

4-H
PERFORMANCE
STUDY GUIDE
SWINE



Part 1- History

- Pigs were domesticated roughly 7000 years ago
- Pigs were brought to North America by Hernando De Soto and other Spanish explorers
- Pigs were first widely fed corn in 1600, which laid the foundation for the modern US pork industry
- The refrigerated rail car, invented in 1870, allowed fresh pork to be shipped long distances without spoiling. This meant that pork no longer needed to be smoked or salted before shipping
- From the late 1880's to the 1940's, consumers used a great deal of lard for cooking purposes, so pork producers raised relatively fat hogs to meet these needs.
- In 1933, the heaviest hog ever recorded weighed 2,552 lbs and was over 9 feet long
- China produces the most pork in the world
- The US ranks third in production, behind the European Union
- Primary Markets for US pork exports are China, Japan, and Mexico
- Pigs cannot sweat efficiently enough to regulate their body temperature, and are more susceptible to overheating than other livestock
- Pigs are among the smartest of all domesticated animals

Part 2- Breeds

- **Berkshire-** Originating from the English county of Berkshire, the Berkshire is one of the oldest breeds in England. Their ears are short and erect. They are black with white feet, white on their tail, and a splash of white on their face
- **Chester White-** An American breed, originating from Chester County, Pennsylvania. Chester Whites are large and pure white, and are known for being good mothers. They have medium size ears that droop down over their face.
- **Duroc-** An American breed, originating from a cross between red hogs bred in New York and New Jersey. Durocs range in color from a light golden, almost yellow color, to a very dark red that's almost mahogany. They have droopy ears, and grow quickly and efficiently.
- **Hampshire-** Originating from the county of Hampshire in England, their most recognizable trait is the white belt encircling the black body that covers both forelegs. This belt must not exceed $\frac{2}{3}$ of their body length. Hampshires may also have white hind legs and feet. They have erect ears, and are noted for being heavily-muscled.
- **Hereford-** Developed in Iowa and Nebraska during the 1920's, Hereford hogs must have a white face, the body must be at least $\frac{2}{3}$ light or dark red, and at least 2 feet must be white. They have droopy ears
- **Landrace-** Originating from Denmark, they are descendants of the Danish Landrace hogs. Landrace hogs are white, and have a long body. They are known for their very large, floppy ears, as well as their natural maternal instincts.
- **Poland China-** Developed in Ohio, the Poland China is one of the oldest breeds of pig in the US. Their coloration consists of a black body with 6 white points: The 4 legs, tail, and nose. They have droopy ears, and are known for being lean and heavily muscled. The largest pig ever recorded, Big Bob, was a Poland China.

- **Spots-** A Spotted Swine has black and white spots with no red or brown tints, and drooping ears. The desired color is roughly 50% black and 50% white. They can trace their origin back to the Poland China breed.
- **Yorkshire-** An English breed with a long, white body and erect ears, Yorkshires are the most recorded breed of swine in the United States. They are used extensively in commercial operations for maternal characteristics



Berkshire



Chester White



Duroc



Hampshire



Hereford



Landrace



Poland China



Spot



Yorkshire

Part 3- Breeding

- Purebred animals have parents who are the same breed and can be traced back to the establishment of that particular breed through the records of a registry association
- Crossbred animals have parents who are of two different breeds. Animals are cross bred to take advantage of the characteristics that different breeds exhibit, and to establish new breeds.
- A male pig is called a “boar”
- A female pig is called a “gilt” if it hasn’t been bred, or a “sow” if they have been bred
- A “barrow” is a castrated male that cannot be used for breeding
- Gilts should be 4-6 months of age when before breeding
- The duration of estrus, or “heat” (when a female is able to breed) in hogs is 50-60 hours
- Estrous is about 10 hours shorter in gilts than it is in sows
- The estrous cycle, or the length of time from one heat cycle to another, is 21 days long
- The gestation period of pigs lasts for 3 months, 3 weeks, and 3 days (approximately 112-114 days)
- Female hogs have ovaries, which produce eggs. Male hogs have testes, which produce sperm
- There are 3 different methods for breeding sows and gilts
 - *Pen-Mating*: A group of females are brought to the boars’ pen, or the boar is brought to the females’ pen, and he services them. This is the least labor intensive system

