

Introduction to Swine Production



Student Reference

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*In cooperation with the Agricultural Education Department and
the College of Agriculture, Food and Natural Resources
University of Missouri-Columbia*



Introduction to the Swine Industry

The swine industry has a major economic impact on agriculture in Missouri. This unit will focus on swine production and the important issues facing the industry.

Economic Implications

The swine industry has experienced tremendous change. In 2005, more than 105 million hogs were processed into more than 21 billion pounds of pork. In 1995, more than 200,000 swine producers operated nationwide. The industry has seen a dramatic drop with around 67,000 swine producers operating today. The swine industry generally ranks either fourth or fifth annually among all production agriculture industries in terms of farm cash receipts. Each year, producers sell more than \$11 billion worth of hogs, which have a retail value of \$30 billion.

In 2005, Missouri had approximately three percent of hog operations nationwide. The state ranks seventh in the number of hogs and pigs produced. The top three counties in the state are Mercer, Sullivan, and Putnam, with close to one million head of hogs between them. Hog numbers in Missouri are illustrated in Figure I.1.

Swine Terms

The swine industry uses many unique terms. Anyone involved in the swine industry should know and understand these terms.

Farrow - To give birth

Gilt - A young female pig that has not yet farrowed

Barrow - A castrated male pig

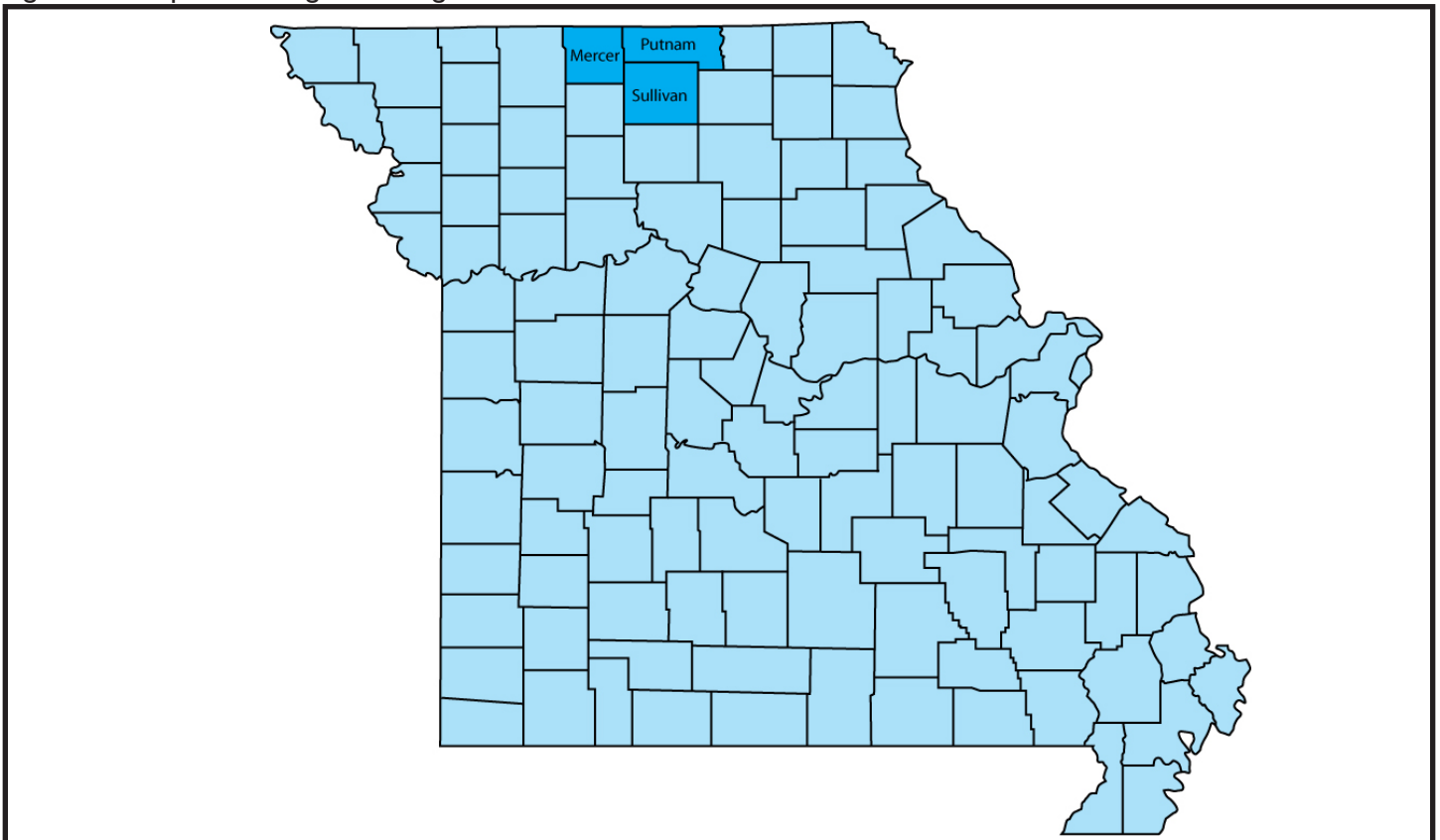
Boar - A male pig used for breeding

Sow - A mature female hog

Feeder pig - A gilt or barrow between weaning and finishing

Market hog - A gilt or barrow weighing between 240 and 270 pounds and ready for processing

Figure I.1 - Top Three Hog-Producing Counties in Missouri



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Swine Facts

Body Temperature - 102.5°F

Market weight - 253 lbs.

Avg. age at 250 lbs. - 170 days

Pigs per litter - 8.3 weaned nationally

Feed to gain ration - 3 lbs. of feed: 1 lb. of gain

Evolution of the Swine Industry

The trend in the swine industry in the United States is toward fewer producers and larger operations. While there are more than 67,000 swine producers operating in the United States today, there were approximately three million producers raising hogs 40 years ago. Thirty years ago, many swine producers operated farms with less than 100 sows. Currently, the industry is moving toward larger operations. These operations may range in size from 1,000 to 80,000 sows.

The location of the swine industry is also shifting. During the 1960s and 1970s, most swine production was centered in the Corn Belt states, such as Iowa, Minnesota, Illinois, Indiana, Nebraska, and Missouri. While these states still contain most of the hogs produced in the United States, North Carolina, Arkansas, Texas, Kansas, and Oklahoma have seen tremendous growth in hog numbers. Large corporate expansions have accounted for much of this recent growth.

Today, a major focus of American swine producers is to expand pork exports. The export market enhances the economic returns of all swine producers. The swine industry slogan, "Pork, the other white meat," is aimed at influencing consumers worldwide to increase consumption of pork and pork products.

Production Systems

The major production systems of the swine industry are farrow-to-finish production, feeder pig production, and feeder pig finishing.

Farrow-to-finish swine production is the most common type of production. It covers the entire production process, from breeding to sales of market hogs. Gilts

and sows are mated to boars or artificially inseminated. Females farrow a litter of pigs. The piglets are weaned, and the sows are bred again. The baby pigs are moved into a nursery until they weigh approximately 50 pounds and then to a finishing barn where they grow until they reach 240 to 270 pounds. The pigs are then sold as market hogs to provide pork for human consumption. Farrow-to-finish production is the most intensive production system and generally has the greatest requirements as to management skills, labor, and facilities.

Feeder pig production involves producing pigs to sell to other producers to be fed for market. Feeder pig producers have a herd of sows for breeding. Pigs are sold when they weigh approximately 50 pounds. The investment required for the operation is less than that for farrow-to-finish production. Most feeder pig producers in Missouri have a contract to produce pigs for a company involved in commercial swine production. The company then buys the pigs and sends them to feeder pig finishers, who are also under contract.

Feeder pig finishers purchase or receive pigs at approximately 50 pounds. They feed the pigs until they reach a market weight of 240 to 270 pounds. After the animal reaches market weight, the pig is processed into saleable pork and pork products. This system requires less labor and managerial ability than the other systems. The investment required is also lower than in farrow-to-finish or feeder pig production.

Business Structures

Before the current increase in corporate production, the vast majority of hogs were produced on privately owned family farms. Many family producers still raise hogs individually.

Some producers are involved in network production. In this type of production, a group of producers cooperates to decrease production costs and improve profits for each operation. Networking can involve collective marketing arrangements, purchasing supplies at a discount for member operations, or cooperative production of swine. For example, one producer might raise feeder pigs to be finished by another producer in the network.

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Some producers operate on a contract basis. The individual producer signs a contract to produce pigs for a company. The company owns the pigs and finances the operation, and the producer provides the facilities, equipment, and labor. The company makes many of the decisions about how the pigs are managed. The producer receives a fixed price per animal.

Many corporate investors have expanded their involvement in the swine industry. The goal of corporate farms is efficient production of a uniform product. Corporate farms are large-scale operations. They may also be vertically-integrated, meaning the company owns and controls all phases of the production process. For example, Company A might own complete farrow-to-finish production facilities, a feed mill that produces feed for its farms, and a processing plant.

Career Opportunities

With the wide scope of the swine industry, career possibilities are extremely diverse. Estimates suggest that over 700,000 jobs in the United States are linked to the swine industry.

