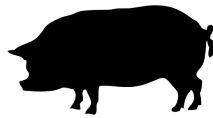




# Production Cycle of SWINE



## Introduction

Pork is the most widely consumed meat in the world. In the United States, approximately 50 pounds of pork are consumed per person per year. Pork production is an important component of American agriculture, with production concentrated in Corn Belt states (such as Nebraska, Iowa, Minnesota, Missouri, Indiana and Illinois) and North Carolina.

Modern pork production is mostly done in enclosed buildings to protect animals from the weather, from predators, and from the spread of diseases. Over the past 50 years low prices have resulted in larger, more efficient operations with many smaller farms finding it hard to produce pigs profitably.

Wild boars domesticated in Northern Europe around 1500 B.C. mixed with smaller Asian species domesticated in China around 3000 B.C. are believed to be the ancestors of modern domesticated hogs. Hogs came to the Americas with Columbus on his second voyage in 1493, but may have also been brought to the Hawaiian Islands even earlier by Polynesians.



Amanda Slater

## Swine Terminology

There are a number of terms that are unique to the swine industry and warrant definition here.

### **Barrow**

Castrated male pigs intended for slaughter. Usually castrations are performed at a very young age (a few days old).

### **Boar**

Intact, sexually mature, male pigs intended for breeding purposes. Boars are generally not intended for slaughter in the U.S.

### **Farrowing**

The process of giving birth to a litter of piglets.

### **Finishing Pigs**

Barrows and gilts from approximately 120 to 150 lbs (55 to 68 kg) to market weight for slaughter.

### **Gilts**

Female pigs intended for slaughter or breeding purposes that have not yet farrowed a litter.

### **Growing Pigs**

Barrows and gilts from approximately 50 to 60 lbs (23 to 27 kg) to 120 to 150 lb (55 to 68 kg).

### **Market Pigs**

Pigs that are marketed and slaughtered for pork production. Typically these pigs are slaughtered at 5.5 to 6 months of age at 200 to 300 lbs (91 to 135 kg).

### **Nursing Pigs**

Pigs from birth until weaning and still nursing.

### **Piglet**

A newborn pig until it is weaned from a diet of milk to an all solid-feed ration.

### **Replacement Gilt**

Breeding female pigs that have not yet farrowed a litter; usually weigh 220 to 300 lbs (100 to 135 kg).

### **Roaster Pigs**

Pigs of both sexes and any age marketed with the carcass unsplit and with the head intact.

### **Sow**

A female pig that has had at least one litter of piglets.

### **Stags**

Male pigs that are castrated at any age after reaching sexual maturity. Sexual maturity is reached at five to six months of age.

### **Starter or Nursery Pigs**

Boars, barrows, and gilts from approximately two to four weeks of age and approximately 50 to 60 lbs (23 to 27 kg).

## **Breeds**

More than 70 recognized or “official” breeds of pigs exist in the world. In the United States, most hogs bred for consumption are the combination of a dark breed boar bred to a white breed sow. Dark breed boars enhance the meat quality of their offspring, while white breed females are used for their ability to produce many piglets and have good maternal instincts. Some of the most common breeds are presented here.



*Wikimedia Commons*

### **DUROC**

There is considerable color variation within the Duroc breed, ranging from a very light golden, to a very dark red that approaches mahogany. The ears should be droopy. Quick growth and maturity and heavy muscling make this a good breed for meat production.

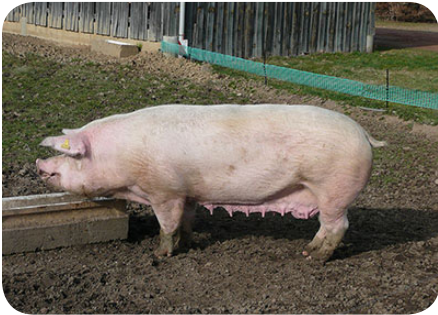
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Evelyn Simak

### **HAMPSHIRE**

The Hampshire breed was developed in the United States and is now one of the world's most important breeds. Black with a white belt over the shoulders. Hampshires are a heavily muscled, lean meat breed that are regarded by many as the best terminal sire breed for all purposes.



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### **LANDRACE**

Landrace pigs are white in color with droopy ears. They are known for having and raising large litters of piglets. Landrace are known for their long body, high percentage of carcass weight in the ham and loin, and ideal amount of fat. Landrace are prolific mothers and are exceptionally heavy milkers.



Kevin Noone

### **YORKSHIRE**

Yorkshire pigs are also white in color, but have erect ears. They are the most common breed of swine in the United States and Canada. This is a very durable and muscular breed with a high proportion of lean meat and low back fat.

## **Swine Operations**

Before the 1960's, most pork in the U.S. was raised in outside lots or on pasture systems. The development of slotted floors and liquid manure handling equipment, allowed producers to more easily care for large numbers of animals, and protect them from the weather in an enclosed building.

