, certain guidelines must be followed. Whenever insecticides or drugs are used to control parasites or when **antibiotics** are used to treat sick pigs, the label instructions must be followed precisely. Many products can be purchased as over-the-counter medications without veterinary prescription, so it is up to the pig producer to use them properly

**Table 4.** Approved Drugs for Removal of Internal Parasites in Pigs (X indicates control of the parasite).

Active ingredient:	Dichlorvos	Fenbendazole	Levamisole	Ivermectin*	Doramectin*	Pyrantel Tartrate	Piperazine	Thiabendazole
Brand names:	Atgard C®	Safe-guard®	Tramisol® Levasole®	Ivomec® Double Impact®	Dectomax®	Banminth®		
	Feed additive	Feed additive	Drinking water additive	Injection	Injection	Feed additive	Drinking water additive	Oral paste
Roundworms	X	X**	X	X	X	X	X	
Nodular worms	X	X	X	X	X	X	X	
Whipworms	X	X**						
Lung worms		X	X	X	X			
Red stomach worms		X	X	X				
Threadworms			X	X	X			X
Kidney worms		X**	X	X	X			

\* Also effective against external parasites including lice and mange mites.

\*\* Also effective against immature stages of the parasite

and safely. Some livestock drugs are regulated more strictly and can only be obtained and used through a prescription by a veterinarian.

Many medications and some swine insecticides have a mandatory **pre-slaughter withdrawal period**. This is the required period of time from when the pig was last treated with the product until it can be transported to market for slaughter and processing. For some products this will be a period of only a few days, while other products may require a period of several weeks. And some medications will have no required pre-slaughter withdrawal period. The purpose of the pre-slaughter withdrawal is to make sure that the pig has cleared the medication from its body before it is slaughtered and processed into pork products. Following label instructions and keeping accurate treatment records is an important part of insuring that all pre-slaughter withdrawal times are met.

The National Pork Producers Council has educational materials that can be used to assist youth market hog producers to become certified in pork quality assurance. To obtain material for this program, participants can make requests through their local Cooperative Extension office, an Extension swine specialist, a swine veterinarian, or the National Pork Producers Council, P.O. Box 10383, Des Moines, Iowa 50306.

## Nutrition and Feeding

Feed costs make up a major part of production costs in the market hog project. And feeding a nutritionally balanced diet is necessary for good pig performance and health. For these reasons a general understanding of swine nutrition is useful to those conducting the market hog project.

Pigs are **monogastric** animals, meaning that they have a simple digestive system with one stomach chamber. Unlike cattle, sheep and goats that have **ruminant** digestive systems and multiple stomach chambers, pigs cannot adequately digest feeds that have high fiber content such as hays, silages and pasture. Instead pigs require feeds consisting mostly of concentrate ingredients such as grains that are high in **energy** and oil seed meals that are high in **protein** (Table 5).

The most frequently used grain in pig diets is ground corn. Corn is an excellent grain source because it is high in energy, low in fiber, and is usually economical. Other grain sources that may be used in swine diet mixtures include grain sorghum (milo), wheat, barley, triticale and oats.

Soybean meal is the by-product that remains after oil has been extracted from soybeans at commercial soybean

**Table 5.** Components of a Complete Market Hog Feed

Dietary Need	Ingredients to Meet Dietary Need
Energy	grains including corn, grain sorghum (milo), wheat, barley, triticale or oats; to increase feed energy, small amounts of fat may be added to complete feeds
Protein and Amino Acids	oil seed meals such as soybean meal, canola meal, peanut meal or cottonseed meal (other sources include animal by-products such as meat meal or meat and bone meal)
Minerals (major or macro)	dicalcium phosphate, monocalcium phosphate (calcium and phosphorus), limestone (calcium), salt (sodium and chloride)
Minerals (trace)	trace mineral premixes
Vitamins	vitamin premixes

processing plants. Soybean meal contains about 44% to 48% protein and is the most commonly used protein supplement in pig diet mixtures. Actually, pigs have specific requirements for **amino acids** that are the molecules that make up protein. Lysine is usually the most limiting (most needed) amino acid for pigs, and soybean meal protein has an excellent balance of lysine and other required amino acids for pigs. Other potential pig diet protein supplements include canola meal, peanut meal, cottonseed meal, and meat and bone meal.