- *Hand-Mating*: One female at a time is brought to the boar for servicing. This has a higher labor requirement, but the producer gets to choose who gets mated to who.
- *Artificial Insemination*: Also known as AI. It is the most efficient mating system. During the procedure, a fine tube (known as a catheter) is inserted through the cervix directly into the uterus to deposit a sperm sample
- NPD, or Non-Productive Days, are the days a sow is neither lactating nor gestating

Part 4- Nutrition

- The six primary nutrients are: water, carbohydrates, proteins, lipids, vitamins, and minerals
- These nutrients are essential for maintenance, growth, gestation, lactation, and fattening
- Body Condition Score, or BCS, refers to the amount of fat covering the body, and is a good indicator of the nutritional status and general health of the animal
- Energy is provided by carbohydrates, lipids, and proteins
- Energy is needed to grow and carry out normal daily functions
- Water regulates the feed intake of the animal
- Water is the most important nutrient for your animal
- Swine diets are formulated on metabolizable energy, available lysine, and available phosphorus
- Nutrients which the animal can synthesize for growth and maintenance are called non-essential nutrients

- Nutrients which the animal cannot synthesize in adequate amounts, and must be added to the ration are called essential nutrients
- Proteins are broken down into amino acids
- Pigs require available amino acids
- Pelleting improves feed efficiency by 5-8%
- Colostrum is the first milk out of a sow after she has farrowed. It contains antibodies to help the piglets fight disease
- Corn and soybean meal are common feeds for pigs
- Gilts have a higher amino acid requirement and consume less feed than barrows
- Carbohydrates and fats are a good source of energy
- Vitamins are required for normal growth and maintenance in an animal's life
- Vitamins that are not stored in the body and need to be consumed every day are water soluble vitamins (vitamins B and C)
- Pigs have a feed conversion ratio of about 3:1. This means that it takes roughly 3 pounds of dry feed for a pig to gain 1 pound of live weight.
- Factors that can impact a pig's rate of gain include loading and unloading, older age, and transportation.
- Pigs stress easily in comparison to other animals

Part 5- Meats

- Worldwide, Pork is the most widely consumed meat
- The USDA does not grade pork in the same way it does beef
- Pork carcasses are not ribbed, and grades of pork are determined by back fat thickness and carcass muscling
- 3 factors that impact pork quality and color, texture, and exudation
- Pork should be a reddish pink color. Undesirable colors in pork range from Pale Pinkish-Gray to Dark Purplish-Red

- Pork should be firm, but not overly so. Soft pork is undesirable
- Pork should not be leaking high volumes of fluid, but should still be able to hold some water. Watery meat and dry meat are undesirable
- PSE pork is a common problem in the industry
- PSE stands for Pale, Soft, Exudative, all 3 of which are undesirable traits for pork
- PSE pork is caused by high amounts of stress in the days or hours leading up to harvest
- Today's hogs have much less fat and more muscle, due to improved breeding, feeding, and genetics
- The safe internal cooking temperature for fresh cuts of pork is 145°F
- Ground pork must always be cooked to 160°F
- The Ham and Loin make up about 40% of a pork carcass
- Dressing percent is the amount of meat left on a carcass once the hide, head, and offal has been removed
- The dressing percent for hogs ranges from 68-77%, with an average of 72%
- LEA, or loin eye area, is a measure of the area of the eye of the loin muscle in square inches

Part 6- Anatomy

- The average internal body temperature of a hog is 102.5 degrees Fahrenheit
- Pigs do have minimal sweat glands, but they are not useful for temperature adjustment. Instead, pigs will wallow in mud or cool water, which has a similar evaporative effect as sweating
- Pigs are monogastric, meaning they only have one stomach
- Pig heart valves have been used to replace human ones
- Sometimes, a male pig will exhibit cryptorchidism. This is when one or both testicles fail to descend.

