The Basics of Pork Production

National Pork Board

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Overview

1. Vocabulary
2. Breeding
3. Feeding & Nutrition
4. Farming
5. Transportation
6. Converting Muscle to Meat
1. Vocabulary
Commonly Used Terms

• Pigs
• Piglets
• Barrows and Gilts
• Market Hogs
• Breeding Stock
  • Boars and Sows
Pigs

General term for any domesticated swine
Piglets

Young pigs, generally from birth until weaning
Market Hogs, Barrows & Gilts

Market Hogs are raised for food production

Barrows
- Castrated male pig (market hog)
- Raised for meat production

Gilts
- Female pig that has not had piglets
- Those that will never be bred (market hog)
- Those that are impregnated but not yet given birth to a litter (breeding stock)
Breeding Stock

Boars
• Intact male pig used for breeding
• Meat typically never enters commercial food supply

Sows
• Female pig that has given birth (farrowed)
• Sows give birth to multiple litters in their lifetime
• Sow meat is often used for processed pork
Pigs by the Numbers

- **22** – Days between a sow’s estrus cycle
- **3, 3, 3** – Months, weeks and days in gestation
- **12** – Average number of piglets in a litter
- **2.4** – Average number of litters per year
- **21 to 24** – Average age (in days) of piglets at weaning
- **5 ½ to 6** – Average lifespan (in months) of a market hog
- **286** – Average weight (in pounds) of a market hog at harvest
- **4,000** – Amount of pork (in pounds) produced per sow annually
2. Breeding
Breeds & Breeding

• Cross-bred vs. Breed-specific pigs
• Common commercial breeds and cross breeds
• Breed specific pigs
• Heritage breeds
Cross Breeding in Black & White

• Five dark breed boars contribute to the meat quality of the offspring

• Three white breed sows are used for their maternal instincts and large litters
Common Dark Breed Boars

Berkshire

Hampshire

Duroc

Spot

Poland China
Common White Breed Sows

Yorkshire

Chester White

Landrace
Cross-Breed
Breed Specific & Heritage Breeds

**Breed Specific**

*Breeding a pure bred boar to a pure bred sow of the same breed*

- Poses some production challenges
- Dark breed sows produce few piglets and fewer survive to market
- White breed boars produce many of piglets but mediocre meat quality

**Heritage Breeds**

*Breeds identified by the American Livestock Breeds Conservancy as being threatened*

- Small genetic pool so line breeding is inevitable
- Slow-growing breeds take 14-16 months to reach market weight
- An older pig with darker meat and more extra muscular fat
3. Feeding & Nutrition
Feeding

- Pigs need carbohydrates (energy), protein (amino acids), lipids, vitamins and minerals to grow and reproduce
- Corn – primary carbohydrate source
- Soybean Meal – primary protein source
- Lipids – soybean oil, tallow, choice white grease
- Vitamin and Mineral Pre-Mix (1 – 2 %)
- Feed efficiency = 2.6 pounds of feed for one pound of gain
No Growth Hormones

Currently there are NO hormones approved to improve growth in pigs or poultry, therefore they are not allowed in raising hogs or poultry.

The claim “No Hormones Added” cannot be used on pork or poultry labels unless followed by:

"Federal regulations prohibit the use of hormones."

FDA Guidance 209/213

- Limits “medically important” antibiotic use to therapeutic purposes
  - To protect animal health and well-being through treatment, control and prevention
- Non-therapeutic use of MI antibiotics are no longer permitted
- Growth Promotion = Improved growth and feed conversion
- Veterinary oversight now guides all on-farm antibiotic decisions
  - MI antibiotics used in feed or water must be vet-directed
  - Eliminates OTC usage of MI antibiotics in feed or water
  - VFD or prescription from vet required
Antibiotic Claims

The claim: “No Antibiotics Added"

May be used on pork or poultry labels if sufficient documentation is provided by the producer demonstrating that the animals were raised without antibiotics.