In addition to energy and protein, pigs require essential **minerals** and **vitamins**. Major minerals, including calcium, phosphorus, sodium, and chlorine, are supplied by ingredients such as dicalcium phosphate (calcium and phosphorus), limestone (calcium), and salt (sodium and chloride). Trace minerals, such as copper, zinc, iron, selenium, manganese, and iodine, are supplied by adding a **trace mineral premix** to the diet formulation. Vitamins added to pig diets include Vitamin A, Vitamin D, Vitamin E, Vitamin K, Vitamin B12, Riboflavin, Pantothenic Acid, Niacin, Choline, Biotin, Folic Acid, and Pyridoxine. These are supplied by including a **vitamin premix** in the diet formulation.

The most convenient way to obtain and provide feed for youth project pigs is to purchase a complete hog feed from a commercial feed mill or feed store. With a **complete feed**, no additional preparation or mixing is required. The

feed should be formulated to meet the nutritional needs for the age and weight of the pigs. Complete feed is available for purchase in bags, which is practical for projects involving a few hogs. For farms with a large number of hogs, bulk delivery of large loads may be feasible. Because most commercial mills are equipped with pellet mills, many commercial complete feeds are purchased in pellet form. An advantage of pelleted feed is that feed wastage by the pigs tends to be lower and feed-to-gain ratio is slightly better. However, with proper management, results can be nearly as good with ground feed fed in meal form. Table 6 gives simple ingredient profiles for two market hog diet formulations that might be prepared at a commercial feed mill or that could be prepared on the farm if milling equipment were available.

Another way to provide feed for project pigs is to obtain individual ingredients such as those shown in Table 6 and prepare and mix a complete feed at the farm. This process can be complicated because it involves a variety of ingredients and is labor intensive. Another option for on-farm feed preparation is to purchase a **complete supplement**. A complete supplement is a feed product that contains the necessary protein, amino acids, vitamins and minerals to be mixed with ground grain in specified proportions to prepare a complete feed. This method of preparing feed on the farm is more simplified because it only involves two separate ingredients. Determining the amounts of complete supplement and ground grain to blend is also relatively simple.

**Table 6.** Example of Corn-Soybean Meal Feed Formulations for Market Hogs

	Percent in Formulation	
	<b>Grower Diet</b> <b>90 lb –</b> <b>170 lb Pigs</b>	<b>Finisher Diet</b> <b>170 lb –</b> <b>260 lb Pigs</b>
Ground corn	77.90	83.15
Soybean meal (48% protein)	19.55	14.45
Limestone (Calcium carbonate)	.80	.80
Dicalcium phosphate	1.25	1.10
Salt	.25	.25
Vitamin premix*	.15	.15
Trace mineral premix*	.10	.10
<b>Total:</b>	<b>100%</b>	<b>100%</b>
Calculated nutrient & energy content:		
Crude protein, %	16	14
Total lysine, %	.80	.65
Calcium, %	.65	.60
Phosphorus, %	.55	.50
Met. Energy, kcal/lb.	1507	1511

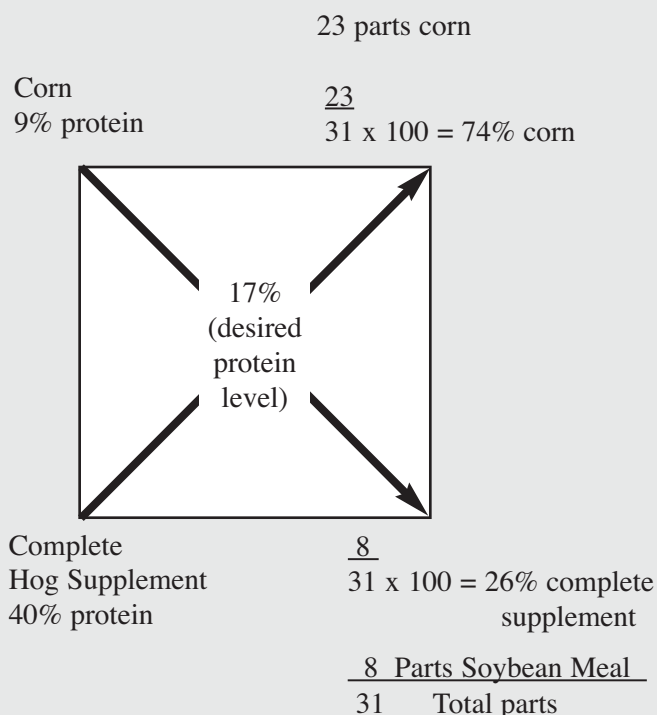
\*Or as directed by the product label.