- The most common form of pig identification is ear notching. The right ear notches represent the litter number, and the left ear notches represent the pig number
- The term “finish” refers to the amount of fat on a pig
- A visual examination of the amount of muscle on a hog is best performed from the rear of the hog, looking towards the head
- Piglets are born with outwardly projecting canine, or “needle teeth”. These teeth are used to compete with littermates for teat access. Needle teeth are often shortened or blunted during the first week of life by grinding or clipping
- Pigs are born with tails, but some are trimmed at birth. This is done to reduce tail-biting and cannibalism
- Research shows that tail-biting is more common in larger litter sizes, and less common when pigs have outdoor housing, or indoor housing with natural ventilation

Part 7- Caring for Piglets

- Farrowing is the term for when a sow gives birth
- A sow usually gives birth to a litter of 9-11 pigs
- Effective feeding and management practices can result in larger, faster growing litters
- The production and secretion of milk is known as lactation
- Pigs need to be monitored for signs of tail-biting or fighting. If necessary, teeth may be clipped, and tails may be docked
- Weaning is the process of getting pigs used to solid food

- Segregated Early Weaning (SEW) is a process through which pigs are weaned from their mothers and moved to isolated facilities. This is done to lower the transmission of disease
- Castration can be done between 3 and 21 days after farrowing. Younger pigs are easier to hold, bleed less, and may have antibody protection from the sow's colostrum
- Two factors that have a major influence on profitability in swine production are: number of pigs weaned per sow and feed efficiency

Part 8- Disease In Hogs

- Pigs are susceptible to the greatest number of diseases out of any domesticated animal in the US
- It is a good idea to isolate new pigs when bringing them to your farm
- Disease can be transferred by two different ways
 - **Horizontal** disease transfer occurs from pig to pig
 - **Vertical** disease transfer occurs from a sow to her piglets
- Pigs with **Atrophic Rhinitis** have signs of sneezing, tearing in the eyes, snorting, and a twisted tail
- **Parasites**- An organism that lives on (external) or in (internal) another organism. The relationship between host and parasite is a form of symbiosis. In parasitism, the host is harmed, while the parasite benefits.
 - **External**- mange and lice
 - **Internal**- roundworms, nodular worms, whip worms, and lung worms
- **Parvovirus** infections cause swine reproductive failure, primarily in gilts and first litter sows

- **Porcine Reproductive and Respiratory Syndrome (PRRS)**- A disease that can cause problems in growing pigs, as it attacks the defenses of the lungs and leads to respiratory problems

Part 9- Showing a Pig

- When showing a pig, the equipment you will need includes a whip or cane, a brush, and a bottle of water with a spraying nozzle
- When showing, you should always keep the pig between you and the judge
- Keep your pig out in the open. Don't let it crowd in the corner with other pigs, and don't crowd the pig close to the judge
- A good place to tap your pig to get them to move is the jowl and neck region, shoulder and front leg region, and very lightly on the rear hock region
- We don't want to tap the ham region, as the ham and lion are high-priced cuts of meat, and excessive tapping will result in bruising
- Most purebred swine associations require several items of information for registration of individual hogs. Some of these items include the date farrowed, number of pigs farrowed, and ear notches. Weaning weight is not required

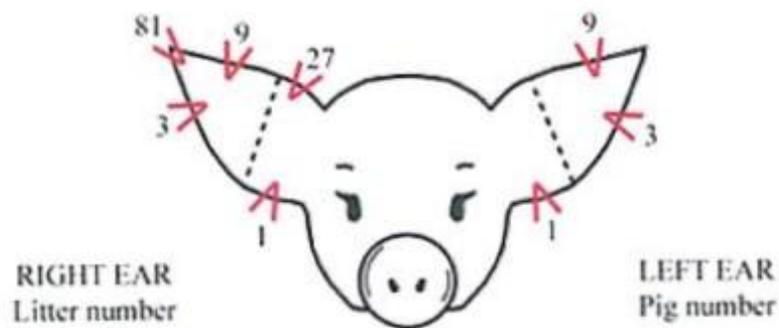
Universal Ear-notching System

Ear-notching helps identify a pig's litter and which one of the litter it is, giving each pig a unique identity number. Notches are placed in one of five locations in the pig's right ear — to show the litter number — and in one of three locations in the left ear — to show the individual pig number. "Reading" the notches allows producers, judges, and other swine professionals to know more about the pig they're viewing.

Correctly notching the pig is key. Each pig must be notched differently. So, to notch pigs properly, you must know the location and associated number of each notch.

The most common ear-notching system is shown in *Figure 1*.

The right ear has five locations for notches, and each location is assigned a number. Those five numbers are 1, 3, 81, 9, or 27. Look at *Figure 1* to find each notch location. Except for the 81 notch, one or two notches may be at each of the other four locations.



