

## Meat Quality

### Understanding Industry Measurements and Guidelines

There is no single definition of high quality meat used in the pork industry today. Meat quality is a combination of subjective and objective measurements which vary across markets, particularly international markets. Some of the most common measurements used in determining pork quality are color, pH, water holding capacity, firmness, and marbling. As the industry has been learning more about meat quality and how to measure it over the last decade, meat quality has become increasingly important to all segments of pork production.

The most important and practical factors determining pork quality in the US are color and pH which are used to determine the four broad categories of pork quality. The categories are red, firm and non-exudative (RFN); dark, firm and dry (DFD); red, soft and exudative (RSE); and pale, soft and exudative (PSE).

#### Color

Color is important. Fresh pork must be visually appealing to the consumer, and meat color makes the first impression. Color may be scored either visually by a trained person using a color scale, or objectively with a Minolta or other device. The NPB developed color scores ranging from 1 to 6, with 1 being the lightest. However, the industry standard is the Japanese scoring system which ranges from 1 to 6, with 1 still being the lightest. The Minolta lightness ( $L^*$ ) score is produced by measuring light reflection from the surface of meat. Minolta  $L^*$  scores of 42 to 46 are preferred. In order to qualify for export to Japan, a loin should have a Minolta  $L^*$  score of 50 or less (depending on the machine used), or a Japanese color score of 3, 4, or 5 (reddish/pinkish color)

#### pH

Live muscle has a neutral pH of 7.0 to 7.2. As live muscle converts into meat, pH drops causing meat to become increasingly acidic. Both the rate of this change, and the final pH level are important in determining pork quality. pH is generally measured within one hour of slaughter (initial pH) or within 24 hours (ultimate pH or pH<sub>u</sub>). If initial pH is below 5.8, the pork may be PSE because pH dropped both too low and too quickly. This meat will typically have an ultimate pH below 5.5. On the other hand, meat with an ultimate pH above 6.1 may be classified as DFD, because pH did not drop to normal levels. The preferred ranges for initial pH are between 6.7 and 6.3, and 6.1 and 5.7 for ultimate pH.

#### Water Holding Capacity

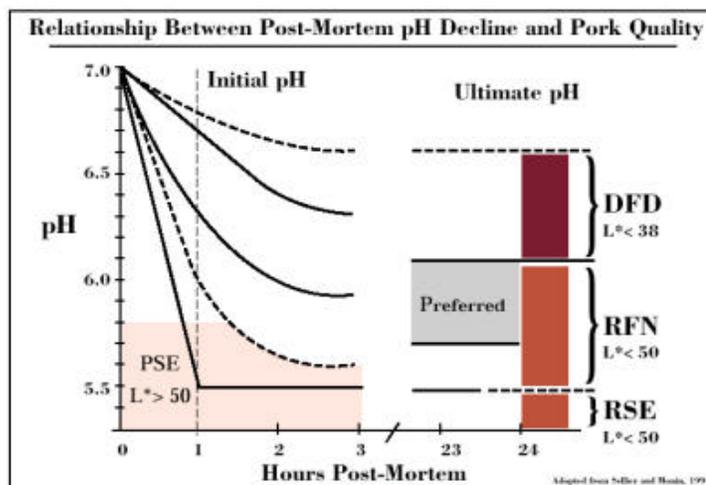
One of the traits that pH affects is water holding capacity. Water holding capacity determines both drip loss from raw pork, and cooking loss during preparation. Pork which does not “hold water” is undesirable for further processing and fresh consumption. Drip loss above 5% and cooking loss above 25% indicate a pork quality problem. Whole loin package purge should not exceed 3%.

### Firmness and Marbling

Firmness and marbling are additional scores developed by the NPB to measure meat quality. Firmness is measured on a scale from 1 (very soft) to 5 (very firm). Marbling is measured on a similar scale of 1 (practically no marbling) to 10 (abundant marbling). Pork for the US fresh market should have an NPB firmness score of 3 and a marbling score of 2-3. Some export markets require a higher marbling score. More information on meat quality measurements post-mortem pH decline and pork quality is provided below.

Standard Meat Quality Measurements				
	Measure of	Range	Optimum score	Comments
<b>Minolta L *</b>	Color by light reflection	38 – 55	Less than 50	Higher score is lighter or less desirable
<b>Japanese Color Score</b>	Objective color score	1 – 6	3, 4 or 5	1 is lightest; 6 is darkest
<b>Initial pH</b>	pH at 45 minutes post mortem	5.6 – 6.8	Approximately 6.7 – 6.3 is most desirable	Initial pH lower than 5.8 may result in PSE meat
<b>Ultimate pH</b>	pH at 24 hours post mortem	5.2 – 6.4	Approximately 6.1 – 5.7 is most desirable	Scores above 6.1 indicate DFD meat – Below 5.5 indicate PSE meat
<b>NPB Firmness Score</b>	Firmness of pork	1 – 5	3 – 4	1 is softest; 5 is firmest
<b>NPB Marbling Score</b>	Intramuscular fat (marbling) level	1 – 10	2-3 for fresh consumption	Score of 1 is devoid of fat; 10 has abundant marbling
<b>Drip Loss (measured in lab)</b>	Water holding capacity of meat in cooler	3 – 6%	Less loss is more desirable	Influenced by pH and chill rate
<b>Cooking Loss</b>	Water holding capacity of meat during cooking	16 – 24%	Greater water holding capacity is desirable	Influenced by pH, chill rate & intramuscular fat

Four Categories of Pork Quality	
<b>RFN</b>	Red, Firm, Non-exudative. Minolta L* less than 50; pH <sub>u</sub> between 5.5 – 6.1
<b>RSE</b>	Red, Soft, Exudative. Minolta L* less than 50; pH <sub>u</sub> less than 5.6
<b>PSE</b>	Pale, Soft, Exudative. Minolta L* greater than 50; pH <sub>u</sub> less than 5.5
<b>DFD</b>	Dark, Firm, Dry. Minolta L* less than 38; pH <sub>u</sub> greater than 6.1





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