Many career opportunities exist in the swine industry besides becoming a producer involved in one of the different production systems. Swine operations need employees to fill positions, such as breeding manager, farrowing manager, and nursery manager. These positions involve overseeing these activities for the operation. A feed mill technician is responsible for producing feed for swine herds. An artificial insemination technician breeds sows and gilts using artificial insemination. Animal geneticists specialize in genetic research to develop more powerful medications and genetically superior animals. Animal health product sales representatives provide swine medications and other products to farm stores, veterinarians, and producers. Veterinarians often specialize in swine where large concentrations of hogs are found. Hog buyers buy market hogs to be processed into pork. USDA inspectors and quality control supervisors work in pork processing plants to help ensure that the food supply is safe and wholesome.

Summary

The swine industry is an important part of agricultural production in the United States, accounting for over \$11 billion in farm receipts annually. Swine are produced in farrow-to-finish, feeder pig, and feeder pig finishing production systems. The swine industry is changing, with hogs being produced on larger farms at diverse locations nationwide. Corporate swine production is becoming more prevalent in the industry. Due to the diversity of the industry, young people interested in working with swine have a variety of career opportunities open to them.

Credits

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Harper, Allen F. "The Role of Swine Producer 'NETWORKS.'" gopher://gopher.ext.vt.edu:70/00/docs/aps/aps-628 (30 July 1997).

Lawrence, John D., et al. "Producing and Marketing Hogs Under Contract." <http://www.public.iastate.edu/~pigmap/PIH/6.txt> (30 July 1997).

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Nix, Jackie. "Facts about Contract Livestock Agriculture." <http://duplin.ces.state.nc.us/pubs/contract.html> (30 July 1997).

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing, 1988.

Pork Issues Handbook. Des Moines: National Pork Producers Council, 1996/1997.

Success in the swine industry depends partly on a broad knowledge of the breeds of hogs used in production. Knowing the different breeds and their characteristics is important in making decisions about which breed to use in breeding programs. Producers also need to consider whether to use hybrid hogs in their operation.

Breeds of Swine

The major breeds of swine include the Berkshire, Chester White, Duroc, Hampshire, Landrace, Pietrain, Poland, Spotted, and Yorkshire. Differences between these breeds are apparent in ear type and color variation.

Berkshire - Berkshires are black with six white points - the tip of the tail, nose, and four feet - and have erect ears. Berkshires produce high-quality meat with excellent marbling and optimum color. The breed has recently lost much of its popularity in the United States because it has not kept up with the trend toward lean, heavily muscled, large-framed hogs. They were first imported from England in the early 1800s.

Chester White - Chester Whites are white with small, drooping ears. They were once very popular across the United States because of their durability and ruggedness. Chester Whites have good mothering ability. This breed was developed in Pennsylvania in the early 1800s.

Duroc - Durocs are solid red in color and have drooping ears. They are among the fastest-growing hogs available to producers. Durocs are primarily used to produce fast-growing market hogs. They were developed in the United States during the mid-1800s by crossing red hogs from New York and New Jersey.

Hampshire - Hampshires are black with a white belt around the front of the body including the front legs, and they have erect ears. Hampshires are used to produce lean, heavily muscled offspring. They originated in England and were first imported during the early 1800s.

Landrace - Landrace hogs are white with large, droopy ears that cover the entire face. They are extremely long-bodied and are used primarily as a maternal breed because of their mothering ability. Landrace hogs originated in Denmark and was imported during the 1930s.

Pietrain - Pietrains are generally spotted with erect ears. They are the leanest and most heavily muscled hogs in the world. Pietrains often carry a stress gene linked to meat quality problems; the gene causes light-colored, watery pork. They are typically crossed with other breeds to produce terminal sires (boars used to produce market hogs of which none are kept as replacement breeding stock). Pietrains were imported from Germany and Poland.

Poland China - Poland Chinas are black with six white points and have drooping ears. They have been used in programs to increase growth rates. The popularity of the breed has decreased recently across the country because it has not kept up with the trend toward leanness. Poland Chinas were developed in Ohio during the first half of the 19th century.

Spotted - Spotted hogs were named for their color; they have black and white spots all over their bodies. They also have drooping ears. They have been used primarily because of their rapid growth. In the U.S. swine industry, spotted hog numbers are small in comparison to the numbers of animals of other breeds. Spotted hogs originated in Indiana from the Poland China breed, and a purebred association was formed in 1914.

Yorkshire - Yorkshires are solid white with erect ears. They are quite versatile in their uses throughout the swine industry. They have excellent mothering abilities but can also be used to produce lean, heavily muscled, fast-growing market hogs. Yorkshires are also called Large Whites and were imported from England in the early 1800s.

Breed Selection

Most American swine producers typically use several breeds together in a crossbreeding program to produce fast-growing, lean, and muscular market hogs. Factors that should be considered are breeds used in the past, litter sizes, leanness, muscle, current growth rates, and efficiency in the conversion of feed to pork. Most producers will evaluate their situation and try to select breeds and individual animals that will help them correct their deficiencies. For example, if a producer is concerned with the mothering ability of the sow herd, he or she might consider using Landrace or Yorkshire hogs

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to improve maternal abilities. Other producers may need to increase the amount of saleable meat on their market hogs and may select Hampshires or Pietrains. The most important part of breed selection is finding breeds and individual animals that meet the needs of the producer.

Hybrid Hogs

Over the past 20 years, producers have started to use hybrid hogs instead of purebred animals. They believe that they can more closely select for specific traits, such as growth or number of pigs born alive. Hybrid hogs have been developed by crossing multiple breeds together and selecting for desired traits. Companies and seed stock producers offer hybrid hogs varying in use from a maternal to a terminal emphasis. The hogs typically are identified by using a number or code to describe the particular strain.

Breeding Systems

Two types of breeding systems are used in the swine industry. Straightbreeding involves mating two animals of the same breed, while crossbreeding is mating animals of different breeds. In the commercial swine industry, most of the producers use some form of a crossbreeding system.

Inbreeding is one form of straightbreeding. Inbreeding is an attempt to concentrate desired traits in offspring. It involves mating two related animals. Closebreeding and linebreeding are two types of inbreeding. In closebreeding, the animals are closely related; an example is mating a brother and sister. Linebreeding involves mating animals that are slightly or distantly related, with only one shared ancestor. Inbreeding can be negative because of the risk of concentrating undesirable and even detrimental traits along with the desirable traits.

Outcrossing is a form of straightbreeding in which unrelated animals of the same breed are mated. Outcrossing is the most popular and safest type of straightbreeding, since it avoids the risks associated with inbreeding.

Crossbreeding, or mating animals of two different breeds, results in a hybrid offspring. Crossbreeding animals with desired traits is an attempt by the producer to maximize heterosis, or hybrid vigor. Heterosis results in improved

performance, growth, and/or carcass traits. It is evident when the animal displays superior qualities in comparison to the average of its parents' traits.

Summary

Several breeds can be used in the production of swine. Producers should select breeds that work well in their production system. When breeding animals, swine producers use purebred and hybrid genetics to produce profitable offspring. Most commercial swine producers use some form of crossbreeding program.

Credits

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Ensminger, M. E. *Stockman's Handbook Digest*. Danville, Ill.: Interstate Publishers, Inc., 1992.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing, 1988.

Principles of Swine Selection

Proper animal selection is one foundation of successful swine production. The choices made will affect producers' profits far into the future. Selection is important in many ways, from producing quality pork to animal health.

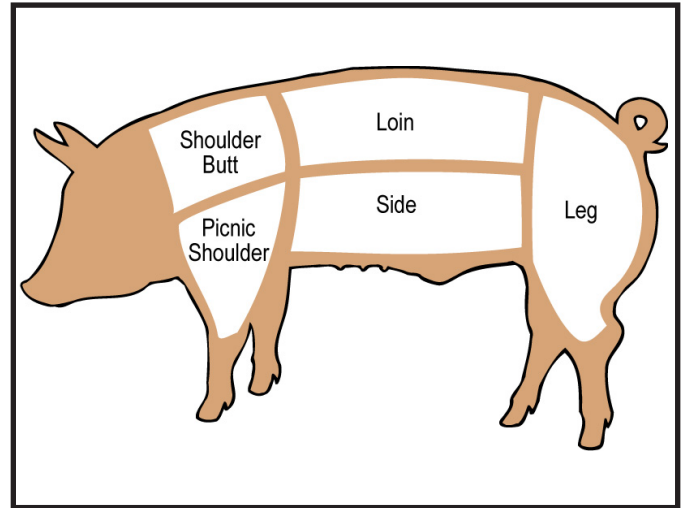
Parts of the Pig

To be able to communicate with individuals involved in the swine industry, one must become familiar with the proper terminology for the parts of the hog. Figure 3.1 is an illustration of the parts of a pig.

Wholesale Cuts of Pork

When hogs are processed into pork, the carcass is divided into wholesale cuts. The wholesale cuts are then sold to retail stores (e.g., the local grocery store). At that level, the wholesale cuts are processed into smaller retail cuts purchased by consumers. The wholesale cuts of pork (see Figure 3.2) are the shoulder butt, picnic shoulder, loin, side, and leg.