To determine the litter number for a pig, add the numerical values assigned to each notch, as shown in *Figure 2*.

$$\text{Litter No.} = 1+1+81+9= 92$$



$$\text{Litter No.} = 1+3+3+27= 34$$



Figure 2. Examples for litter numbers 92 and 34.

The left ear has three locations for notches, and each location is assigned a number. Those three numbers are 1, 3 and 9. Look at *Figure 1* to find each notch location. As with litter numbers, the number values are added. (*Figure 3*).

The litter number is notched in the pig's right ear and the individual pig number in the pig's left ear.

Pig No. = $1+1+3+9 = 14$



Pig No. = $1+3+3 = 7$

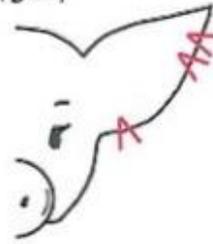
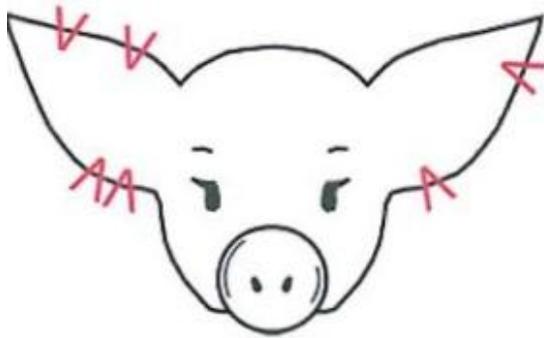


Figure 3. Examples for pig numbers 14 and 7.

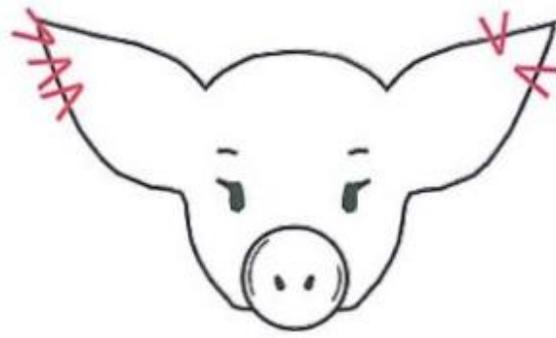
Combining Both Ears

After a pig is notched in its right and left ear, it has a unique identity. Examples are shown in *Figure 4*.



Litter No. $1+1+9+27 = 38$ (pig's right ear)
Pig No. $1+3 = 4$ (pig's left ear)

