

OVERVIEW OF WORLD SWINE AND PORK PRODUCTION

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Contents

1. History
 2. Geographic Distribution
 3. Breeds
 4. Genetic Improvement
 - 4.1 Selection
 - 4.2. Breeding Programs
 5. Feeding Programs
 6. Production Systems
 7. Harvest, Consumption and Trade
 8. Production Trends and Efficiencies
 9. By-products and Other Uses for Swine and Swine Products
 10. Challenges for the Future
- Bibliography

Summary

Since domestication around 4900 B.C., the pig has played an important role in the production of food for human consumption. As evidenced by the fact that pork consumption exceeds all other meat products throughout the world, it is apparent that pigs and pork play a vital role in providing high-quality protein to humans. The pig industry continues to thrive in areas of the world where access to grains and protein sources are plentiful. Pigs are adaptable to various climatic conditions as evidenced by the large number of breeds present throughout the world.

The swine industries of the world are very dynamic and continue to evolve and change along with the external forces that shape agriculture world-wide. The factors influencing change are generally related to economic efficiency and competition from alternative protein sources. The global trend is for fewer producers, responsible for larger numbers of pigs, and more concentration within the swine industry. The ability to maintain economic viability is a function of providing optimal facilities, genetics, nutrition, and health programs to the pig in a system that addresses cost of production and generating revenue from the marketing of a high-quality product.

Adaptation of environmentally controlled housing and concentration of swine production facilities on smaller tracts of land have led to additional challenges for the global swine industry. Environmental concerns regarding water and air quality are now

present in many areas of the world and are projected to increase. Animal rights issues and challenges to existing pig production practices are influencing pig production in the European Union. To address these issues, science-based research will continue to be a priority.

1. History

The modern pig is of the order Artiodactyla, an even-toed ungulate mammal, and belongs to the family *Suidae*, of non-ruminant, even-toed, hoofed mammals. The genus of the swine is *Sus*, which includes the domestic pigs and the European wild boar. The roots of the modern pig date back many millions of years, with the current genus and species evolving from a class of animals named the Hyotherium about 10 million years ago (Hedgepath, 1978). The ancestors of most modern breeds of swine are the European wild boar (*Sus scrofa scrofa*) (Epstein, 1971). In addition to the modern breeds of swine, there are many indigenous species of swine throughout the world including: *Sus salvanius* (the Pygmy Hog) *Sus verrucosus* (the Javan Warty Pig), *Sus barbatus* (the Bearded Pig), *Sus celebensis* (the Sulawesi Warty Pig), *Sus philippensis* (the Philippine Warty Pig) and *Sus cebifrons* (The Visayan Warty Pig) (Ruvinsky and Rothschild, 1998).

Historical data indicate the pig was domesticated by 4900 B.C. in China, and pigs were raised in Europe as early as 1500 B.C. Since domestication, the pig has played a vital role throughout the world as a source of food for survival, but it has also played a role in cultural, religious, and social aspects of humans. Pigs were first introduced into North America by Hernando de Soto in 1539, with further introductions into Mexico by Hernando Cortez in 1600.

The modern pig has played and continues to play a major role in providing food for human consumption due in part to its tremendous versatility and adaptability to a wide-range of environmental conditions. Although the pig is a monogastric animal (non-ruminant), having a simple, single compartment stomach, part of the pig's ability to adapt is that pigs are omnivores, which have the capability to digest both forage-based and cereal grain-based feedstuffs. This ability to adapt plays a significant role in how pigs are raised and grown in various countries of the world.

2. Geographic Distribution

Swine production is widely scattered across the globe (Table 1). The estimated global swine inventory of over 801 million in 2002 was a slight increase over the global swine inventory estimate of over 782 million in 1996. The countries of Asia have the largest inventory of swine in the world, accounting for over 62% of the total global inventory in 2002. The countries of European Union account for nearly 15% of the global inventory, followed by North America with approximately 10%. Swine are produced primarily in regions of the world with available natural resources including: arable land, cereal grains, and water.

The Peoples Republic of China, by a large margin, has the highest number of swine in the world, with an estimated inventory of 464 million pigs or approximately 58% of the

global total. The Chinese pig population is predominantly produced and raised by a very large number of individual families having small herds consisting of only a few animals. This is in contrast to many other countries of the world, where swine production is in the hands of a small proportion of the population and production units are very large in size. The USA is the second largest swine producing country in the world, with an inventory of approximately 60 million pigs at any given point in time.