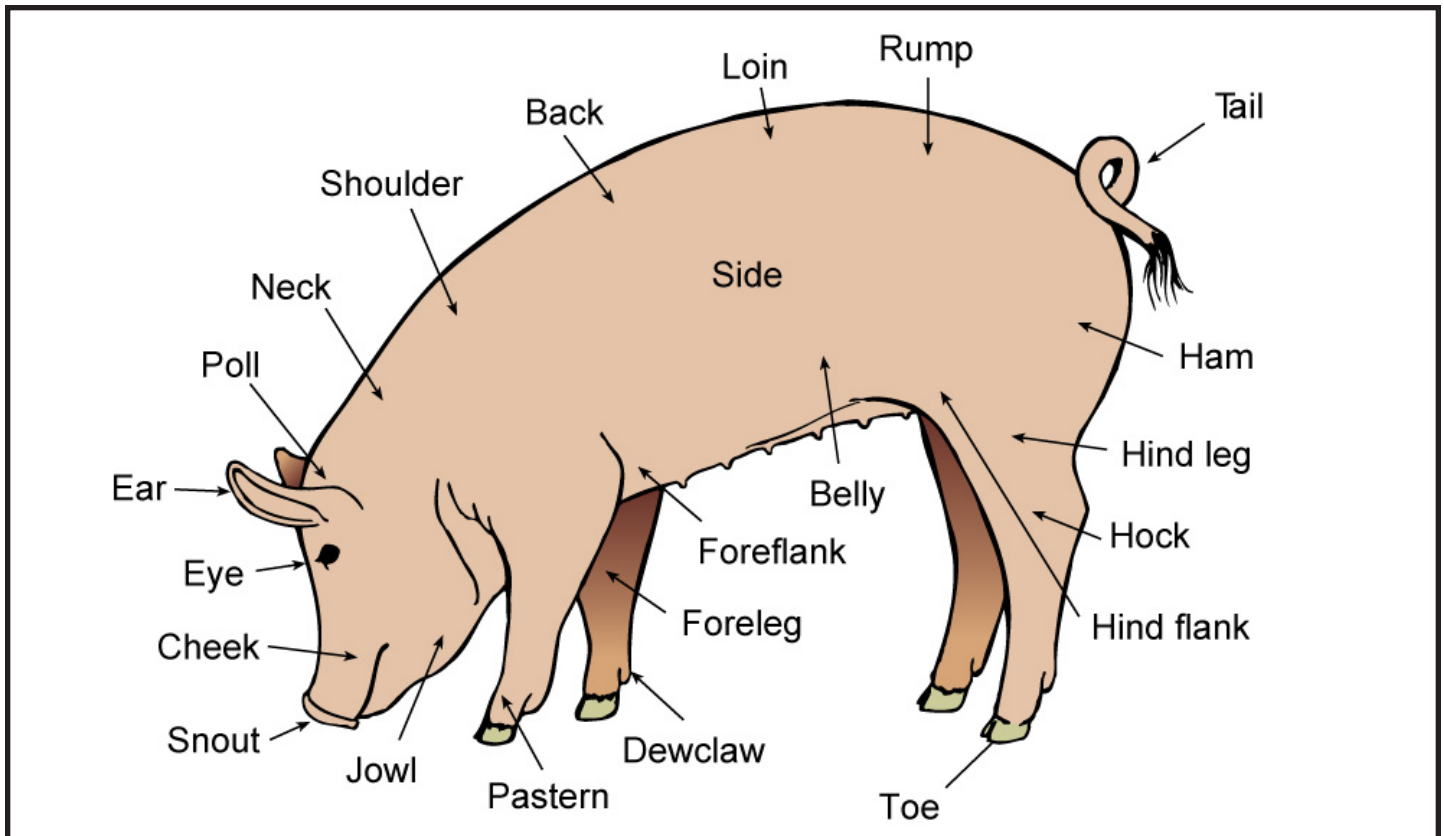
Figure 3.2 - Wholesale Cuts of Pork



Slaughter and Feeder Pig Selection

The demands of the consumer drive the selection of slaughter hogs. Retail consumers purchase lean and meaty cuts of pork. This trend has caused the industry to emphasize leanness. Other factors important in slaughter hog selection are muscling, size/age, and soundness.

Figure 3.1 - Parts of a Pig



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Leanness - Market hogs must be mostly free from fat to produce lean pork. When viewed from the top, a lean hog has an hourglass shape (see Figure 3.3). The loin will be narrower than its shoulder and ham regions. Also, lean hogs will be trim through the lower body.

Muscling - Heavily muscled market hogs produce more saleable pork than more lightly muscled hogs. Hogs should be evaluated for the expression, or definition, of muscle instead of pure thickness. Often market hogs that are extremely wide over their tops are fatter than is desirable.

Size/age - To be profitable, market or slaughter hogs need to reach the appropriate size at an acceptable age. Currently, the packing industry is demanding heavier market hogs. Market weight is usually between 240 and 270 pounds, reached at an age of 140 to 170 days.

Soundness - Soundness refers to the physical ability of the animal to get up and down and move with relative ease. Sound animals with good feet and legs are more productive and generally grow more quickly.

Selecting feeder pigs for purchase involves some of the same criteria. Feeder pigs should be selected for health, soundness, leanness and muscling, and frame size. Health

and soundness are emphasized because feeder pigs are young and light. They must grow and perform until they reach market weight.

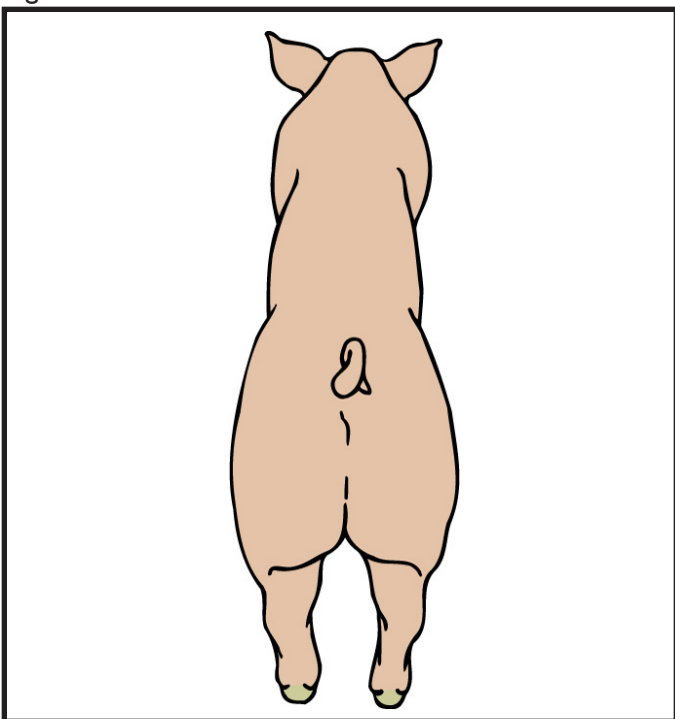
Health - Producers should purchase feeder pigs from healthy herds and vaccinate them against major diseases. Unhealthy pigs should not be purchased no matter the price.

Soundness - Being able to move with ease is a priority when selecting 50-pound feeder pigs. Young pigs that are injured or not sound are a high-risk investment. Production is decreased because they are more susceptible to diseases, grow more slowly, and have higher mortality rates.

Leanness/muscling - Feeder pigs should be extremely lean and display muscle expression at 50 pounds to maintain their leanness until they reach market weight. Leanness and muscle both contribute to the future cutability of the market hog. Cutability is the ratio of the percentages of saleable meat and fat from a carcass.

Frame size - Large-framed animals are desirable because they mature later and stay leaner at higher weights. Small-framed pigs should be avoided. Large-framed animals are taller, and the cannon bones in their front legs are longer than those of smaller-framed animals.

Figure 3.3 - Leanness



Breeding Swine Selection

The selection of hogs to be used as breeding animals should focus on the efficient production of lean pork. Breeding animals should be evaluated for reproductive soundness, skeletal soundness, growth and potential production, frame size, and leanness and muscling. Superior animals excel in all these traits. Producers should never select animals on a single trait without considering the others.

Reproductive soundness - Reproductive and skeletal soundness are priorities in the selection of breeding hogs. Boars should have two functional testicles. Females should have fully developed vulvas and functional underlines (the outline of the underbody) with a minimum of six teats and preferably seven teats per side.

Skeletal soundness - Most hogs are raised indoors on concrete floors. They must be skeletally sound to survive, grow, and reproduce in confinement. Hogs need to have

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proper skeletal angulation; the legs should be straight and set at the proper angle from the body (see Figure 3.4). Hogs should also be able to move with ease.

Growth/potential production - Breeding animals are selected for fast growth and high production. Producers should note the age of the animal when it reaches 230 pounds, referred to as “days to 230”; fewer days are more desirable. Breeding gilts should be selected from large litters of pigs, because a sow that can raise a large litter has mothering ability, which is a desired trait. They must also have an acceptable body capacity. A large body capacity allows animals to consume greater amounts of feed.

Frame size - A large frame size is important in producing lean animals at high weights. Large-framed animals remain leaner at heavier weights than do small-framed animals.