One method to calculate the amounts of each ingredient to add to the diet is called **Pearson's Square** (Figure 7). For example, 74 lb of ground corn and 26 lb of 40% protein complete hog supplement could be mixed to prepare 100 lbs of a complete hog feed that contains 17% total protein. With Pearson's Square, the desired protein level of the finished feed is recorded inside the square and the protein content of the grain on upper left corner and the protein content of complete supplement on the lower left corner. Values are subtracted across the diagonal lines of the square to give the "parts" of grain in the upper right corner of the square and the "parts" of supplement in the lower right corner. The sum of the "parts" of the two ingredients is divided into the "parts" of each individual ingredient to give the proportion (or percentage) of each ingredient in the final mixture.

Under most market hog project circumstances, complete diets are full-fed in self-feeders or fed to appetite daily in troughs or pans. Restricted feeding is sometimes practiced with project pigs. In this system pigs are fed daily slightly less than they would consume on a full-feeding program. Pigs that are restricted fed will grow slower, have less backfat, and may appear less content than full-fed pigs. Excessive feed restriction in youth project pigs is not recommended.

The feed should be presented in a clean, fresh manner. Spoiled feed should be removed and discarded. Likewise, clean fresh drinking water should be available at all times.

**Figure 7.** "Pearson's Square" Method for Simple Hog Diet Formulations



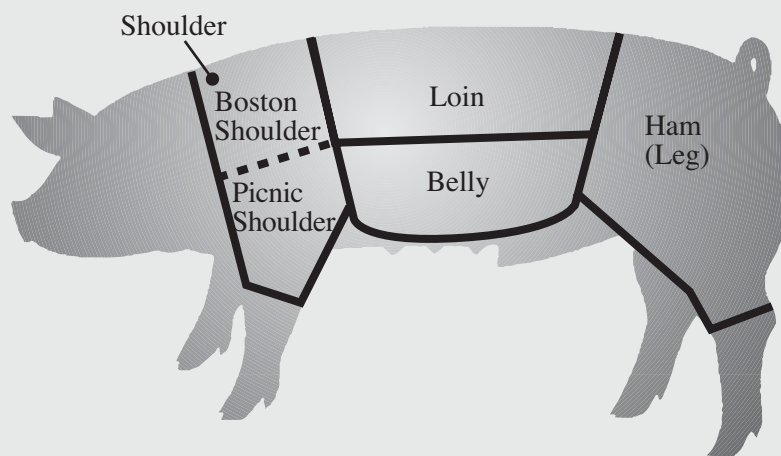
# Pork and Pork Products

After reaching market weight (235 to 270 lbs.), most project hogs are sold as slaughter hogs and processed into various types of pork food products. This is true of hogs sold directly to livestock markets or meat packers, and those sold through junior market hog show sales. Pork is one of the most widely consumed meat products throughout the world and is especially popular among people in European countries like Germany, Denmark, Spain, France and Poland, and in Asian countries like China, Taiwan, Singapore, Korea and Japan. Pork is also a popular food product in the United States. Average pork consumption in this country ranges from 48 to 54 pounds per person each year.

Today's pork is lower in fat than in earlier times and is considered to be a nutritious food when consumed along with other foods (breads, cereals, vegetables, fruits and dairy products) as part of a balanced diet. For example, a

3 ounce serving of cooked lean pork supplies an adult man with 44% of his recommended daily allowance of protein, 63% of his recommended daily allowance for the essential vitamin thiamine, and 30% of his recommended daily allowance for the mineral iron. This same serving of lean pork is considered nutrient dense because it supplies these essential nutrients while only contributing a total of 206 calories to the daily diet.

Pork processing begins first by separating the dressed carcass into wholesale or primal cuts. **Wholesale cuts** of pork include the loin, ham (also called the leg), belly, and shoulder. The shoulder may be further divided into an upper portion called the Boston Shoulder and a lower portion called the Picnic Shoulder. These larger cuts of pork may then be broken down into smaller retail cuts for sale as fresh pork products such as pork chops, roasts, sliced bacon, spare ribs and others. Larger cuts of pork and pork trimmings may also be processed into various specialty **processed pork** products such as sausages, frankfurters, lunch-meats and cured or smoked pork products. For example, pepperoni is a special type of processed sausage made from pork that is very popular as a pizza topping.