		1996	2002
North America	Canada	11,588	14,726
	Mexico	11,100	10,729
	USA	58,201	58,943
	Subtotal	80,889	84,398
South America	Brazil	32,068	32,735
European Union		114,009	120,900
Eastern Europe	Bulgaria	2,140	1,100
	Czech Republic	4,024	4,120
	Hungary	5,032	4,955
	Poland	20,343	19,000
	Romania	7,960	4,650
	Subtotal	39,499	33,825
Former Soviet Union	Russian Federation	22,630	17,000
	Ukraine	13,144	9000
	Subtotal	35,774	26,173
Other Asia	China, Peoples' Republic of	441,692	464,000
	Japan	9,900	9,550
	Korea, Republic of	6,461	8,110
	Philippines	9,023	12,218
	Taiwan	10,510	7,000
	Subtotal	477,586	500,878
Oceania	Australia	2,600	2,729
	Total	782,425	801,465

Source: Foreign Agricultural Service, Commodity and Marketing Programs (2003).
http://www.fas.usda.gov/psd/complete_files/LP-0013000.csv: Accessed 03/25/03.

Table 1. Swine inventory (x 1000) in selected countries (1996 and 2000)

3. Breeds

The definition of breed can be described as somewhat elusive because of different interpretations of the criteria that establish a breed. A classic definition of “breed” from a genetic standpoint is often described as “Animals that, through selection and breeding, have come to resemble one another and pass those traits uniformly to their offspring”. Unfortunately, this definition leaves some unanswered questions. Perhaps the definition of a breed from *The Genetics of Populations* (Jay L. Lush) helps explain why a good definition of "breed" is elusive.

A breed is a group of domestic animals, termed such by common consent of the breeders, ... a term which arose among breeders of livestock, created one might say, for their own use, and no one is warranted in assigning to this word a scientific definition

and in calling the breeders wrong when they deviate from the formulated definition. It is their word and the breeder's common usage is what we must accept as the correct definition.

The Genetics of Populations, 1994

In recent years, Oklahoma State University has established a system to characterize swine breeds from across the world and to provide background information to individuals wishing to better understand the genetic resources and diversity found within the swine species. Access to the information is available through the Internet or World Wide Web at the following web address www.ansi.okstate.edu. A total of 65 different breeds are described at the Internet site.

The most commonly recognized breeds used in modern swine production units include the Berkshire, Chester White, Duroc, Hampshire, Pietrain Poland, China, Landrace, Meishan, Spot, and Yorkshire (Large White). Because genetic selection practices differ among countries, traditional breeds have undergone genetic change and are now identified with a country of origin attached to the original breed name. An example is the American Landrace, Danish Landrace, and Finnish Landrace breeds that have all been genetically selected over many generations to excel in traits that are important within a respective country. Examples of the common breed and brief descriptions of breed characteristics are described below.

Berkshire: Originated in England. The ears are short and erect. The body is black with white feet, tail and a white spot on the head. Known for high quality pork, tender, juicy and flavorful meat.

Duroc: Originated in the United States. Durocs are solid red in color, with the red ranging from light to very dark. The ear carriage is down and often described as droopy. Duroc is widely used as a sire breed and is known for a high rate of lean growth, efficient conversion of feed to lean tissue and extremely high quality pork products.

Chester White: Originated in the United States. Chester White hogs are solid white in color with small, downward pointing ears. The Chester White is known for prolificacy and mothering ability.

Hampshire: Originated in England. Hampshires are black in color with a characteristic white belt starting behind the neck and extending a short distance across the back. Ears are generally upright. The Hampshire is a popular terminal sire, known for its lean, muscular carcasses.

Landrace: Originated in Europe. Landrace are solid white in color and generally have long, drooping ears that cover a portion of the face. Landrace are known for their mothering ability and prolificacy, but are also selected for leanness and muscle in many countries of the world. Many breed strains exist within the Landrace population, including: American Landrace, Belgian Landrace, Dutch Landrace, Finnish Landrace, French Landrace, German Landrace, Italian Landrace and Swedish Landrace.

Pietrain: Originated in Belgium. Pietrains are predominantly white, with black spots that vary in intensity due to variation in pigment content. Pietrains have been selected for extremely lean carcasses with large volume of muscle. They are used primarily as a terminal sire breed throughout Europe.

Meishan: Originated in China. The Meishan is predominantly black in color, with large ears and very wrinkled skin. They are characterized as fat, slow growing pigs with good pork quality. They are primarily known for their extreme prolificacy and resistance to some disease causing organisms. The Meishan has been extremely important as a model for improving reproductive capacity of the modern pig.

Yorkshire (Large White): Originated in England. The Yorkshire and Large White names are considered by most people to be synonymous, with Large White being the internationally recognized name. Yorkshires are entirely white, with ears that are erect and moderate in size. Yorkshires are recognized worldwide as the mother breed due to their prolificacy and mothering ability.

Many additional breed resources continue to be propagated throughout the world. Many of these breeds are considered 'minor' breeds due to limited numbers and often a lack of a breed society to ensure breed purity. The Peoples Republic of China is home to an extensive group of pig breed resources estimated to number more than 100 in total. The diverse Chinese pig breeds have been extensively characterized by Jones (1998).

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