Leanness/muscling - To produce lean and heavily muscled market hogs, breeding animals must share these traits. Breeding stock should be leaner and more muscular than average. Producers should use ultrasound to look at backfat and loin eye area, which are the best indicators of

leanness and muscularity. Adjusted backfat scans at 240 pounds should be between .6 and 1.1 inches, while loin eye areas should be more than six square inches.

Along with making a visual appraisal, producers can look at several important indexes when selecting breeding animals. They are the Sow Productivity Index (SPI), Terminal Sire Index (TSI), and Maternal Line Index (MLI). They use Expected Progeny Differences (EPDs) to evaluate the potential worth of animals for breeding. EPDs look at the expected performance of the offspring of an animal. All three of the indexes assign an average parent a specific value; a higher number indicates an animal that is superior in the traits examined.

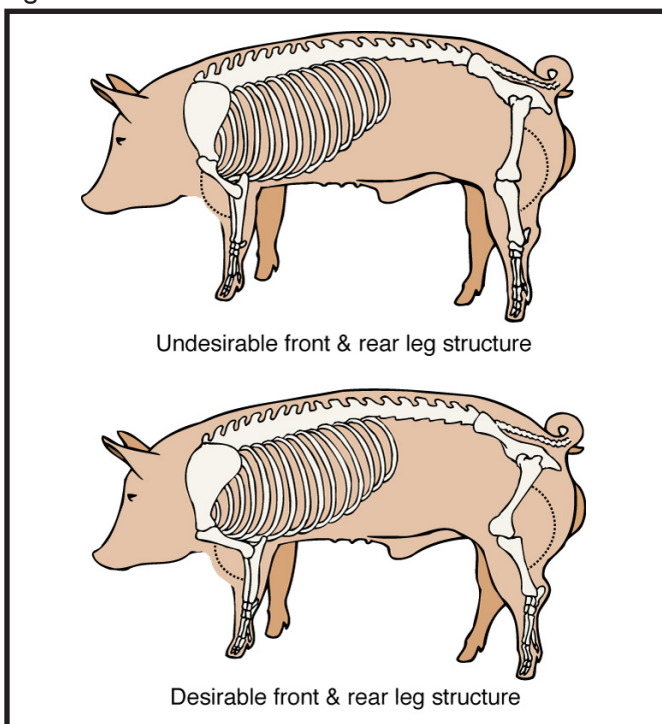
Sow Productivity Index (SPI) - The SPI looks at EPDs for 21-day litter weight and number born alive. SPI numbers above the average indicate animals that should produce daughters that have larger and heavier litters. The SPI should be used when selecting animals for reproductive traits. Each point of the index equals \$1 per litter produced by the daughters of a boar or sow. Litters of sows or boars with an SPI of 105 are \$5 more valuable than an average animal with a value of 100.

Terminal Sire Index (TSI) - The TSI uses data on leanness and growth, looking at EPDs for the number of days to 230 and for backfat. Animals with above average TSI values will produce animals that are leaner and grow more quickly than average. TSI should be used to select terminal sires. Points on the index are worth \$.10 per pig sold, or \$1 for every ten pigs sold. A boar with a TSI of 110 should sire pigs \$1 more valuable than those from an average boar valued at 100 points (10 points x \$.10 = \$1.00 per pig).

Maternal Line Index (MLI) - The MLI looks at EPDs for both reproductive traits (21-day litter weight, number born alive) and growth data (days to 230, backfat). Animals with above average MLI ratios will have higher reproductive and growth values. This index should be used to select replacement gilts. Like the SPI, points are worth \$1 per litter produced by the daughters of a boar or sow.

Indexes are determined by using data from the animal and its ancestors and offspring. The breed associations calculate the ratios, which are generally used for registered

Figure 3.4 - Skeletal Soundness



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animals. Individual producers can calculate variations on the indexes mentioned above.

Summary

Individuals interested in swine production must learn the proper names for the parts of a hog and for wholesale cuts. Producers should select slaughter and feeder animals to produce lean pork for consumers. Selection of breeding hogs involves making a visual appraisal and using indexes, such as the SPI, TSI, and MLI.

Credits

Boggs, Donald L., and Robert A. Merkel. *Live Animal Carcass Evaluation and Selection Manual*. 4th ed. Dubuque: Kendall/Hunt Publishing Company, 1993.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing, 1988.

“What are EPDs?” http://www.ansc.purdue.edu/stages/stg_user.html#What_are_EPDs (2 June 1997).

Swine production is a complex business that requires proper management to be profitable. Producers need to be aware of potential returns and available marketing options.

Facilities

Swine are often raised on large farms. Most of the hogs on these farms are raised in confinement. In total confinement production, producers raise all of the hogs in pens inside buildings. The design of these facilities must take into account the needs of the hogs for proper temperature, ventilation, sanitation and manure management, and food and water. Facility costs for farrow-to-finish production, feeder pig production, and feeder pig finishing are quite expensive. Many producers have hundreds of thousands of dollars invested in facilities.

Farrow-to-finish swine producers have the most facility requirements. The producers require the following facilities: farrowing house, nursery, growing/finishing barns, gestation/breeding barns, feed handling and storage, and manure storage.

The farrowing house consists of farrowing crates where the female is placed to farrow, or give birth. The crate provides a safe place for the baby pigs by keeping the mother from laying on them. The farrowing crate also has a waterer and a feeder for both the mother and the litter. Generally, animal wastes drop through the floor and are flushed into a manure storage facility.

After weaning, the sow is returned to the gestation/breeding barn. The sow will be bred again and will remain in the barn to gestate until farrowing. The piglets are placed in a nursery. The nursery where the baby pigs are taken is usually quite warm so that they remain healthy and productive. After the pigs reach approximately 50 pounds, they are placed in a growing/finishing barn where they remain until they reach market weight.

Other facilities needed for swine production include feed handling and storage facilities and manure storage facilities. Manure storage usually takes the form of a lagoon or pit. A lagoon is an artificial manure holding area similar to a pond. A pit is a metal or concrete manure storage facility.

Feeder pig producers will need many of the same facilities as farrow-to-finish producers. Feeder pig producers require a farrowing house, nursery, gestation/breeding barn, feed handling and storage, and manure storage. Since they sell their pigs, the growing/finishing buildings are not necessary.

Feeder pig finishers usually have the fewest facility requirements. Finishers typically receive pigs that are ready to be placed in growing/finishing barns. They also require feed handling and storage and manure storage facilities.

Production Costs

Production costs vary greatly within each production system and from producer to producer. Costs are affected by the type and size of the operation, labor requirements, loans, and other factors. Producers will have two categories of costs: fixed costs and variable costs. Fixed costs will be similar for all producers despite the type of production system used. They include depreciation, interest on loans, repairs, taxes, and insurance. Variable costs may differ depending on the production system. The major variable cost in raising swine is the cost of feed. Other variable costs for swine production include medications, veterinary care, equipment, facilities, and the cost of the stock.

Of the three production systems, farrow-to-finish producers have the most costs because they own the pigs for the longest time. Producers must purchase breeding stock and maintain a breeding herd as well as raise market hogs. Feeder pig producers have similar costs, but they do not have to pay for the feed and facilities needed to finish the slaughter hogs for market. Feeder pig finishers have the fewest costs, since they do not have the expenses connected to breeding and raising young pigs. Feed, feeder pig stock, and facilities are their main expenses.

Returns on Production

Like production costs, potential returns from each system vary. For example, the returns of farrow-to-finish producers primarily come from the sale of slaughter hogs. The typical market hog is sold at 240 to 270 pounds and an average price (depending on the current market)

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of \$40 to \$60 per cwt (100 pounds). A 250-pound pig sold at \$50 per cwt is worth \$125. If a producer could average 20 pigs sold per sow each year, he or she could generate \$2,500 in returns per sow.

The main income of feeder pig producers comes from selling feeder pigs. Depending on the market, feeder pig prices generally range from \$30 to \$55 with an average of \$45. If a sow produces 20 feeder pigs per year that sell for \$45 per pig, she can generate \$900 in income per year.

The returns of feeder pig finishers come from selling slaughter hogs. While they may receive the same amount of money for their hog as farrow-to-finish producers, feeder pig finishers must pay for the feeder pigs. If each hog is worth \$125 and was purchased for \$45, the finisher will receive \$80.

Looking at the potential returns, farrow-to-finish production seems to have the greatest profits. However, it also has the highest costs. Profits may be higher with one of the other production systems.

Marketing Options

Once a producer has raised a pig, he or she must sell it to make a profit. Three major marketing options are available to farrow-to-finish producers and feeder pig finishers: buying stations, auction markets, network marketing, niche marketing, and lean-based pricing.

Buying stations are owned and operated by various packers. The packers purchase market hogs from producers at a set market price, which is generally based on the lean yield from the last three loads sold by the producer. The producer then either delivers the hogs to the local station or hauls them directly to the processing plant.

Auction markets sell market hogs to the highest bidder. Usually, the auction market is privately owned, and the owner charges the producer a small fee to sell the animals at auction. Recently, auction markets have been decreasing in popularity for selling market hogs. Company-owned buying stations are replacing them.

In network marketing, independent producers cooperate to ship their hogs together as a group, so they can market a larger number of animals. Their goal is to get a better price for their hogs.

