

Pork Muscle Profiling

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The shoulder and ham primals of pork carcasses have traditionally been marketed to processors and retailers in intact form, for fabrication and manufacture into consumer products containing the variety of muscles found in those cuts. In recent years, the meat processing industry has sought to develop new value-added products by discovering unique properties of single muscles or groups of muscles from primal cuts. To facilitate this effort, it is very important to understand the characteristics of individual muscles. The objective of this project was to determine the physical and chemical properties of significant muscles from the ham and shoulder, to enhance selection of raw materials from these primals to use in developing new value-added pork items.

Methods

This research was cooperatively conducted by scientists and technical staff from Iowa State University, Michigan State University and the University of Wisconsin. The work was financially supported by the National Pork Board.

Pork carcasses were selected from a single packer, which purchases pigs on the open market from a variety of producers employing a wide range of genetic lines. Carcass selection followed pre-determined guidelines for specific carcass weight ranges, estimated carcass percent muscle and pH at 45 minutes postmortem (an indicator of lean quality), to assure an appropriate distribution of carcasses varying in these criteria. After 24 hours of chilling, carcasses were transported to the Meat Science Laboratory at Iowa State University.

Between 48 and 80 hours postmortem hams and shoulders from both sides of selected carcasses were fabricated into individual muscles. Muscles of significant size (0.5 pounds or larger) were evaluated for the following proper-

ties: weight, physical dimensions, pH, sensory properties, objective tenderness, objective color, water-holding capacity, protein solubility, gel strength, pigment concentration, total collagen and nutrient content.

Results

The results from the chemical, physical and nutritional evaluation of 25 significant shoulder and ham muscles have been organized into a multi-level classification system for each parameter measured. For example, the mean pH value of each muscle is classified as low, medium or high pH, and the mean sensory tenderness of muscles is described according to a five descriptor scale, encompassing very tender, moderately tender, average tenderness, moderately tough and very tough. With such descriptions defined for all muscle parameters evaluated, a determination can be considered for the most appropriate potential use of individual muscles or closely-adjacent muscle groups. A section of *longissimus* muscle from each carcass (from the fifth rib forward) was included in these evaluations, to serve as a familiar benchmark. As an example of the output generated from this work, Table 1 presents the results of the evaluations and analyses performed on the *Semitendinosus* and *Longissimus dorsi*.

Representatives from the pork processing industry will review and react to these findings on the characteristics of individual muscles, and provide input into their merchandising potential. Not only are the size, shape and characteristics of individual muscles important to their potential application, but also the accessibility of the muscles and their ease of removal from the shoulder and ham primals, using current and possible future fabrication methods, will be critical factors in determining muscle use.

The desired outcome of this comprehensive determination of the properties of the individual ham and shoulder muscles is to identify those muscles which possess appropriate characteristics and realistic fabrication potential, to be able to be merchandised as higher-value products. Such an outcome would increase the overall value of these primals to the processing industry, and ultimately add value to the total pork carcass, to the benefit of pork producers and pork processors.

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Table 1. A comparison of the chemical and physical properties of raw pork *Semitendinosus* and *longissimus dorsi*.

	<i>Semitendinosus</i>	<i>Longissimus dorsi</i>
Weight (lbs).	1.23	1.53
pH Classification	average	low
mean value	(6.12)	(5.81)
Water-Holding Capacity	low	low
mean value (%)	(91.77)	(92.29)
Color	average	light
mean L*	(48.3)	(53.0)
mean a*	(20.1)	(17.5)
mean b*	(6.1)	(5.3)
Color Uniformity	two-toned	uniform
Fat Content	average	average
mean fat (g/100)	(5.7)	(3.2)
Total Iron		
mean iron (mg/100 g)	(0.98)	(0.78)
Heme Pigment		
mean value (mg/g)	(0.99)	(0.82)
Collagen		
mean value (mg/g)	(6.53)	(3.96)
Protein Solubility	high	high
Overall Tenderness	average	moderately tender
mean sensory	(102/150)	(104/150)
mean star probe	(4.18)	(4.49)
Texture	fine-textured	average
Flavor	moderate pork flavor	light meat pork flavor
Recommended Category	fresh-- enhanced	fresh -- enhanced
Product Suggestions	medallions, roast	chops, roast