

**2017-2018**  
**Citrus County Fair**  
**Swine Skill-a-thon**  
**Study Guide**

# INTRODUCTION

This manual has been developed by the Animal Sciences Department Faculty at the University of Florida as a study guide for the Swine Skill-a-thon. The topic for this year's Skill-a-thon is Products and Marketing.

The Citrus County Fair recognizes that agricultural education instructors, 4H agents, parents, and leaders provide the traditional and logical instructional link between youth, their livestock projects and current trends in the animal agriculture industry. **PLEASE NOTE:** This manual is provided as a **study guide** for the skeleton competition and should be used as an additional aid to ongoing educational programs.

Sections are labeled **Junior, Intermediate & Senior, Intermediate & Senior, or Senior** to help exhibitors and educators identify which materials are required for each age level.

The knowledge and skills vary by age group and may include:

**Juniors (age 8-10 as of September 1, 2017)**

By-Products  
Wholesale cuts of Pork & Primal

**Intermediates (age 11-13 as of September 1, 2017)**

all of the above plus...  
Retail Cuts of Pork  
Market classes of swine  
Cookery

**Seniors (age 14 and over as of September 1, 2017)**

all of the above plus....  
Market Hog and Carcass Evaluation  
Carcass Lean Value  
Quality Assurance  
Skeletal Anatomy

**GOOD LUCK!**

## Products and Marketing

Youth livestock projects focus on the selection, raising, showing and often selling of animals. By virtue of their participation in livestock projects, youth become part of an industry that provides food and fiber for the world. The steps involved in the movement of animals and animal products from producer to consumer are known as *processing and marketing*. Tremendous changes have occurred in recent years in the ways animal products are harvested and marketed but the fundamentals remain the same. Price is dependent on *supply and demand*. We can impact supply through increased breeding but demand is more difficult to affect. The swine industry aggressively sought expansion in the late 1990's but it created a surplus of pork that caused great economic upheaval for the small producers. Many went out of business. As with many other livestock commodities, the number of producers is decreasing steadily while the size of operations is growing astronomically.

In order to maintain a stable market for animal products, consumers must have confidence in the **wholesomeness and quality** of what they are buying. That means the products must be safe, nutritious and tasty. Many livestock organizations have implemented promotion programs to increase market share, improve prices and increase export markets. The Pork Checkoff is an example of such a program. Read about it at: <http://www.pork.org/home.aspx>

Marketing may be as simple as receiving a set price per pound or may involve a pricing system known as 'Value Based Marketing'. **Value based pricing systems** account for quality and apply deductions or bonuses as products deviate from an accepted *baseline*. This should ultimately improve the quality of products offered to consumers, therefore boosting consumer confidence. Animal products may be marketed at auctions, by direct sales, contracts or electronically with the use of computers and satellite technology. Regardless of the marketing method, the seller is trying to receive the highest *price* while the buyer is trying to receive the greatest *value* (high quality and reasonable price). Producers can manage fluctuations in prices by hedging hogs with futures or with options contracts.

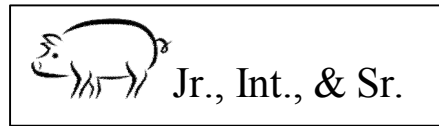


## Swine Products and Marketing

Pork is the world's most widely eaten meat (Pork 42%, Chicken 33%, Beef 22%, Turkey 3%). The United States produces almost 10% of the world's pork with a little over 6% of the world's hogs. Through application of research findings and new technology, today's pigs are both leaner and more efficient. Even so, in recent years, exceedingly high feed prices have made it extremely difficult to make a profit in the swine industry. Sometimes youth exhibitors are unaware of the issues that the industry faces because they buy and sell in a "show pig" environment. Read the following fact sheet for some good insights comparing the commercial swine industry and the show pig industry: <http://www.pork.org/filelibrary/youth/showpig.pdf>