One of the newest and most popular ways of marketing hogs is a lean-based pricing system, which has grown out of the demand for leaner pork and emphasizes lean, heavily muscled slaughter hogs. Producers send the hogs directly to the packing plant to be processed. The carcasses are measured for backfat and muscling. The measurements are put into a formula that computes the percentage of muscle containing five percent fat. The higher the percentage, the more valuable the carcass is. Percent muscle usually ranges from 45 to 60 percent with 49 percent being standard. The packing plant pays a premium for hogs with more than 49 percent muscle. Hogs with less than 49 percent are penalized in price.

Producers can also market their animals through niche markets. Producers can potentially realize greater profits through value-added marketing. Rather than selling a live animal, a pork producer might sell the actual food product, like a whole hog ready for roasting or individual cuts, including hams, bacon, or loins, to consumers or food distributors. Producers may cooperate with meat processors or packing houses in value-added ventures. The producer pays the processor for slaughtering the hogs and processing the meat and then sells the meat to retail stores, restaurants, distributors, or directly to consumers. Some producers may have their own slaughtering and processing facilities. By adding value to their pork, producers hope to take a larger share of the profits along the food distribution channel, instead of having those dollars go only to processors and distributors.

Feeder pig producers generally have a contract with a company or with individual feeder pig finishers. The producer receives a set amount for each pig produced to the desired weight and/or age specified in the contract.

Summary

The three production systems used in producing swine vary as to the facilities needed, costs, and returns on the pigs marketed. Swine producers require different types of facilities, depending on the production system. The costs connected to these facilities are only one of the

costs of swine production. Producers have many other fixed and variable costs; the cost of feed is the major production cost for all three production systems. Farrow-to-finish producers have the highest costs and returns of the three production systems. The major marketing options available to farrow-to-finish producers and feeder pig finishers for selling hogs are buying stations, auctions, network marketing, lean-based pricing systems, and niche markets. Feeder pig producers generally are under contract to produce pigs.

Credits

Ensminger, M. E. *Stockman's Handbook Digest*. Danville, Ill.: Interstate Publishers, Inc., 1992.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Pork Issues Handbook. Des Moines: National Pork Producers Council, 1996/1997.

Swine Care Handbook. Des Moines: National Pork Producers Council, 1996.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing,

Swine production often occurs on a large scale in a confined setting. This type of environment increases the opportunities for diseases to spread among swine (although it reduces their spread from farm to farm or by other animals). Swine producers have to be able to keep diseases from spreading to produce healthy and productive pigs.

Swine Diseases

Swine are generally hardy animals, but they are susceptible to a variety of diseases. Producers can prevent most diseases by using good health management practices, or they can control them by using vaccines. The major swine diseases are erysipelas, leptospirosis, pneumonia, porcine reproductive and respiratory syndrome (PRRS), pseudorabies, rhinitis, and transmissible gastroenteritis (TGE).

Erysipelas - A bacterium causes this disease. Pigs suffering from erysipelas are slow growing and sometimes lame. Hogs with severe erysipelas often have red skin lesions. Animals with this disease frequently die. Producers should vaccinate pigs against erysipelas at six to eight weeks of age if it is present in the herd.

Leptospirosis - Leptospirosis is a reproductive disease caused by bacteria that results in abortions and the birth of weak or dead pigs. Females and males should be vaccinated against leptospirosis. Producers should vaccinate females two to three weeks before breeding.

Pneumonia - Pneumonia is a respiratory disease caused by bacteria. It usually does not cause death. However, the disease causes chronic coughing and reduces growth and efficiency. Producers can vaccinate pigs for some strains of pneumonia, but good management practices is the best prevention. Good sanitation and isolation of infected animals are two ways to prevent the disease. Pigs also should not be exposed to cool and drafty conditions.

PRRS - PRRS is the most profound health problem in swine herds across the United States. It is a viral disease that is spread from contact between hogs and between humans and hogs. The disease can cause abortions, mummified pigs, and stillbirths; it can also result in chronic respiratory problems throughout the herd. PRRS is hard to prevent and treat, but producers can vaccinate hogs

against it. They should also buy breeding stock that is free of the disease.

Pseudorabies - Pseudorabies is a viral disease that is spread from hog to hog through body fluids. The disease cannot be treated, and it causes a high death rate in young pigs. Pigs experience paralysis and run a fever. Sows with pseudorabies may abort, or the pigs may be stillborn. Pseudorabies is a difficult disease to control when an outbreak occurs. Producers must use a zero tolerance policy when dealing with pseudorabies. They should purchase all breeding stock from herds certified free of pseudorabies. Vaccines can prevent the spread of the disease.

Rhinitis - Rhinitis is caused by bacteria. It results in the degeneration of the bones in the pig's snout. The snout will then appear twisted. Pigs usually become infected at a few weeks of age. Vaccinating sows and baby pigs against rhinitis can prevent the disease.

TGE - TGE is a preventable viral disease that usually affects young pigs, most critically. The disease causes severe diarrhea. The death rate is close to 100 percent when young pigs contract TGE. Producers can vaccinate pigs against TGE, but vaccines are not effective in controlling the disease. Proper sanitation plays a major role in preventing outbreaks.

Reducing the Spread of Disease

Swine producers can reduce the spread of disease in several ways. They include biosecurity measures, proper sanitation, and the purchase and use of disease-free breeding stock.

Biosecurity involves preventive measures designed to reduce exposure to disease. These measures help to isolate diseased animals, keeping them from contaminating others. Many swine operations use biosecurity to varying degrees. Typically, swine operations limit the number of outside visitors. If they do allow visitors, the visitor showers in and puts on clean clothes and shoes before entering the facilities. Biosecurity also involves limited access to critical areas, such as the farrowing house and nursery, because pigs are the most vulnerable to disease when they are young. Some biosecurity plans specify that certain people can only enter particular buildings. For

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example, people working in the farrowing house could not go into other swine buildings because they might carry disease-causing bacteria or viruses back to the farrowing house. An outbreak of disease could cause large losses.

Proper sanitation is also important to herd health. Producers should clean and wash new animals before allowing them into the facilities. After they have moved all of the pigs out of a facility, the building should be cleaned using a pressure washer to remove waste. They should then disinfect the facility.

Another important preventive measure is the purchase and use of disease-free breeding stock. Many swine producers who sell breeding stock to others have strict health programs to ensure that their animals are free from disease. Their herds may be validated as specific pathogen free (SPF) herds, which means they are declared free of certain diseases. Blood tests are done on the animals before sale to ensure that they do not have any diseases. All incoming breeding stock should go through an isolation and acclimation period lasting 45 to 60 days in which they are tested for diseases and then exposed to cull animals from the facility in which they are to be placed. Using artificial insemination can reduce the spread of disease among breeding stock.

Herd Health Programs

Herd health programs vary from producer to producer and within production systems. However, most producers vaccinate animals for disease whenever possible. A good practice for all farrow-to-finish and feeder pig producers is to take blood samples from their animals and have them evaluated for specific diseases, which they can then treat.

Farrow-to-finish producers are involved in all phases of production. They have the most extensive herd health program because they must prevent health problems throughout the breeding, farrowing, and growth phases. Producers should use blood tests to reveal health problems and then target those problems with vaccines. They should also buy disease-free breeding stock, practice biosecurity, and administer preventive antibiotics in the feed given to the pigs. In addition, they should use products to control external and internal parasites. Pigs must be treated for parasites at regular intervals.

Feeder pig producers focus on breeding, farrowing, and raising the young pigs until they weigh approximately 50 pounds. Producers should purchase disease-free breeding stock and use the same biosecurity programs as farrow-to-finish producers. They should also take blood samples to discover specific health problems and vaccinate their animals for them. Producers also need to add preventive antibiotics to the feed and control external and internal parasites.

Feeder pig finishers usually have the fewest problems with disease. They own the pigs for a short time with no breeding, gestation, or farrowing taking place. Most feeder pig finishers will purchase vaccinated feeder pigs and use antibiotics in their feed. They also practice necessary biosecurity measures and treat animals for parasites.