This pig's identity is 38-4

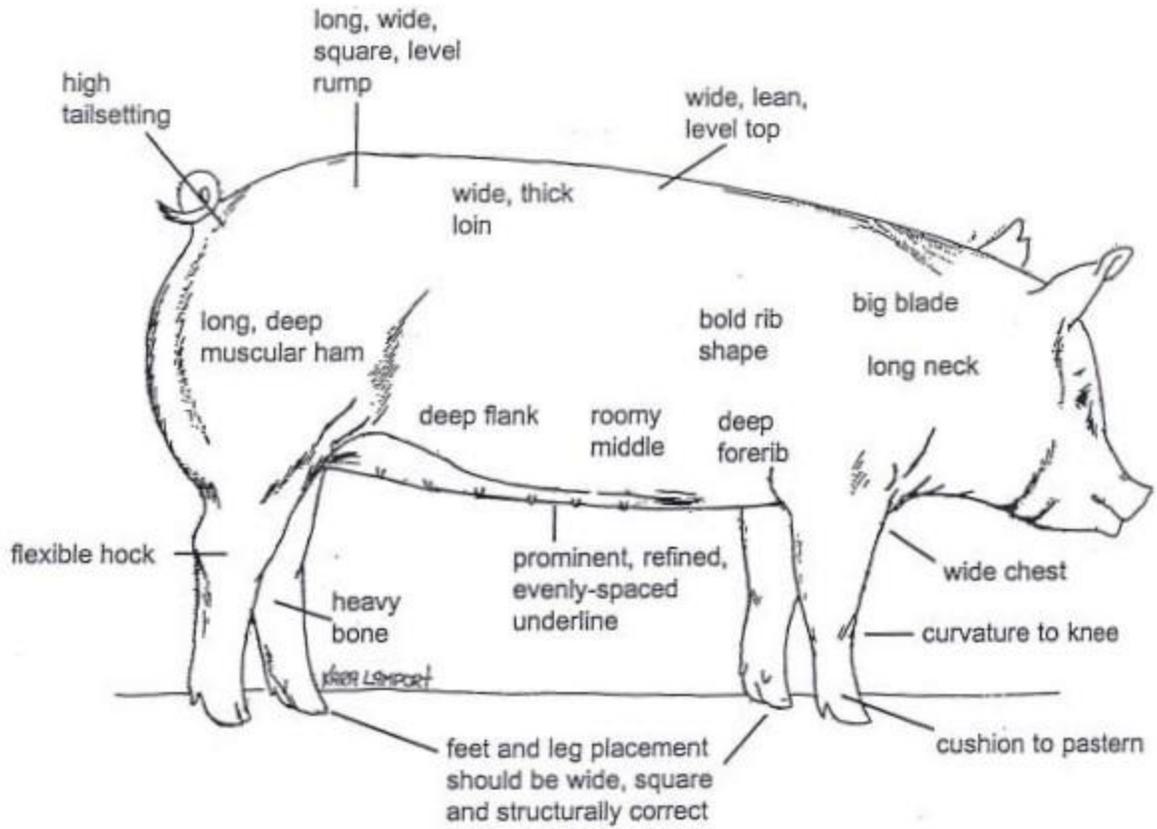


Litter No. $3+3+81 = 87$
Pig No. $3+9 = 12$

This pig's identity is 87-12

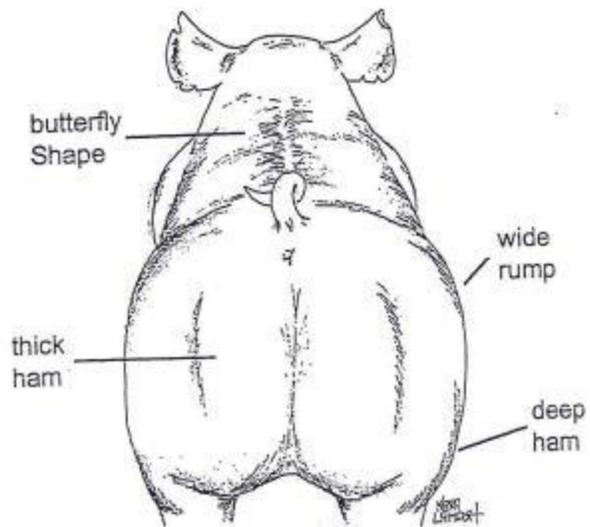
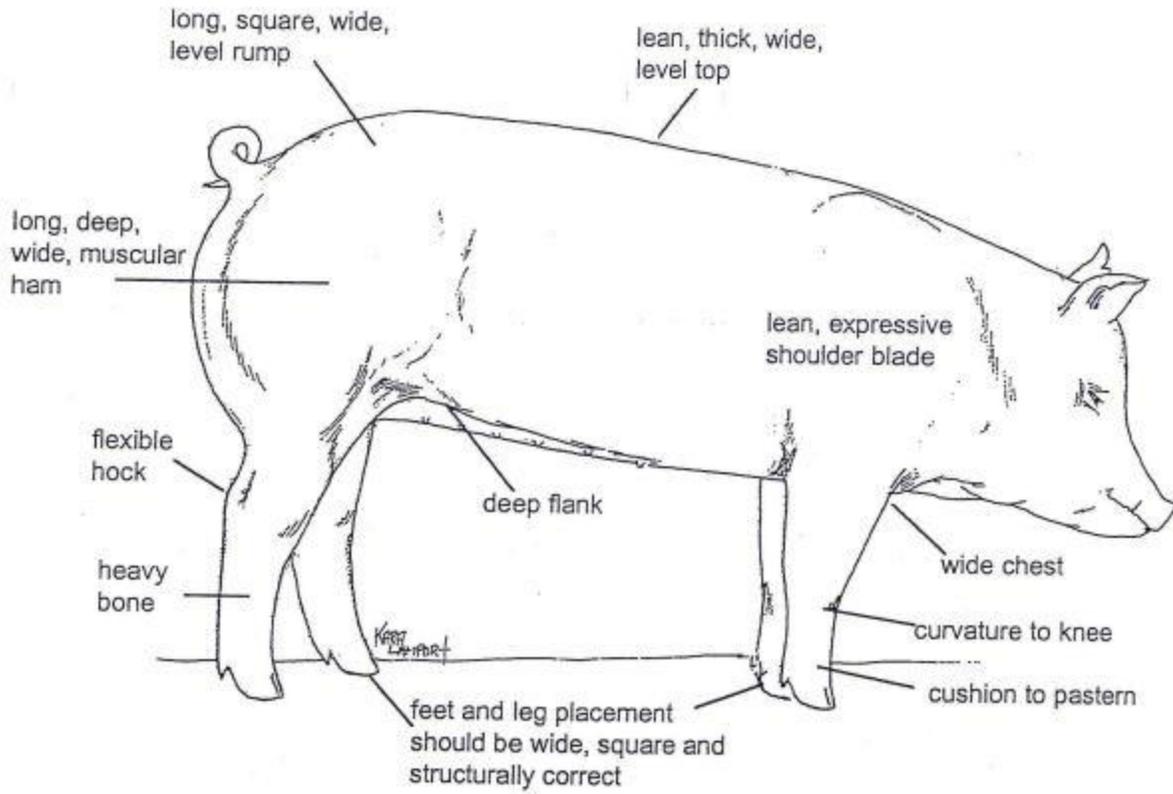
Ideal Breeding Gilt