As early as the 1950's, pork producers recognized the need to organize and formed the National Swine Growers council which later became the National Pork Producers Council. They began a voluntary check off called "Nickels for Profit". In 1985 the Pork Checkoff was written into the Farm Bill, creating the National Pork Board <http://www.pork.org/Home.aspx> which manages the collection and distribution of money from the program. Major advertising campaigns and educational efforts have helped pork hold steady in market share. Pork, The Other White Meat® became the national campaign in 1987, repositioning pork as a lean, nutritious protein source. Quick Facts: The Pork Industry at a Glance is available in PDF format at:

<http://www.extension.umn.edu/youth/mn4-H/events/project-bowl/docs/pb-gl-Quick-Facts-The-Pork-Industry-at-a-Glance.pdf>



## Animal By-Products

Animal by-products are anything of economic value other than the carcass that comes from animals during harvest and processing. They are classified as edible or inedible for humans. There may be some disagreement about what is edible but we can all agree that there are many uses for what is left after the carcass is rolled into the cooler. In developing countries by-products may become jewelry, religious implements, tools, fuel, construction material, fly swatters, or musical instruments. In developed countries, advances in technology have created many products from non-animal sources (synthetics) which compete with animal by-products, thus reducing their value. Still, by-products represent multibillion dollar industries in the United States and other developed countries. An added benefit of changing inedible parts of carcasses into useful products is that the decaying materials don't pile up and cause environmental problems. **Rendering** is the term for reducing or melting down animal tissues by heat and the rendering industry refers to itself as the "original recyclers". The creativity of meat processors in finding uses for by-products has led to the saying "the packer uses everything but the squeal".

### Edible by-products

#### Raw Material

Brains, Kidneys, Heart, Liver  
Spleen, Tongue  
Cheek and head trimmings  
Blood  
Fats  
Intestines  
Esophagus  
Pork skins  
Bones (& skin)

#### Principal Use

Variety Meats  
  
Sausage ingredient  
Sausage component  
Shortening (candies, chewing gum)  
Sausage casings, chitterlings  
Sausage ingredient  
Fried pork skins  
Gelatin for confectioneries (marshmallows),  
ice cream and jellied food products

### Inedible by-products

#### Raw Material

Skins

#### Processed by-product

Leather  
Glue  
Hair

#### Principal Use

various leather goods  
paper boxes, sandpaper, plywood, sizing  
Felts, plaster binder, upholstery, brushes,  
insulation  
Industrial oils, lubricants, soap, glycerin  
Insecticides, weed killers, rubber,  
cosmetics, antifreeze, nitroglycerine,  
plastics, cellophane, floor wax,  
waterproofing agents, cement, crayons,  
chalk, matches, putty, linoleum  
Livestock and poultry feeds  
Glue, hardening steel, refining sugar,  
buttons, bone china  
Animal feed, fertilizer, porcelain enamel,  
water filters