Almost all large swine operations now are total confinement operations, and these produce the majority of market hogs in the United States. The buildings have a controlled environment

### **Indoor Confinement Operation**



USGS

provided by fans for ventilation and heaters for warmth. Many of the buildings have flexible curtains on the side walls that can be opened and closed to allow for natural ventilation. In this type of system, feed intake and animal health is more easily monitored. Also, there is reduced risk of disease since there is less contact with wildlife, and between different age groups of pigs.

Outdoor rearing systems generally require less capital input, however there is lower productivity in terms of product output when compared to a confinement system. Pigs are especially susceptible to heat stress, making it necessary to provide shade structures in warm climates if rearing pigs outdoors. Farrowing huts, bedded with straw, are often used for the gestation and farrowing phases in outdoor swine production systems.

Hoop-type buildings can be used for gestating and finishing pigs. These buildings have wooden or concrete sidewalls 3-4 feet high upon which are mounted hoops that support covers. The ends of the building are left open during warmer weather.

### Hoop Type Building



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## Feeding Swine

Swine are classified as having a monogastric digestive system, characterized by a simple, glandular stomach. Humans and carnivores are also monogastrics.

### Hogs Being Fed in Outdoor Pen



*Lynn Betts, NRCS*

In swine diets a variety of feedstuffs such as corn, barley, milo, or oats are used to provide energy, while oilseed meals (primarily soybean meal) are the major source of protein. Vitamins and minerals are also added to the feed to optimize health and growth at each stage of life. The ration is normally changed to provide more energy and less protein as the pig grows. Pig rations are usually ground or partially ground prior to mixing.

Feed can be delivered to pigs by a variety of methods and the one chosen will depend on the type of housing, availability of labor, management preference, and feedstuffs being used. In automated delivery systems, feed is delivered to pigs via feed lines and drawn from a feed bin using an auger. This system requires a power source to get feed from the bin to the pen. Hand delivery is more labor intensive, and is usually used in outdoor rearing systems and farrowing rooms. With this method, workers monitor feed intake and delivery on an individual basis.

## Identification

Ear notching is widely used in the swine industry, and involves removing V-shaped notches from the pig's ear that correspond to a specific litter

number and also an individual pig number from that litter. Ear notching is used when the pig needs to be recognized separately from other pigs, such as breeding stock and exhibition animals.

Ear tags are often used in conjunction with ear notches in a breeding herd. These are typically plastic tags with numbers printed on them to identify individuals.

Slap tattoos (a temporary tattoo, usually on the shoulder of the animal) may be used when hogs are sent for slaughter. This allows the transporters and slaughter facilities to readily identify ownership of the shipment.

### Ear Notch



*Dr. John Angelos, UC Davis WIFSS*

## Record Keeping

Large confinement swine operations will utilize commercial computer software to keep track of sows and growing pig production. These software programs can generate a variety of reports that allow the manager to track individual, as well as group performance. Culling and feeding decisions are often based on performance records.

Smaller farms and outdoor swine producers will also maintain records. Written paper records

are commonly observed in these situations. Breeding records and drug usage records are the information most commonly kept by producers.

### Ear Tag for Record Keeping



*Wikimedia Commons*

## Life Cycle of a Pig from Birth to Death

Over 100,000,000 swine are slaughtered annually in the United States, with the vast majority being market hogs. About 3% of the total number of pigs slaughtered consist of other classes, including roaster pigs, boars, and sows.

In large, integrated hog farms, a group of pigs will move together through the system from birth to slaughter. That is, a group of sows will farrow at the same time, the piglets will be weaned at the same time, and those pigs will then move through the nursery and finishing units together. This “all-in, all-out” (AIAO) approach helps maximize production and limits disease transmission. Each room or building is completely emptied and sanitized between groups of pigs, therefore new groups of pigs enter freshly disinfected environments. The facility has a separate room or building for each group of pigs weaned. AIAO animals in each room are of a uniform age and size, and are isolated to the extent possible, to

decrease the possibility of diseases spreading from older animal groups to younger ones.

Swine production is generally classified into four production phases (on large farms, each phase occurs in a separate barn, and often a separate physical location):

### **BREEDING/GESTATION**

Historically, sows have been bred by placing a number of sows in a pen with one or more boars. Now, boars are often rotated between sow pens to make sure that all sows are bred while they are in heat. Sows come into estrous three to five days after their piglets are weaned, and are bred at this time. If the sow is not bred, she will return to estrous about 21 days later. After breeding, the sow has a gestation period of about 115 days (three months, three weeks, and three days). The goal of most pork producers is to have, on average, greater than two litters per sow per year.

### **FARROWING**

Just prior to farrowing, pregnant animals are moved to individual pens or stalls in the farrowing barn. Sows typically farrow eight to twelve piglets. A group of piglets are called a “litter.” Most confinement operations place the sow in a farrowing pen or crate which restricts her movement to protect the baby pigs. Farrowing and lactation occur in the same facilities until the baby

#### **Sow and Her Piglets in a Farrowing Pen**



*Keith Weller, USDA ARS*

pigs are weaned. An average sow will raise three to five litters of pigs in her lifetime.

Pigs are born with sharp teeth and curly tails. The tips of the teeth are clipped at birth to prevent injury to the sows udder and other piglets, and the tail is shortened to prevent tail biting. Piglets are weaned anywhere from five days to four weeks, with most operations weaning at two to three weeks.