4. Farming
Types of Housing

Hoop Barn

Indoor Housing

Pasture

Outdoor Access
Stalls

• Pigs raised for meat consumption do not live in individual stalls
• Stalls are used for sows in the production of piglets

U.S. Breeding herd = 6.2 million sows and boars
U.S. Market herd = 75 million pigs
Sow Housing

• Farrowing = about 3 weeks
• Breeding and Gestation
  • Return to estrus = 3-5 days after weaning
  • Implantation = 2-3 weeks after breeding
  • Pregnancy detection = 4-5 weeks after breeding
• Gestation takes 3 months, 3 weeks, 3 days or 114 days
Farrowing Stalls
Gestation Stalls & Free Access Stalls
Group Housing
National Pork Board Statement on Sow Housing

"The National Pork Board builds its animal care and well-being programs on this foundation: What is best for the pig? The board also relies on the best scientific research available, and the best scientific research now available indicates there are several types of production systems that can be good for pigs. Those systems include open pens, gestation stalls and open pastures.

Regardless of the system, what really matters is the individual care given to each pig."
5. Transportation
Transportation & Loading/Unloading

• Transportation is a critical component of pork production
  • Swine health
  • Animal welfare
  • Pork quality
  • Worker safety
Lairage Pens

• Holding pens at slaughter plants where pigs are allowed to relax following transportation
Pork Board Programs

- PQA Plus - designed to help pig farmers and their employees use best practices to produce pork
- TQA – designed to help pig transporters, producers and handlers understand how to best handle, move and transport pigs
6. Converting Muscle to Meat
Harvesting

• Resting pigs after transportation (lairage pens)
• Stunning: electrical or CO₂
• Bleeding
• Scalding to sanitize and de-hair
• Eviscerating (offal)
• Splitting
• Chilling Method – conventional, deep chilling, or blast
What matters most is preserving meat quality:
This is what we are looking for:
What is meat?

- Lean
- Extra muscular fat
- Intra muscular fat (marbling)
- Connective tissues
Conversion of Muscle to Meat

- Activity in the animal’s muscles up to 48 hours prior to harvesting directly affects meat quality.
- What happens in the muscles 24 hours after harvest directly affects meat quality.
**Process of Converting Muscle to Meat**

- Conversion of glycogen to lactic acid: An important biochemical reaction that occurs in post-mortem muscle.
- Once blood flow ceases, lactic acid accumulates in muscle cells decreasing muscle pH.
- The combination of elevated temperature and lower pH denatures muscle proteins which affects pork quality.
- Properly chilling pig carcasses helps preserve pork quality.
Relationship Between Post-Mortem pH Decline and Pork Quality

- **Initial pH**
  - pH values range from 7.0 to 5.5

- **Ultimate pH**
  - Defined by L* values
  - **DFD** (L*<38)
  - **RFN** (L*<50)
  - **RSE** (L*<50)

- **Hours Post-Mortem**
  - Key hours: 0, 1, 2, 3, 23, 24

- **PSE** (L*>50)

Adapted from Siller and Hossin, 1994
PSE, RFN, and DFD Pork

**COLOR - TEXTURE - EXUDATION**

**PSE** Pale pinkish gray, very soft and exudative. Undesirable appearance and shrinks excessively.

**RFN** Reddish pink, firm and non-exudative. "IDEAL". Desirable color, firmness and water-holding capacity.

**DFD** Dark purplish red, very firm and dry. Firm and sticky surface, high water-holding capacity.
PSE Pork

- **Pale, Soft, Exudative**
- That means it exudes water
- Can’t hold native or introduced water
- Tough and dry following cooking
RFN Pork

- Redish pink, Firm, Non-exudative
- “Ideal”
- Desirable color, firmness and water-holding capacity
DFD Pork

- **Dark red, Firm, Dry**
- That means it doesn’t exude moisture
- Not ideal because the color is unappealing
A Closer Look At Color

Pork color is a proxy for pH

• Red = Higher pH = moist pork
• Pale = Lower pH = drier pork
Marbling

• Intramuscular fat
• Scale: minimum percentage of fat for each score (1-10%)
• Ideal is 3 to 5
Summary

- Ideal pork is Reddish-pink Firm and Normal (RFN)

- Ideal color, intra muscular fat, and final pH affect eating experience

- Factors that affect pork quality:
  - On farm: genetics, nutrition, handling, and transportation
  - At plant: handling, stunning method, and chilling method
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