## Shoulder

- Boston Shoulder Roast
- Boneless Boston Shoulder Roast
- Blade Steak
- Cubed Pork Steak
- Pork Cubes
- Fresh Picnic Shoulder
- Smoked Picnic Shoulder
- Arm Roast
- Arm Steak
- Ground Pork
- Pork Sausage
- Processed Pork Products

## Ham (Leg)

- Smoked Whole Ham
- Smoked Ham – Rump Portion
- Smoked Ham – Shank Portion
- Boneless Fresh Ham
- Boneless Smoked Ham
- Canned Ham
- Cooked (Boiled) Ham
- Smoked Ham Slices
- Ground Pork
- Pork Sausage
- Processed Pork Products

## Loin

- Blade Pork Chop
- Rib Pork Chop
- Loin Pork Chop
- Sirloin Pork Chop
- Country Style Ribs
- “Baby” Back Ribs
- Canadian Style Bacon
- Boneless Loin Roasts or Chops
- Tenderloin
- Blade Loin Roast
- Center Loin Roast
- Sirloin Roast

## Belly

- Spareribs
- Slab Bacon
- Sliced Bacon
- Smoked Bacon
- Salt Pork
- Processed Pork Products

**Figure 8.** Wholesale Cuts of Pork and Names of Selected Retail Pork Items

Figure 8 illustrates the wholesale cuts of pork and gives a partial listing of retail pork products that can be obtained from each wholesale cut.

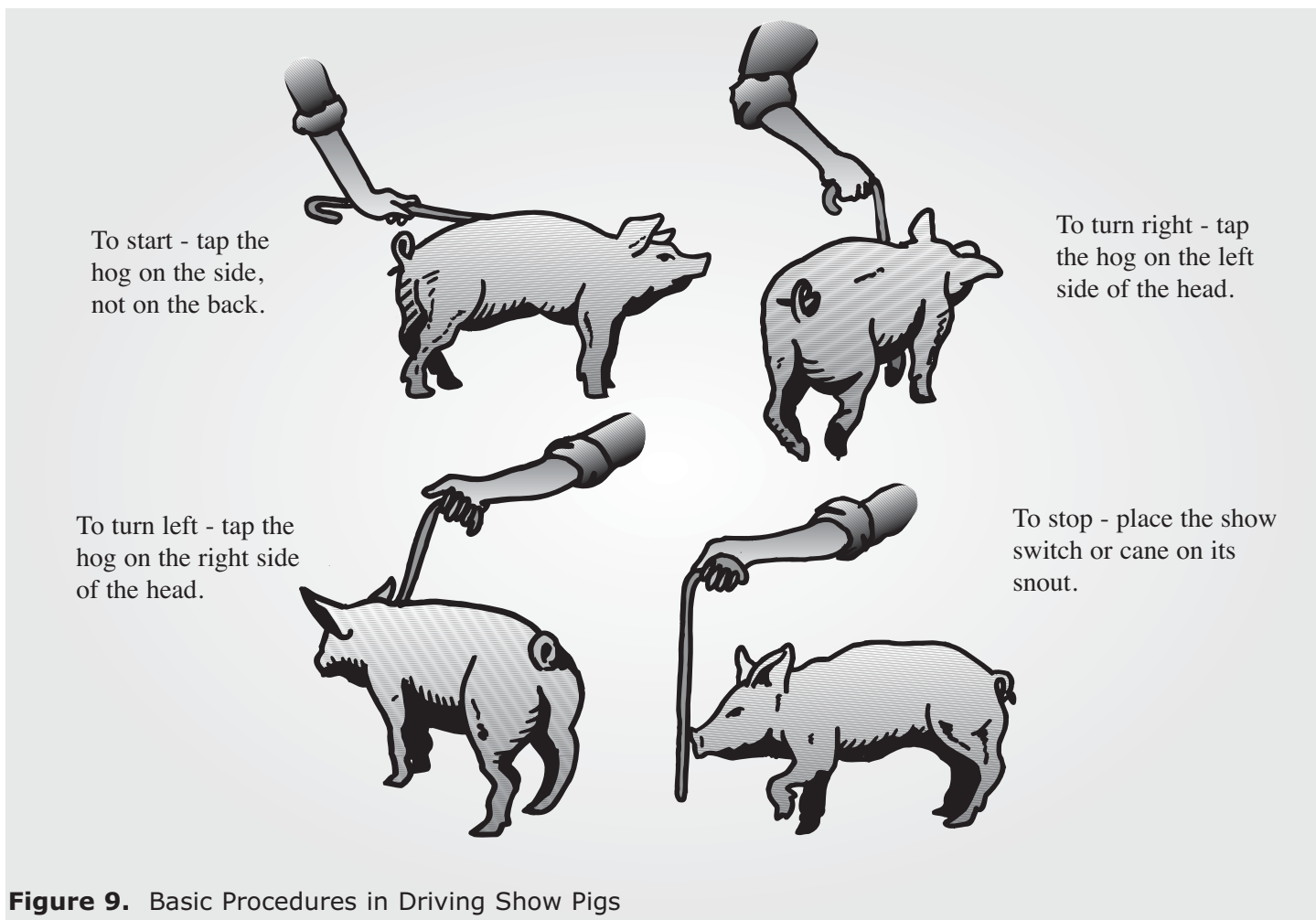
## Exhibiting Market Hogs at Youth Live-Stock Shows