Fats

Inedible tallow

Bones

Tankage  
Dry bone

Bone meal

Feet

Neatsfoot stock  
Neatsfoot oil  
Pharmaceuticals

Glands  
Lungs

Fine lubricants  
Leather preparations  
Medicines  
Pet foods

Blood

Blood meal  
Blood albumen

Livestock and fish feeds  
Leather preparations, textile sizing

Viscera and  
meat scraps

Meat meal

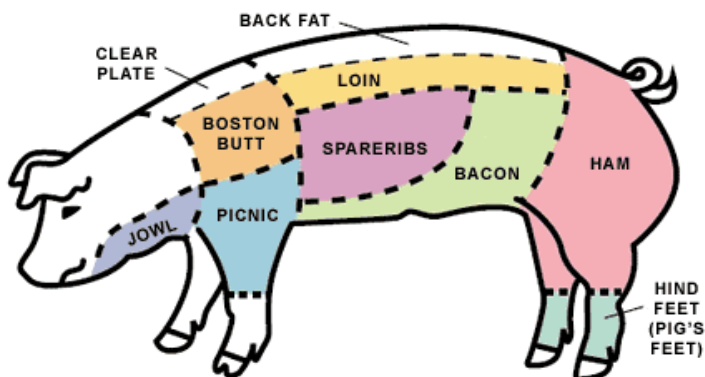
Livestock, pet and poultry feeds

Source: <http://www.epa.gov/agriculture/ag101/porkproducts.html>

## Wholesale Cuts of Pork












Fabrication of carcasses is the cutting of the carcass into wholesale and retail cuts for distribution to various markets. The size of the carcass and the preferences of the customer will determine how it is fabricated. For pork carcasses, wholesale cuts come from standard cutting methods developed to:

- Separate fat from lean portions
- Separate tough from tender sections
- Separate thick from thin sections
- Separate valuable from less valuable cuts
- Separate retail cuts by cutting across the grain.



## Primal Cuts

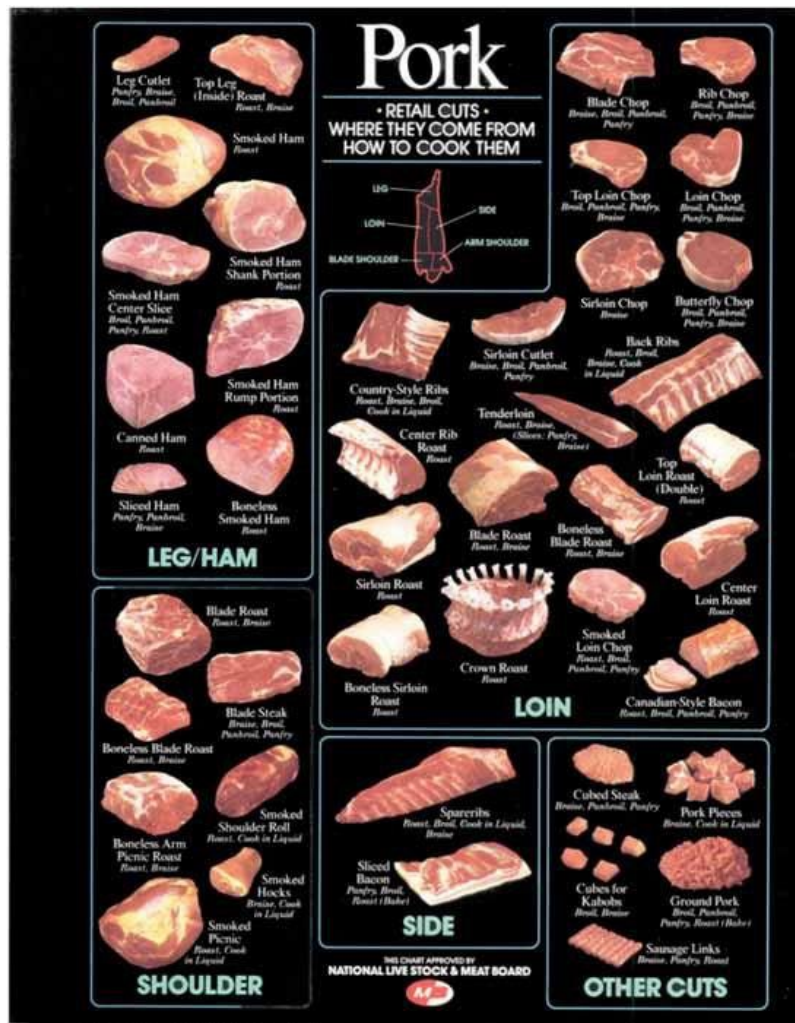
Of the wholesale cuts, those that are lean, tender, thick, and valuable and that contain a large proportion of their muscles running in the same direction are called *primal* cuts. The **primal pork cuts are Ham, Loin, Arm Picnic Shoulder, and Blade Boston-Style Butt.**