Administering Medications

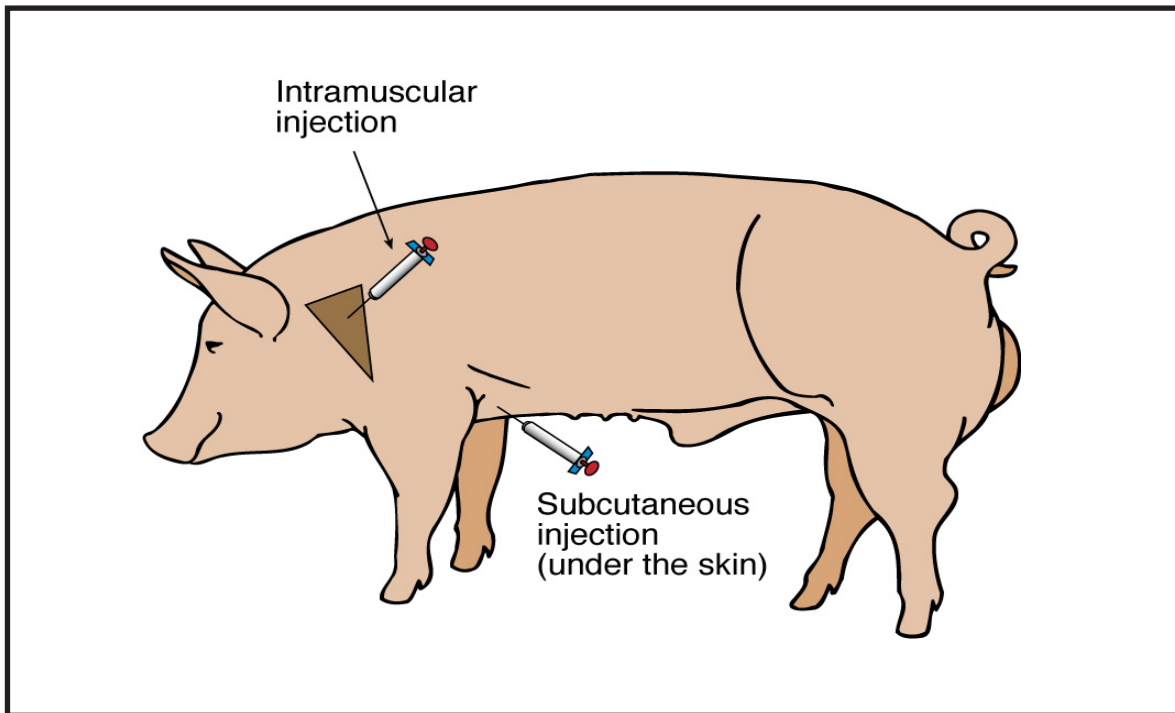
Swine producers need to know how to administer medications to keep their pigs healthy. They typically use subcutaneous and intramuscular injections plus medicated feed to help prevent and treat diseases. Figure 5.1 shows injection sites. To ensure that they produce high quality, safe pork, producers must be cautious and observe proper dosage, usage, and withdrawal times when using any medication. Withdrawal times tell producers how long the medicine takes to clear out of an animal's system. After the specified time, the animal can be sold for human consumption.

Subcutaneous (Sub-Q) injections are injections given between the skin and muscle. Most subcutaneous injections are given just behind the front leg in the loose skin of the foreflank between the leg and stomach. Sub-Q is recommended because there is a potential for carcass damage when injections are made into muscle tissue.

Intramuscular (IM) injections are made into the muscle. Injections should always be given in the neck of the pig and never in the rump or ham area, because the meat from the neck area is of a lower value.

Most swine producers use medicated feeds to help prevent disease and promote growth. The feed contains small amounts of USDA-approved antibiotics. Pigs consume the medication as they feed.

Figure 5.1 - Injection Sites



Summary

Pigs can contract many different diseases. Producers use a variety of methods to help reduce the spread of disease, including biosecurity measures, proper sanitation, and the purchase of disease-free breeding animals. They need to identify specific health problems and work to reduce their effects. Swine diseases can generally be prevented through the use of disease-free breeding stock, biosecurity, and vaccinations. Producers should use subcutaneous injections whenever possible.

Credits

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Ensminger, M. E. *Stockman's Handbook Digest*. Danville, Ill.: Interstate Publishers, Inc., 1992.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Pork Issues Handbook. Des Moines: National Pork Producers Council, 1996/1997.

Pork Quality Assurance Levels I, II, III. Des Moines: National Pork Producers Council, 1994.

Swine Care Handbook. Des Moines: National Pork Producers Council, 1996.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing, 1988.

Herd management is a critical component of success in the swine industry. Management includes nutrition, reproduction, pig processing, and measuring production efficiency.

Nutrition

Swine are monogastric animals with a simple stomach that has one compartment. Because of the structure of the stomach, swine cannot digest much roughage. Swine diets contain large amounts of grain, usually corn.

Proper nutrition is an essential part of maintaining herd health. Animals that are suffering from nutrient deficiencies are more susceptible to disease-causing organisms and do not achieve maximum performance. Swine require proper levels of energy (from carbohydrates and fats), protein, vitamins, minerals, and water in their diet. Producers should have nutrient analysis done on samples of the grain they have produced to learn the exact nutrient composition of the grain. Using this information, the producer can design a feed ration that will meet the nutritional requirements of the animal.

Feeding Phases

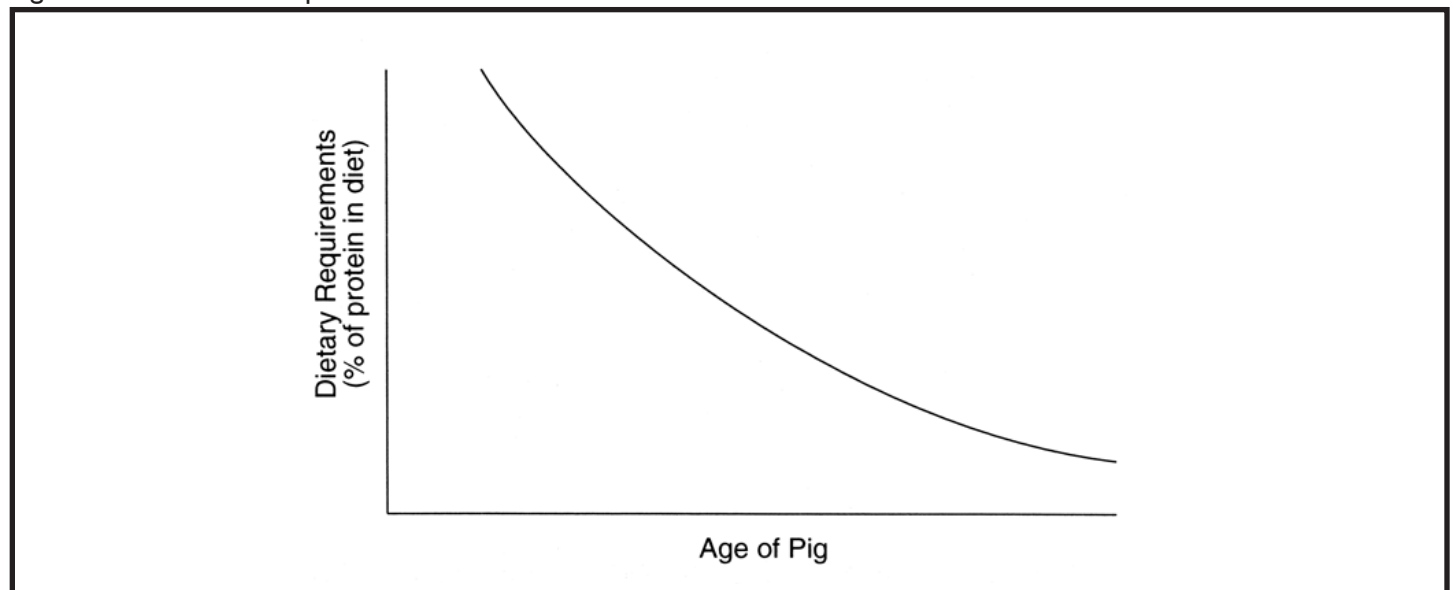
Swine production can be divided into various phases: gestation, lactation, weaning, and growing and finishing. Pigs have various nutritional needs throughout the different phases.

Gestation diets are generally lower in protein than any other swine diet. Gestating sows and gilts are usually fed four to six pounds of feed per head per day depending on the body condition of the animal and environmental conditions. Extra fiber is usually added to the diet shortly before farrowing to act as a laxative and reduce constipation. A good supply of fresh water should be available at farrowing time.

To meet the energy needs of the female, lactation diets are higher in protein and energy than gestation diets. The amount fed to the sows is gradually increased to full feed within five to seven days after farrowing. Generally, producers will feed lactating sows between 12 and 20 pounds per head per day depending on body weight and litter size. Lactating sows also require larger amounts of water than other pigs.

Weaning diets are the most critical swine diets because they provide the first feed the baby pig consumes and affects the future development of the pig. These diets are usually very high in the amino acids found in protein because weaning is a critical time for muscle growth, which requires protein. The level of protein is generally 18 to 22 percent, but it may be as high 26 percent. Feed generally contains milk and blood proteins. As the pig grows, the levels of protein and amino acids are reduced because the pig's requirements decrease. The graph in Figure 6.1 illustrates this change. A phase feeding program may be used to meet the changing nutritional needs of young pigs. Easy access to water is also important.

Figure 6.1 - Nutrient Requirements



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Growing and finishing diets may also be fed in phases in which the amount of protein varies. The level of protein is usually 14 to 16 percent. The amount of protein in the diet is gradually reduced. Also, many producers feed gilts separately from barrows. Gilts generally grow more slowly than barrows and require more protein to reach maximum levels of performance. Feeding them separately allows producers to match the diet to the needs of the pig.

As the graph in Figure 6.2 illustrates, swine producers are better able to meet the nutrient requirements of the pig by phase feeding. The animals will then perform closer to their genetic potential. Producers will also save money because they do not overfeed the pigs.

Production Efficiency

Swine producers measure production efficiency for finishing pigs in several ways. Some of the most common are: days to 230 pounds, feed to gain, and gain to feed.