Exhibiting at a local or regional market hog show is a great way to conclude the youth market hog project. An added benefit is that most youth hog shows also offer the opportunity for exhibitors to sell their project pigs at the conclusion of the show. Exhibiting pigs involves driving the project hog in a show ring to display its best qualities to an official hog judge. Hog showmanship is quite different from showing other kinds of livestock because no halters or lead lines are involved. Instead, a simple cane or whip is used to guide and direct the show pig around the show ring. Contrary to what some people believe, hog showmanship is not an undisciplined exercise in which

youngsters drive pigs about in a show ring in random directions. The following are some points to focus on as youth exhibitors strive to improve their hog fitting and showmanship skills.

### Begin training and preparing your pigs well ahead of the show.

As you begin working with show pigs, your first goal is to get each pig familiar with you as a showman and the process of being driven as if in a show. Start out in the pen in which the pig is kept. If another pen is available, conduct periodic training sessions there also so the pig will become accustomed to new surroundings. The basic idea is to use a cane or show pig whip to guide and direct the pig in a calm and deliberate manner (Figure 9). To start the pig moving forward, stand toward the rear of the pig and to one side, tapping it on its side. If the pig stops, tap it again but do not tap the pig constantly as long as it is moving as directed. To turn the pig to the right, tap it on the left side of the head. To turn it to the left, tap it on right side of the head. To stop the pig, hold the cane or show whip in front of the pig's snout. Work with show pigs frequently but keep each training session brief so that



the pig does not become agitated. In the summer, conduct training sessions during the cooler periods of early morning or evening. Above all, do not lose patience during the show training process. Try to make the experience stress-free for both the pig and the exhibitor.

### **Bring clean pigs to the show barn.**

By doing a good job pre-washing show pigs at home, it will be much easier to do light cleaning and washing at the show barn. For pigs kept in dirt lots or on heavy manure packs, it may take two or three washings starting several weeks before the show to get all the dirt and stains removed. Use mild detergent, warm water and a non-abrasive brush. Rinse the pig well but take care not to get water into the pig's inner ear. Return the washed pigs to clean, dry quarters; provide clean, dry bedding if temperatures are cold.

### **Organize and prepare equipment to take to the hog show.**

The exhibitor should plan on taking all the necessary feed and equipment to care for and exhibit the pigs at the show barn. Some exhibitors construct a wooden show box or modify an old foot-locker to carry their equipment and keep it neatly stored at the show. A partial checklist for items to bring to the show may include:

- Watering pans and buckets
- Feeding pans
- Feed (only enough to last during the show)
- Bedding (if not provided at the show)
- Washing supplies (bucket, brushes, mild soap, clean rags, water spray bottle, etc.)
- Shovel and broom (for cleaning around the pen area)
- Work clothes and shoes
- Show clothes and shoes
- Show cane or hog show whip and small show brush (to fit in pants pocket while showing)
- Other items as directed by the local show advisors

### **Plan on using the "natural look" when showing pigs in youth exhibitions.**

Complete body hair trimming close to the skin may be done in some major livestock shows, but it really is not necessary (in fact it should be discouraged) in state and local youth shows. Some minor trimming with scissors to remove stray hairs along the face, ears, flanks and tail is certainly permitted and advisable. In the past some exhibitors have used mineral oil or talcum powder application to improve the appearance of show pigs. However, a comment often made by judges at youth hog shows is that

mineral oil application and talcum powder are often used so excessively that it detracts from the appearance of the pig. A very small amount of mineral oil wiped on with a cloth will give a slight shine on colored pigs. Likewise a very small amount of talcum powder will brighten up white pigs. However, too much of either is worse than if none at all were applied.

### **Dress neatly and appropriately for the show.**

The exhibitor's show clothes should be clean and neat. Slacks or clean jeans and a clean blouse or shirt are fine for both girls and boys. The shoes or boots should be a hard-soled type that will clean up easily. "Vibram" soled shoes are not advisable because manure tends to collect in the sole. A few youth shows even have a specific dress code for the show ring.