Shoulder Arm Cuts	 Arm Bone
Shoulder Blade Cuts (Cross Section of Blade Bone)	 Blade Bone (near neck)  Blade Bone (center cuts)  Blade Bone (near ribs)
Rib Cuts	 Back Bone and Rib Bone
Short Loin Cuts	 Back Bone (T-shape) T-Bone
Hip (Sirloin) Cuts (Cross Sections of Hip Bone)	 Pin Bone (near short loin)  Flat Bone (center cuts)  Wedge Bonet (near round)
Leg or Round Cuts	 Leg or Round Bone
Breast or Brisket Cuts	 Breast and Rib Bones



## Retail Cuts of Pork

At the retail markets, boxed cuts are used to generate retail cuts for the meat case. Different stores have their own styles for each cut in an attempt to meet their customers' needs. Retail specifications include size or thickness of cut, external fat trim, boneless or bone-in, and number of cuts per package. Items generated other than steaks and roasts may include stir fry, kabob, cubing material, and grinding material for processed or value-added products. Labels on meat must be specific for species, wholesale cut and retail cut names (example: Pork Shoulder Roast). A printable chart for retail cuts of pork and guides for making your own cuts can be found at: <http://www.porkbeinspired.com/TheCuts.aspx>



Visit the grocery store and practice visually identifying retail cuts of pork or go to:

[http://animal.ifas.ufl.edu/meat\\_extension/youth/meat\\_resources/docs/identifying\\_retail\\_cuts.pdf](http://animal.ifas.ufl.edu/meat_extension/youth/meat_resources/docs/identifying_retail_cuts.pdf)



## Market Classes

In the swine industry producers may sell breeding animals, feeder pigs or market hogs.

There are five primary types of swine operations:

1. Feeder pig production - maintain breeding herd and sell weaned pigs at 10 - 15 pounds or feeder pigs at 40 - 60 pounds.
2. Feeder pig finishing - purchase feeder pigs and feed to market weight of 270 - 290 pounds.
3. Farrow to finish - maintain breeding herd and sell finished pigs at market weight.
4. Purebred or hybrid seedstock producers - sell breeding boars, boar semen, and gilts.
5. Integrated corporate production - farrow to finish with different segments of the operation often located at different sites for biosecurity. Feeders may be contracted out by the company. These large companies employ highly trained managers and utilize cutting edge technology

The pictures below show a pig on the left whose secondary indicators of growth suggest he should be a nice project; a low-volume gilt in the middle that will likely remain lean to a heavy weight and will likely be too slow-growing; and a wide-chested, big-bodied barrow on the right that will likely have too much 10th rib fat thickness by 280 lbs.



These pigs from left to right will have about 0.75 in fat thickness at the 10th rib by approximately 250, 275 and 290 lbs, respectively. (National Swine Registry)



Youth exhibitors select pigs with the hope of doing well in a show. The pictures above along with additional helpful information can be found at: <http://www.thepigsite.com/articles/3934/selecting-pigs-for-youth-swine-shows>



## Meat Cookery

Methods of cooking meat include dry heat or moist heat. Dry heat cookery methods improve flavor of meat through crust formation and caramelization but increase chewiness and decrease tenderness because of protein hardening. Moist heat cookery methods increase the tenderness of meat cuts that are comprised of muscles containing large amounts of connective tissue. Cookery under moist conditions for long periods at relatively low temperatures, generates steam that then converts the collagen in connective tissue into gelatin. Methods should be selected based on initial tenderness of the cut, desired quality characteristics of the resulting product, available cooking facilities/equipment, and the amount of time available for preparation.

<http://www.wikihow.com/Cook-Pork> OR <http://www.porkbeinspired.com/>

### Dry Heat

Dry Heat methods of cooking are suitable for tender cuts of meat or less tender cuts which have been marinated. Use cuts low in collagen and elastin.

**Roasting** - This method of cooking is recommended for larger cuts of meat. Meat is seasoned and placed in an open roasting pan with a cooking thermometer placed in the center to determine degree of doneness.