Days to 230 pounds is a reflection of the growth rate of the producer's market hogs; it indicates the number of days between farrowing and reaching a market weight of 230 pounds. Pigs that grow more quickly will take fewer days to reach this weight. Fewer days on feed usually means that feed costs will be lower and translates into the ability to produce more animals with the given facilities.

Feed to gain is a measure of how many pounds of feed are necessary to produce a pound of gain in the pig. To calculate feed to gain, producers simply divide the pounds of feed fed by the pounds of pork produced, or the number of animals multiplied by the pounds each gained.

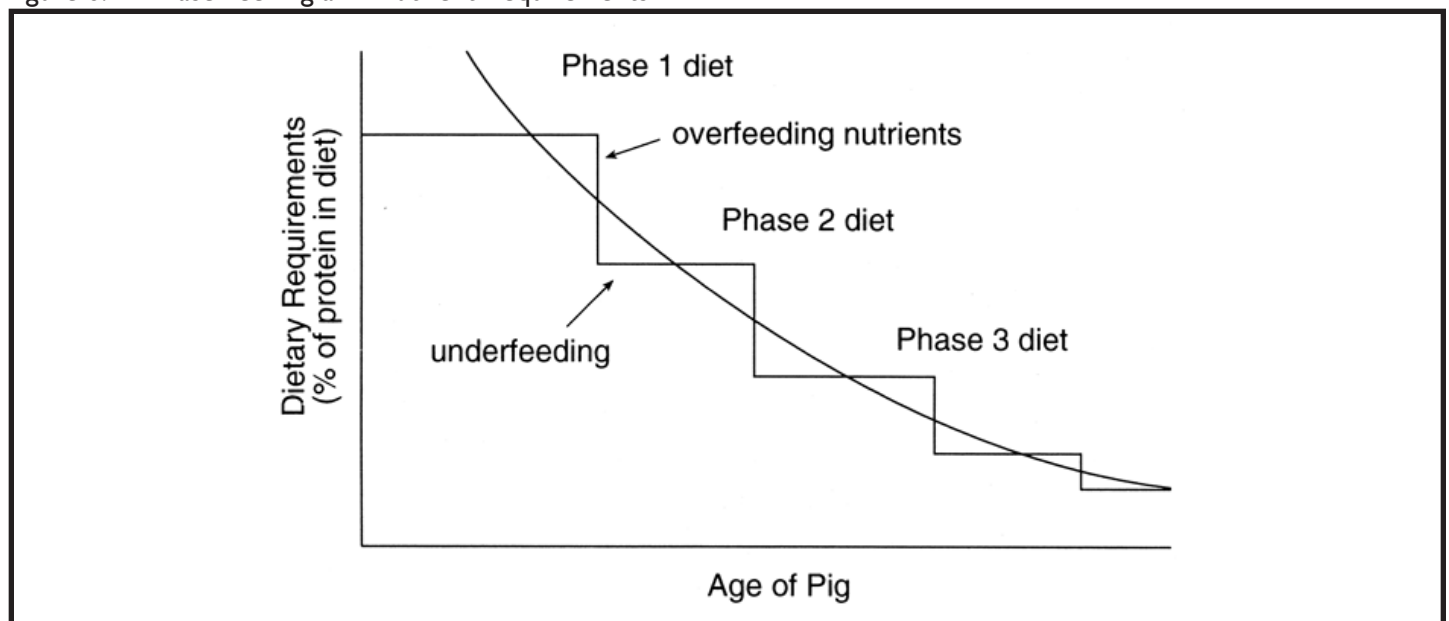
Suppose a producer fed 6,000 pounds of feed to 10 pigs. The producer purchased the pigs at 50 pounds and sold them at 250 pounds. Feed to gain for these pigs is calculated below.

$$\frac{6000 \text{ pounds feed}}{10 \text{ pigs} \times (250 \text{ lbs.} - 50 \text{ lbs.})} = \frac{6000}{2000} = 3.1$$

For every three pounds of feed consumed the pigs gained one pound in weight. A lower feed to gain ratio is desirable, since the pigs will then require less feed. If less feed is required, then feed costs are lower.

Gain to feed is a measure of the efficiency of gain. It is calculated by dividing pounds of gain by the pounds of feed fed. High numbers are desirable. For example, if a pig consumed 600 pounds of feed and gained 200 pounds, the pig would have a feed efficiency of one to three (200/600). Producers compare gain to feed when selecting animals to be used as reproductive replacements for the herd.

Figure 6.2 - Phase Feeding and Nutrient Requirements



Reproductive Management

Proper reproductive management is required for a producer to maximize production. The gestation cycle in swine lasts an average of 114 days. Producers need to keep accurate breeding records to know which females are due to farrow and when farrowing will occur. Sows should be placed in the farrowing house several days before their due date.

After farrowing, swine producers may take pigs from large litters and foster them to sows with small litters to balance litter size; fostering should take place within 24 hours of birth for both litters. This practice helps achieve a more uniform weaning size. Fostering also helps increase the survival rate of pigs. Fostering should be done as soon after birth as possible to ensure success. The largest piglets in the litter should be fostered.

Most producers will wean piglets when they are between 14 and 28 days of age, depending on their production system. They wean piglets from a group of sows on the same day to maintain the farrowing group. Sows will usually come into estrus three to seven days after weaning. Most producers will breed the female as soon after weaning as possible to maximize production.

Artificial insemination (AI) is becoming more common in the swine industry. Producers may purchase semen or buy superior boars and collect semen from the boars on the farm. AI allows superior boars to be used

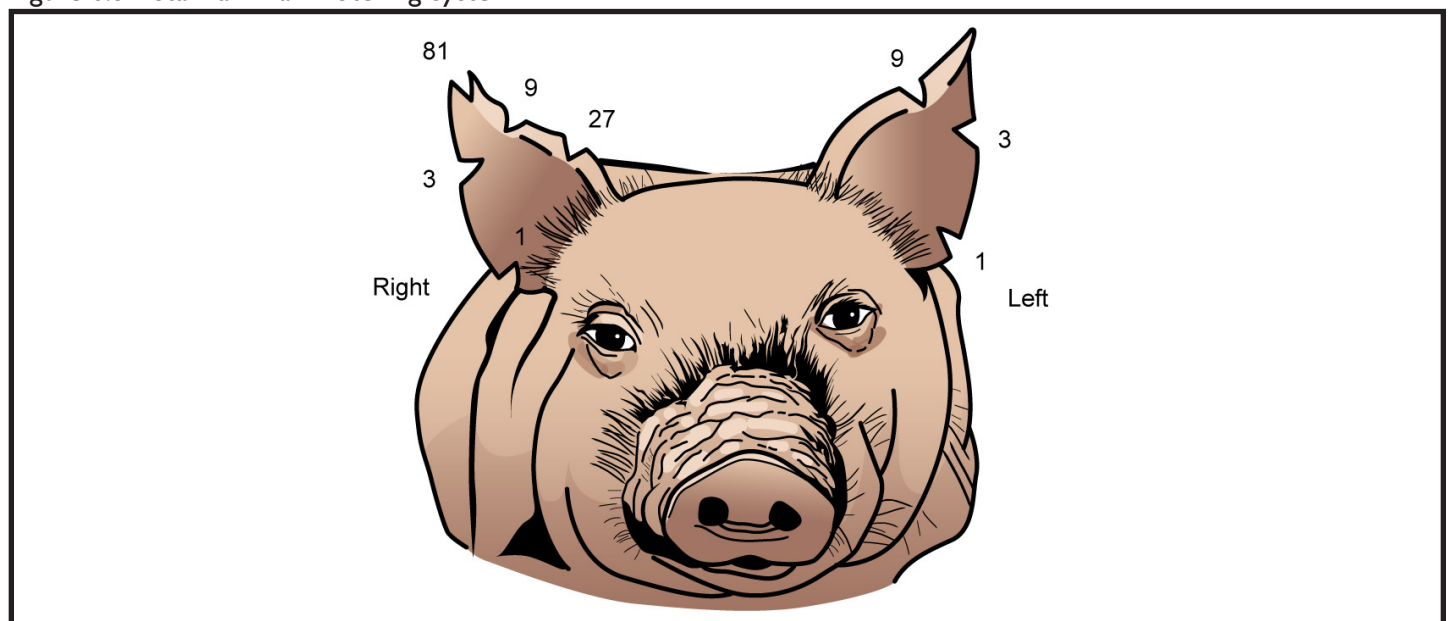
more extensively than in natural mating. When using AI, producers will check gilts and sows for estrus (heat) and then typically artificially inseminate the animal twice. Signs of estrus in sows and gilts include restlessness, mounting other hogs, and swelling of the vulva.

An important factor for producers to remember is that sows usually have three years of productive life. After three years of farrowing, they generally experience a decline in productivity.

Processing Baby Pigs

After the sow farrows, piglets are usually processed at one day of age. The producer should remove the navel cord soon after the birth. Iodine is then applied to the pig's navel to prevent infection. Producers clip the needle teeth from the piglet so it will not injure the sow's udder when nursing and will not hurt other pigs when fighting. Also, they should dock the piglet's tail to prevent tail biting. Baby pigs are given an iron shot to help prevent anemia. Some producers castrate the males at processing. Others let the pigs reach approximately one week of age before castrating the boars.