Figure 10



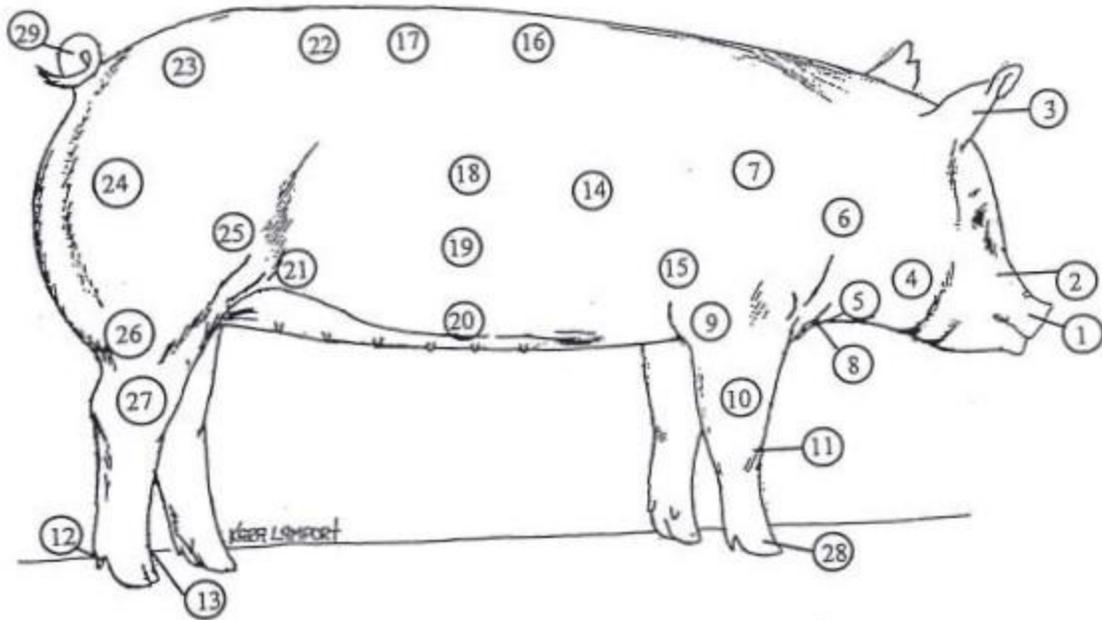
Ideal Market Hog

Figure 8



External Parts of Swine

Figure 3



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|----------------------|--------------------|-----------------------|
| 1. snout | 11. knee | 21. rear flank |
| 2. face | 12. dewclaw | 22. ham-loin junction |
| 3. ear | 13. pastern | 23. rump |
| 4. jaw | 14. rib | 24. ham |
| 5. jowl | 15. forerib | 25. stifle |
| 6. neck | 16. top or topline | 26. base of ham |
| 7. shoulder or blade | 17. loin | 27. hock |
| 8. chest | 18. side | 28. foot or toes |
| 9. elbow | 19. middle | 29. tail |
| 10. forearm | 20. underline | |