**Broiling** - This method is most suitable for tender, usually thin cuts of meat. Less tender cuts may also be broiled when marinated. Meat is directly exposed to the source of heat from above or from both sides at the same time. It involves high heat and produces a distinct caramelized flavor.

**Grilling** - This method is actually a method of broiling. Meat can be grilled on a grid or rack over coals, heated ceramic briquettes or an open fire.

**Pan-Broiling** - This method is faster and more convenient than oven broiling for cooking thinner steaks or chops. It involves conduction of heat by direct contact of the meat with hot metal. Fat drippings are poured off as they accumulate.

**Pan-Frying** - This method differs from pan-broiling in that a small amount of fat is added first, or allowed to accumulate during cooking. Pan-frying is for ground meat, small or thin cuts of meat.

**Stir-Frying** - This method is similar to pan-frying except that the food is stirred almost continuously. Cooking is done with high heat, using small or thin pieces of meat.

**Deep-Fat Frying** - This method is cooking meat immersed in fat. This method is only used with very tender meat.

**Microwave Cookery** - High frequency electrical energy causes molecules inside the product to vibrate creating friction and heat without heating the surrounding air. The rapid speed of microwave cooking makes it ideal for frozen cuts in institutions and restaurants. Consumers complain that microwaved meat is inferior in flavor.





## **Moist Heat**

Moist Heat methods of cooking are suitable for less tender cuts of meat. Moist heat cooking helps to reduce surface drying in those cuts requiring prolonged cooking times. With moist heat cookery, meat may lose some water-soluble nutrients into the cooking liquid. However, if the cooking liquids are consumed, as in stews or soups, nutrients are transferred and not totally lost. Meat should never be boiled because high temperatures toughen protein.

**Braising** - In some regions of the country the term *Africassee* is used interchangeably with braising. The surface of the meat is seasoned, covered with flour and browned. Afterward the meat is placed in a covered pan with a small amount of liquid and cooked at low temperatures to soften the connective tissue and yield a more tender product.

**Stewing** – Small pieces of lean meat can be browned on the surface then covered with liquid and gently simmered in a covered pan until tender. Care should be taken not to let the temperature of the liquid exceed 195°F, because boiling toughens meat protein.

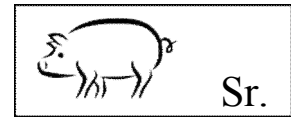
**Simmering** - Involves cooking in water at low temperatures (180°F) like stewing except more water is used and the meat is usually not browned first.

**Pressure Cooking** – Cooking under pressure produces steam which aids in softening connective tissue. Pieces of meat may be browned then cooked with a small amount of water in a special vented pressure cooker.

**Poaching** - Cook in a liquid that is not actually bubbling at 165 to 180 degrees. It is usually used to cook delicate foods such as fish and eggs. It takes one third less time than roasting. Poaching helps to keep shrinkage of the meat to a minimum.

## **Meat Facts**

100g Roasted	Calories (g)	Fat (g)	Sat'd Fatty Acids (g)	Protein (g)	Iron (mg)
Beef	216	9.9	3.79	29.58	2.9
Chicken	190	7.41	2.04	28.93	1.21
Goat	108	2.58	.79	29	3.3
Lamb	206	9.52	3.4	28.22	2.05
Pork	212	9.66	3.41	29.27	1.1
Rabbit (stewed)	206	8.41	2.51	30.38	2.37



## Slaughter Hog Evaluation

The traits of economic importance for market swine are weight, dressing percentage, fatness, subjective muscle score, USDA Grade and percent muscle. The factors used to predict percent muscle are hot carcass weight, loin eye area and 10<sup>th</sup> rib fat depth. USDA grades of slaughter barrows and gilts are based on estimated last rib fat and a muscle score. Values for these factors are then used in the mathematical equation:

Grade = (4.0 X last rib fat) - (1.0 X muscle score) to arrive at the final grade.