### **Equip yourself with a show cane or hog show whip (slapper type) and a small brush for the show ring.**

It is a personal choice whether the cane or show whip is used. Both are intended to assist in gently driving and guiding your pig in the ring. Either tool should be easily held in one hand. A brush should definitely be carried into the ring, but it should be a small brush that can easily be kept in one's pocket when not in use. If dirt or bedding gets on the pig during the showing process, the brush can be taken from the pocket and used to discreetly brush away the unwanted material. A common mistake seen among young exhibitors is they attempt to show with a cane in one hand and a large brush in the other throughout the class. In some cases they may use the brush to guide and direct the pig, but this can be distracting to the judge.

### **Know which class your pigs are in and be prompt when the class is called.**

The main mistakes to avoid here are being late into the ring when a class is called or even bringing the wrong pig into a class.

### **Remember your purpose: to give the judge the best look possible at your pig throughout the entire time that the class is in.**

Some exhibitors misinterpret this important point and attempt to move their pig directly to the judge each time he or she moves to a new location in the ring. Naturally, the judge will move regularly during the class to get different views of the pigs. The exhibitor should be focused on



the judge and respond accordingly when the judge changes position. But this does not usually mean moving the pig directly to the judge's new location. Rather it means that the exhibitor may need to turn the pig back into the range of view that the judge is currently taking. In fact, it is preferred that the exhibitor attempt to show his pig at a distance of 15 to 25 feet from the judge to allow for good viewing from side, rear and front angles. Judges who want to get closer to or handle individual pigs will usually approach the pig and exhibitor. However, exhibitors not focused on the judge may fail to recognize important opportunities to allow the judge to approach or give a better view of their pig when the judge changes position. When driving your pig into the judge's field of view, remember to be courteous and sportsmanlike to other exhibitors in the ring who are trying to accomplish the same task.

### **Use the show cane (or whip) skillfully and judiciously.**

The cane or whip is a tool to assist in driving, turning, stopping and otherwise controlling the show pig in the ring. However, inexperienced exhibitors often misuse it. The most common mistakes include frequently holding the cane between the pig and the judge, striking the pig along the back-line or the hams causing the pig to assume awkward positions, and striking the pig too frequently or too aggressively with the cane. Often this last problem only serves to frustrate the pig to the point that it becomes impossible to show and can cause bruising of the live pig and discoloration on the carcass. Exhibitors skilled in the use of the show cane or whip tap the pig, usually gently, on the shoulder or jowl to encourage movement in a given direction. The pig is typically tapped on the right side to turn left and on the left side to turn right. A little extra force is sometimes used when needed but this is not taken to the extreme. The cane may be held in front of the pig's snout if there is an opportunity to stop the pig to allow a standing view for the judge. Additionally, experienced showmen can change the cane from the right hand to the left and from the left to the right as needed to effectively move the pig without distracting the judge.

### **The body position and movement of the exhibitor should be used to full advantage.**

The exhibitor should move along with the pig, on the side away from the judge. When attempting to move the pig forward, it is best to be on the side but slightly toward the rear of the pig. A partially crouched position

with the cane and free hand spread apart and below waist level will allow the pig to see the exhibitor and will encourage the pig to be more responsive to the exhibitor. As much as possible the pig and exhibitor should be moving at a slow and deliberate pace. On occasions when the exhibitor stops the pig for viewing by the judge, the exhibitor can move discreetly to a position directly behind the judge's view of the pig. If the pig moves into a corner of the show ring, the exhibitor's best solution is to move along the ring fence and into the corner between the pig and the fence. This should encourage the pig to move away from the corner and back out into the open ring area. When it is necessary to move completely around the pig, the exhibitor should go around the pig in the direction that does not impede the judge's view of the pig. In fact, the exhibitor should make a special effort to avoid obstructing the judge's view of the pig throughout the entire show class. It is not unusual for good swine exhibitors to perspire while showing because they are mentally and physically concentrated on exhibiting their pig during the entire time in the class. But they should also maintain a pleasant, sportsmanlike attitude and a keen awareness of the judge's position and viewing needs at all times. Work hard at it but have fun doing it.

### **Be prepared for pig fights.**

Pigs that have not been raised together may occasionally fight in the show ring. When this happens a solid hurdle board should be used to separate the two pigs involved in the fight. Most youth shows have adult ringmen equipped with hurdle boards to assist with breaking up pig fights. To avoid injury, the exhibitor should not use his hand or body to try to separate fighting pigs.