Figure 6.3 - Standard Ear Notching System



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Pigs must be ear notched using an ear notching system. Ear notching is a permanent and easy-to-read form of identification. Several different systems of ear notching can be used to identify pigs. Figure 6.3 shows a standard system of ear notching. It can be used to identify up to 161 litters. The ear is divided into quadrants. Each quadrant can have one or two notches. Notches on the right ear indicate the litter number; notches on the left ear identify the number of the piglet. Adding the numbers of the notches on each ear gives the litter and piglet numbers for that animal. In this system, after the 80th litter, the top of the right ear is notched to designate litter 81.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production*. 3rd ed. New York: Macmillan Publishing, 1988.

Summary

Swine producers must make sure to meet nutrient requirements for proper herd health and production. Diets vary depending on the stage of growth or production. For example, phase feeding involves feeding diets with different levels of protein at different stages to match the nutrient requirements. Various methods can be used to measure the efficiency of production, such as the number of days to 230 pounds, feed to gain ratios, and gain to feed. Proper reproductive management is necessary for efficient breeding. After farrowing, several steps should be followed when processing piglets.

Credits

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Boggs, Donald L., and Robert A. Merkel. *Live Animal Carcass Evaluation and Selection Manual*. 4th ed. Dubuque: Kendall/Hunt Publishing Company, 1993.

Ensminger, M. E. *Stockman's Handbook Digest*. Danville, Ill.: Interstate Publishers, Inc., 1992.

Gillespie, James R. *Modern Livestock and Poultry Production*. 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production*. Danville, Ill.: Interstate Publishers, Inc., 1996.

Swine Care Handbook. Des Moines: National Pork Producers Council, 1996.

The production of swine can be a complex business. Producers must take into account not only the needs of the operation but also the concerns of consumers, which may affect their attitudes toward the industry and the consumption of pork. The swine industry is working to address these concerns.

Consumer Concerns

The swine industry is similar to other American agricultural industries in that consumers have concerns about various aspects of the industry. Confinement swine production has increasingly come under public scrutiny. Producers raise hogs in confinement for a variety of reasons, including increased efficiency, the ability to control the environment and reduce stress, and ease of waste management and feeding. However, some consumers are troubled by the factory-like conditions in which swine are produced and the effects of raising hogs in this way. In particular, consumers focus on the environmental problems associated with swine production, food safety, animal welfare, and animal rights.

Large-scale confinement operations have increased concerns among consumers and producers about the effect of swine production on the environment. Confinement swine production can produce a large amount of waste. Producers must store these wastes until producers can properly apply them to the land as fertilizers. They can emit unpleasant odors. Consumers are concerned with odor emission and its effects and the potential for the pollution of groundwater and waterways from untreated wastes in leaking storage facilities.

The safety of pork is another issue that concerns consumers. Some consumers believe that producers give too many antibiotics. They worry that pork may contain residues from these antibiotics.

The welfare of pigs is another concern of consumers. In swine production, pigs are often raised inside and are not allowed to go outside. Consumers question whether the amount of room given to each animal is adequate and whether the buildings contain too many pigs. They also worry about the consequences for the pigs if temperature regulation fails in the confinement building or a fire breaks out and they cannot escape.

The debate over animal rights is also of interest to the American public. Some groups, such as People for the Ethical Treatment of Animals (PETA), believe that animals have rights. They feel that humans should therefore not use animals for food or research.

Managing Manure Nutrients

To meet consumer concerns and protect the environment, pork producers must manage the disposal of animal waste products carefully. Because of the high volume of wastes resulting from hogs raised in confinement, producers must have an efficient system for handling manure that includes well-designed waste storage facilities. Manure is typically stored in lagoons or pit structures before being applied to the land as fertilizer.

Lagoons are artificial structures similar to ponds. They are designed to catch runoff from outside animal lots or to hold waste piped from buildings. While the waste is stored inside the lagoon, the solids are broken down by bacteria into liquid and gases. Lagoons have to be sealed to prevent leaking and may require a liner in some soils. The Department of Natural Resources must approve lagoons before construction.

Pit structures are concrete pits two to eight feet deep that are found directly below the confinement building. Liquid and solid wastes drop through the slotted floor of the building and are collected and stored in the pit. Nutrients are conserved during storage. Pit structures must be sealed with no leaks.

Land application of swine wastes occurs in two basic ways: irrigation or injection. For lagoons, most producers use irrigation systems to apply the remaining liquid onto farm land. In pit structures, the pit is emptied and applied to the soil using either irrigation or injection methods.

Irrigation involves pumping the liquid waste through sprinklers on top of the ground. Producers need to monitor irrigation equipment constantly to ensure that waste is not leaking from the equipment and causing runoff into waterways. Spring and summer are the preferred times to irrigate with swine wastes.

Injection is a mechanical procedure that involves injecting, or “knifing,” the waste into the soil. The manure is placed

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directly under the soil surface, allowing the nutrients to be used more effectively by plants. Injection reduces odor and runoff but it is more time consuming and labor intensive.

Maintaining a stable nutrient balance is a major key to using waste nutrients from swine production effectively. Manure can be applied to supply nitrogen, phosphorus, and potassium to the soil for use by plants, which take in these nutrients through their roots. Producers must properly balance the amount of nutrients in the soil with the amount of nutrients applied in manure and commercial fertilizers. They should first test the soil for nutrient composition and test the waste for nutrient content. These tests will allow them to gauge how much liquid waste can be applied to specific fields. Swine producers should work closely with the Soil Conservation Service (SCS) to develop and carry out a nutrient utilization program.

Producers must be careful not to oversupply nutrients to the soil. When excessive amounts of nutrients are applied, the potential for nutrient leaching increases. Nutrients can cause problems if seepage causes ground water contamination.

Animal Welfare and Animal Rights

Animal rights and animal welfare are two terms that reflect a concern with the well-being of animals. They differ over the issue of use. Animal rights supporters believe that animals should not be used as resources by humans, whatever the benefits of their use to humans. Animal welfare, however, calls for the humane use of animals. People who support animal welfare believe that use of animals brings a responsibility to provide appropriate care to the animals to ensure their well-being.

Most pork producers are concerned with the welfare of the animals they raise. They assume responsibility for meeting the needs of their pigs for such things as food, water, shelter, and health care. Producers have an interest in meeting these needs, since ignoring them affects growth and production, which ultimately influences the profits received from the animals.

Addressing Consumer Concerns

With the help of the National Pork Producers Council (NPPC) and state-level associations for pork producers, the swine industry has taken steps to ensure that consumer concerns are addressed. They have developed programs to educate producers to ensure the welfare of pigs, environmental safety, and the quality of pork. Consumers also need to be educated about the measures taken within the industry to deal with these issues.

The swine industry has moved to address the issue of pork production's effect on the environment in several ways. An Environmental Assurance Program has been developed to encourage producers to assess whether they are adequately protecting the environment. The NPPC and state associations have conducted research into reducing odor, protecting ground and surface water, and better utilizing the nutrients from swine wastes. Research has already provided suggestions for modifications to swine diets that can reduce odors and products that can be added to diets or to manure to decrease the amount of odor given off by the waste.

Through programs such as Pork Quality Assurance, producers are exposed to proper production practices to improve management, reduce costs, ensure proper drug usage, and learn about food safety issues. The final stage of Pork Quality Assurance allows producers to develop a Hazard Analysis Critical Control Points (HACCP) program for their individual farms. HACCP is a management tool that identifies potential problems in production practices that might reduce the quality of the pork produced. The producer can then work to eliminate these problems and produce higher quality pork that is more acceptable to consumers.

To help ensure that hogs receive humane care, the NPPC has developed the *Swine Care Handbook* for producers. It contains information on such topics as management practices, proper facilities, environmental management within confinement buildings, nutrition, and health. The industry must continue educating both consumers and producers so no grounds exist for allegations of mistreatment.

Summary

Aspects of pork production, particularly those connected with large-scale confinement hog production, sometimes trouble the American public. Consumers are concerned about pollution of the environment, food safety, animal welfare, and animal rights. With the aid of state and national associations, producers are working to address potential concerns and produce safe, edible pork in a humane and environmentally conscious way.

Credits

Guide to Environmental Quality in Pork Production. Des Moines: National Pork Producers Council, 1993.

Guthier, Harold D., and Janice Swanson. "Animal Rights and Animal Welfare." <http://ianrwww.unl.edu/farbill/aniright.htm> (30 May 1997).

National Pork Producers Council. "America's Pork Producers ... 'Meeting Today's Environmental Challenges.'" <http://www.nppc.org/environbook.html> (30 May 1997).

National Pork Producers Council. "Most Commonly Asked Questions About Pork Production and the Environment." <http://www.nppc.org/EnvironmentalSection/commquestions.html> (30 May 1997).

National Pork Producers Council. "The Tradition of Care Continues on America's Hog Farms." <http://www.nppc.org/how.hogs.are.raised.html> (30 May 1997).

Pork Issues Handbook. Des Moines: National Pork Producers Council, 1996/1997.

Pork Quality Assurance Levels I, II, III. Des Moines: National Pork Producers Council, 1994.

Swine Care Handbook. Des Moines: National Pork Producers Council, 1996.