Muscling scores for the equation are: thin (inferior) = 1, average = 2, and thick (superior) = 3.

Another way to determine live grade is to assign a preliminary grade based on last rib fat and adjust up one grade for superior muscling and down one grade for inferior muscling.

<u>Preliminary Grade</u>	<u>Backfat thickness range</u>	Animals with an estimated last rib back fat thickness of 1.75 inches or over cannot be graded U.S. No. 3 even with thick (superior) muscling.
U.S. No. 1	Less than 1.00 inch	
U.S. No. 2	1.00 to 1.24 inches	
U.S. No. 3	1.25 to 1.49 inches	
U.S. No. 4	1.50 inches and over	

For pork carcasses, grades are based on carcass quality and yield of the four lean cuts (ham, loin, picnic shoulder, and Boston Butt). The quality of the lean is referred to as acceptable or unacceptable. Acceptable carcasses have bellies that are at least slightly thick overall and not less than 0.6 inches thick at any point. Other factors used to determine quality are the amount and distribution of external finish and the firmness of fat and muscle. Carcasses with acceptable lean quality and firmness of fat are further classed in one of the four top grades, based on the expected yield of the four lean cuts. If the lean quality is unacceptable, the carcass is graded Utility. The official USDA grades for pork carcasses are U.S. No. 1, U.S. No. 2, U.S. No. 3, U. S. No. 4, and U. S. Utility and are outlined in detail at the USDA web-site

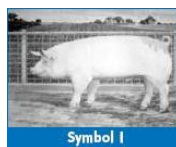
Some fairs utilize ultrasound of the live animal to predict carcass merit. Ultrasound measurements are highly correlated with carcass measurements and can be useful in determining live market hog grades. Read about it at: <http://edis.ifas.ufl.edu/an252>  
You can learn more about swine evaluation and practice judging pork carcasses by visiting the following web sites: <http://www.meatjudging.org/>



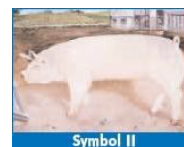
1980's

1995

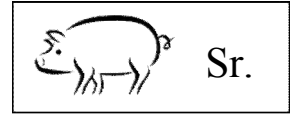
**Symbol III** A standard of excellence for the swine industry was unveiled at the 2005 World Pork Expo. Described as symbolizing profitability for all segments of the industry. "This hog has correctness of structure, production, performance, function, livability, attitude, health, optimum lean yield, and produces the best quality, safest pork that provides the optimum nutrients for human nutrition."



Symbol I



Symbol II



## Carcass Lean Value Programs

Many pork packing plants purchase hogs through a carcass lean value program. These programs are designed to reward pork producers for superior hogs at the expense of inferior hogs. Although each company has a slightly different program, the Hormel Foods example below represents the method that most packers use to price pork carcasses. In the Hormel Foods Carcass Lean Value Program, a grid is constructed that shows the percentage of the **base price** that a carcass is valued based on factors like carcass weight, last rib fat thickness or depth of loin. Carcasses that are higher in lean yield receive a bonus while those lacking in quality receive a discount.

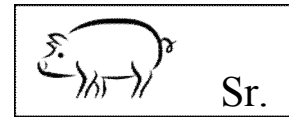
**Hormel Foods Lean Pork Value Table<sup>1</sup>**

Carcass Weight	Last Rib Backfat, inches						
	.60/Down	.61 - .80	.80 - 1.00	1.01 - 1.20	1.21 - 1.40	1.41 - 1.60	1.61/Up
<145	65%	65%	65%	65%	65%	57%	47%
146-152	91%	88%	84%	80%	76%	68%	58%
153-159	100%	97%	92%	87%	83%	76%	66%
160-166	109%	106%	102%	97%	91%	84%	74%
167-173	111%	108%	104%	100%	96%	89%	79%
174-180	111%	109%	106%	101%	97%	90%	80%
181-187	111%	109%	106%	102%	97%	90%	80%
188-194	111%	109%	106%	102%	97%	90%	80%
195-201	111%	109%	106%	102%	97%	90%	80%
202-208	111%	109%	106%	102%	97%	90%	80%
209-215	111%	109%	106%	102%	97%	90%	80%
216-222	109%	106%	103%	99%	94%	87%	77%
>223	103%	99%	95%	90%	86%	79%	69%

<sup>1</sup>For any carcass, multiply the quoted carcass base price by the appropriate lean value percentage determined by its weight and fat range to obtain the meat price for that specific carcass.