### **Maintain high ethics and sportsmanship throughout the project and during the show.**

The overwhelming majority of young people and adults involved in youth livestock shows are ethical and honest. But there are occasional reports of participants who choose not to follow the rules. Those who choose to bend the rules of the project or show really should not be participating. Likewise, adults who foster unethical behavior among youth livestock exhibitors in an effort to gain higher awards in a livestock show should find other ways to spend their time. Exhibitors who do their best with their project, who accept high placing graciously and accept lower placing honorably, will leave the show with a justifiable sense of pride and accomplishment.

# Glossary

**Amino acids:** Organic molecules, all of which contain nitrogen, that bind together chemically to form proteins. Pigs have dietary requirements for essential amino acids.

**Antibiotic:** A type of medication that may be given to pigs to control certain types of bacteria that cause disease or depress performance.

**Backfat:** The fat that is located below the skin but above the muscles and bones along the back of the pig. Excessive backfat on market hogs is considered wasteful and reduces the value of the hog at the packing plants.

**Barrow:** A male pig castrated before it has reached sexual maturity.

**Boar:** An intact male hog.

**Breed:** A group of swine (or other livestock) that have the same outward characteristics (color pattern, ear shape, etc.) that can be passed from one generation to the next.

**Carcass:** The part of the hog remaining after it has been slaughtered, de-haired, and had the internal organs removed at the pork processing plant. High value pork products come from a carcass that usually weighs about 72 to 76 percent of what the live hog weighed.

**Complete feed:** A prepared swine feed that needs no additional preparation or mixing before feeding to pigs.

**Complete supplement:** A blended swine feed ingredient containing the necessary protein, amino acids, vitamins and mineral to be mixed with ground grain to prepare complete feed.

**Contract swine production:** A production agreement in which a farmer or “swine grower” provides the land, hog buildings, equipment and labor to produce hogs under contract for a larger swine producer or “integrator” who provides the feed, hogs, transportation and management advice to the grower.

**Crossbred:** Pigs with a sire and dam of different breeds.

**Dam:** The female parent.

**De-wormer:** A medication given to pigs to kill internal parasites.

**Energy:** The component of feeds that provides fuel to the animal’s body for growth, reproduction, milk production and other processes.

**External parasites:** Parasites that cause problems on the outside of the pig such as hog lice and mange mites.

**Feed-to-gain ratio:** A measure of feed efficiency that is calculated by dividing the pounds of feed a pig consumes during a period of time by the pounds of growth the pig had during that period. A lower feed-to-gain ratio indicates better feed efficiency.

**Full feeding:** A feeding method in which growing market pigs are allowed to consume feed as often as they choose to. With full feeding, feed is available to the pigs at all times.

**Gastrointestinal disease:** Any disease that affects the stomach and(or) intestines of pigs. Symptoms of gastrointestinal disease often include diarrhea or scours.

**Gilt:** A female pig less than one year old that has not given birth to a litter of piglets.

**Growth rate:** The speed at which a market hog grows. For example, a hog growing at a rate of 2 lb per day has a faster growth rate than a hog growing at a rate of 1.6 lb per day.

**Heterosis:** A situation in livestock breeding in which the offspring from parent animals of different breeds or genetic backgrounds has improved performance (reproduction, growth, etc.) above the average of the parent breeds or genetic groups.

**Hybrid:** Swine (or other livestock) that are the offspring of parent animals from different genetic groups or breeds.

**Independent swine farm:** A farm producing hogs in which the farm or owner-operator owns all the components of production including the buildings, equipment, feed and hogs.

**Internal parasites:** Parasites such as roundworms, lung worms and kidney worms that cause problems inside the pig’s body.

**Loin muscle:** The elongated muscle that runs down the length of the market hog’s back on each side of the

backbone. The loin muscle is one of the highest value wholesale pork cuts and is used by live hog judges and pork processing companies to determine the overall value of the hog.

**Lower critical temperature:** The temperature below which pigs start feeling severely cold and exhibiting cold temperature stress.

**Manure:** A by-product of producing swine that includes any combination of pig feces, urine, bedding material or water. When properly handled, manure can serve as a good plant fertilizer.

**Maternal breeding lines:** Groups of breeding swine that have been selected to excel in reproductive and mothering traits, such as having large litters and producing large quantities of milk for nursing piglets.

**Minerals:** Inorganic compounds that may be classified as essential nutrients in feeds because they are required for normal bone and tissue growth, and normal body functions in the animal. Major or macro minerals are required in the diet in relatively large quantities and trace minerals are required in smaller amounts.

**Monogastric:** Animals such as swine that have a single stomach compartment.

**Net profit:** The money that remains for a hog business after all business expenses (pig costs, feed costs, medications costs, repair costs, etc.) have been paid from the funds received when selling the pigs.