### **NURSERY**

Weaned pigs are moved to either a nursery facility or a wean-to-finish building. In either case, both weaned types of facilities may be on a separate site from the farrowing facility.

In confinement barns, the floors will be constructed from plastic or plastic covered steel, with slots to allow manure to fall through. The temperature is closely controlled, as pigs can suffer from heat and cold stress. Pigs are normally removed from the nursery at about six to ten weeks of age and placed in the finishing building.

### **GROW-FINISHING**

Pigs are fed in the grow-finishing facility until they reach market weight of 250 to 275 pounds. The grower stage takes starter pigs from about 35 to 60 pounds to 120 to 150 pounds body weight while the finishing stage takes pigs from about 120 to 150 pounds up to 230 to 270 pounds body weight. During these stages pigs are fed specialized diets to maximize growth and achieve a target of 230 pounds body weight by 175 days of age. Marketing typically occurs at five to six months of age. At this time, gilts may be selected to become replacement sows and be moved to a breeding/gestation facility. The remainder of the market weight pigs are sent to slaughter.

### **LEAVING THE HERD**

Market pigs are sent to slaughter at about 6 months of age, weighing 200 to 300 pounds of live weight. This represents the most common

reason for leaving the herd. Sows and boars are culled from the herd due to old age, reproductive failure, poor performance (small litter size, high preweaning mortality, low birth weight), illness or injury. About one in five, to one in four, breeding age females are culled or die every year. Those that are culled are usually sold to livestock auctions or sent directly to slaughter.

#### Pigs in a finishing facility



*Wikimedia Commons*

## Common Swine Diseases and Treatments

AIAO production in confinement barns has helped many swine farms greatly reduce the incidence of disease in their herds. There continues to be several significant infectious and non-infectious diseases that affect swine production, and a few of the more important ones are presented below.

### RESPIRATORY DISEASE

Market hogs are susceptible to a variety of microbial agents that can cause respiratory infections and pneumonia including viruses, bacteria, and some parasites. Often, disease transmission is exacerbated if less than ideal environmental conditions (poor ventilation,

high humidity) exist in the swine units. The most common type of treatment for respiratory infections is antibiotic therapy. Drugs used to treat bacterial pneumonia in pigs include oxytetracycline, ceftiofur, florfenicol, sulfamethazine, tulathromycin, lincomycin, and tylosin. Some of these drugs are supplied in the form of medicated feeds, injectable formulations, or both.

### GASTROINTESTINAL PROBLEMS

Ileitis, bloody diarrhea, and gastric ulcers are common in market hogs. Antibiotics are used in the U.S. to help treat some of the causes of these conditions. In some cases medications are provided through feed to help control and/or treat these diseases in large groups of pigs. Drugs provided through the feed include chlortetracycline, tiamulin, tylosin, and lincomycin.

In outdoor rearing systems, internal and external parasites are more commonly encountered than in confinement barns. Parasite treatments include ivermectin, hygromycin B, levamisole, and fenbendazole. Roundworms are often seen in sows and boars, especially in those reared outdoors. Fenbendazole is an antiparasitic drug that can be administered in the feed to control infestations with roundworms.

### LAMENESS

Lameness is a common reason for sows and boars to be culled from a breeding herd. While there are potentially many causes of lameness, producers may not establish a definitive diagnosis, and often will administer antibiotics such as penicillin procaine G, in the hopes that the causative agent is a bacteria that is susceptible to the drug.

### PORCINE EPIDEMIC DIARRHEA VIRUS (PEDV) AND PORCINE DELTA CORONAVIRUS (PDCOV)

Recently, two new viral infections of swine have been identified in the U.S. swine population: porcine epidemic diarrhea virus (PEDV) and



porcine delta coronavirus (PDCoV). Together these viruses are responsible for a condition described as novel swine enteric coronavirus disease (SECD). In suckling piglets, PEDV causes a severe disease characterized by acute watery diarrhea, vomiting, loss of appetite, and dehydration; are fatal in 50 to 80% of affected piglets. PDCoV is believed to cause a similar disease in suckling piglets. Both viruses are only known to affect swine and are not threats to public health. Efforts to develop vaccines to protect pigs against these diseases are ongoing.

## Tissue Residues and Swine

Tissue residues are possible when drugs are administered in ways that are not specified on the manufacturer's label. For example, procaine penicillin G, an over the counter drug that is readily available at feed stores, is often administered at doses that far exceed those listed on the label. If a producer has not consulted with a veterinarian with whom they have a valid Veterinarian-Client-Patient Relationship,

such use would constitute extra-label-drug-use (ELDU) and would be illegal. Such use can result in a producer not observing an appropriate withdrawal period for the drug prior to sending an animal to slaughter, and could result in violative tissue residues of a drug being detected at slaughter. Inadequate record keeping or lack of individual animal identification may lead to an animal being sent to slaughter prior to the end of an adequate withdrawal period.

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*Dr. John Angelos, UC Davis WIFSS*

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