Using the Lean Value Table, the percent of base value is located by matching the carcass weight with the fat thickness range. Multiplying that percentage by the carcass base price determines the carcass price/cwt for a specific carcass weight range. Multiplying the carcass price/cwt by the hot (warm or unshelled) carcass weight equals the total value.

**Example:** Hog with a carcass weight of 180 pounds and a last rib fat thickness of 1.3 inches.  
 Base carcass price = \$80/cwt.  
 Carcass receives 97% of base carcass price ( $\$80 \times .97$ ) = \$77.60/cwt  
 Total Value = \$77.60 x 180 pounds = \$139.68



## Pork Quality Assurance

The National Pork Board offers both adult and youth producers a certification program for pork quality assurance (PQA Plus®). <http://www.pork.org/Certification/11/pqaPlus.aspx>

### Why should you care?

- Pork quality is the responsibility of the producer – that's you.
- Pork processors are reluctant to buy show animals because of quality issues.
- If we want to continue to have a market for show animals, exhibitors need to start focusing on how they can improve packer confidence of their animals.

### Issues:

Stress Gene (Halothane) that is responsible for porcine stress syndrome (PSS) which leads to pale, soft and exudative (PSE) meat. <http://www.porknetwork.com/pork-magazine/features/whats-up-with-pse-113894904.html>

- Giving Injections in the muscle can lead to injection site lesions in cuts of meat.
- Increased drug residue violations
- Carcass characteristics that will appeal to the packer and consumer
  - Hot carcass weight (205lbs.)
  - 10<sup>th</sup> rib fat thickness (B=0.7", G=0.6:0")
  - Loin eye area (B=>6.5, G=7.1 sq. in.)
  - Belly thickness (1/0")
  - Fat-free lean index (B=53.0, G=54.7)
- Pork Quality Characteristics
  - Muscle color score of 4.0
  - Maximum drip loss of 2.5%
  - Intramuscular fat level of 3.0%
  - Provides safe, wholesome product free of all violative residues



Read about pork quality issues at:

<http://www.pork.org/filelibrary/youth/meatquality.pdf>

What can you, the show exhibitor control?

- Genetics – eliminate the stress gene carriers to reduce the incidence of PSE
- Give injections in the proper location to reduce injection site lesions
- Handling – reduce bruising
- Proper legal drug use – follow label directions for dosage and withdrawal times

<http://pqaalliance.org/measures/default.asp>

The youth manual can be downloaded:

<http://www.pork.org/filelibrary/YouthPQAPlus/YPQAManual.pdf>

**Food Safety** is everyone's concern. Pigs are harvested under strict government inspection. USDA Food Safety Inspection Service (FSIS) is responsible for protecting the meat supply under the Federal meat Inspection Act. <http://www.fsis.usda.gov/wps/portal/fsis/topics/rulemaking/federal-meat-inspection-act>. Pathogen Reduction/Hazard Analysis and Critical Control Points (PR/HACCP) system is used to identify and prevent food safety risks. Review this excellent fact sheet: <http://www.pork.org/filelibrary/youth/foodsafety.pdf>

# Pork Skeletal Anatomy

When fabricating the carcass into wholesale and retail cuts, skeletal anatomy provides the framework and landmarks for each of the cuts. Identification of bone-in retail cuts is much simpler when you have a good grasp of the bones associated with each region of the carcass.

## PORK SKELETAL CHART

Location, Structure and Names of Bones