**Pearson's Square:** A simple mathematical procedure used to calculate how much of two feedstuffs of different nutrient content to blend together in order to produce a feed of a specific nutrient content.

**Pre-slaughter withdrawal period:** The period of time required for use of some medications from the day the pig was last treated with the medication until it can legally be shipped for slaughter.

**Processed pork:** Pork or retail pork product that has been further processed from fresh pork by cooking, smoking, blending, special seasoning, or other special processing methods.

**Protein:** A type of feed nutrient that is made up of amino acids and is required in the diet of pigs for growth of muscle and other tissue development.

**Purebred:** A pig with a sire and dam of the same breed.

**Respiratory disease:** Any disease that affects the nasal passages, bronchial tubes and(or) lungs of pigs. Symptoms often include coughing, wheezing, sneezing, and eye and nasal discharge.

**Ruminant:** Animals such as cattle, sheep and goats that have a specialized four-chamber stomach that allows digestion of high fiber feeds.

**Self-feeder:** A type of feeding equipment that keeps feed available to pigs at all times in full feeding systems.

**Sire:** The male parent.

**Terminal sire breeding lines:** Groups of breeding boars which have been selected for their ability to produce offspring that excel in market hog traits, such as fast growth, good feed efficiency and lean, heavily muscled carcasses.

**Trace mineral premix:** A mixture of trace or minor minerals required in the feed of pigs that is added in small quantities to complete swine feeds.

**Upper critical temperature:** The temperature above which pigs start feeling severely hot and exhibiting heat stress.

**Vaccination:** The process of giving a vaccine to a pig. A vaccine stimulates the animal's immunity for one or more specific diseases to help prevent disease in the pig.

**Ventilation:** In a barn or hog building, the process by which stale air is replaced with fresh air.

**Vitamin premix:** A mixture containing the required vitamins for swine feeds that is added in small quantities to complete swine feeds.

**Vitamins:** Organic compounds that are classified as essential nutrients in feeds because they are required for various chemical processes in the animal body.

**Wholesale cuts:** Four larger primal cuts of pork from the hog carcass that can be further cut or processed to specific retail cuts and pork products. The four wholesale cuts of pork include the loin, ham (or leg), belly and shoulder.

## Author

Allen F. Harper, Extension Animal Scientist, Swine,  
Virginia Tech  
Virginia Tech Tidewater Agriculture Research and  
Extension Center  
6321 Holland Road  
Suffolk, Virginia 23437  
alharper@vt.edu

## References and Sources of Additional Information

The Pork Industry Handbook, Dan Pawlik – Editor  
Purdue University  
1151 Lilly Hall  
West Lafayette, Indiana 47907

The National Swine Registry  
P. O. Box 2417  
West Lafayette, Indiana 47996  
nsr@nationalswine.com

The National Pork Producers Council  
P. O. Box 10383,  
Des Moines, Iowa 50306  
<http://www.nppc.org>.

The Virginia Pork Industry Board  
1100 Bank Street  
Richmond, Virginia 23219

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The Virginia Pork Industry Board  
1100 Bank Street, 1012 Washington Building  
Richmond, Virginia 23219

## Review Team

The thoughtful reviews of the following individuals were  
essential in producing this publication.

Dr. Mark Wahlberg  
Extension Animal Scientist, 4-H Livestock  
Virginia Tech Department of Animal & Poultry Sciences  
Blacksburg, Virginia 24061

Dr. Cindy Wood  
Associate Professor  
Virginia Tech Department of Animal & Poultry Sciences  
Blacksburg, Virginia 24061

Mr. Steve Britt  
Extension Agent, Agriculture and Natural Resources  
Virginia Cooperative Extension – Pittsylvania County  
P.O. Box 398  
Chatham, Virginia 24531

## Service, Illustration and Informational Assistance

Linda Byrd-Masters, Virginia Tech Tidewater AREC  
Charles Babb, Virginia Tech Tidewater AREC  
Phil Taylor, Virginia Tech Tidewater AREC  
Terry Lee, Virginia Tech Tidewater AREC  
Dr. Mark Estienne, Virginia Tech Tidewater AREC  
Dr. Steve Umberger, VCE Associate Director – ANR  
Billie Cline, Public Relations Assistant Specialist, Virginia  
Tech  
Bev Brinlee, VCE - Agriculture & Extension  
Communications, Virginia Tech  
Chris Cox, VCE - Agriculture & Extension  
Communications, Virginia Tech  
John Voss, National Pig Development (USA)  
The Pig Improvement Company  
National Pork Producers Council  
The National Swine Registry  
Oklahoma State University Cooperative Extension

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