Pork Quality

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What is Pork ***Quality***?

- Summation of those attributes that make pork desirable as a human food.

Pork Quality is defined by

- Color
- Water Holding Capacity
- Marbling
- pH

Pork Quality

- Safety
- Nutritional Value
- Processing Characteristics
- Sensory Characteristics

Processing Characteristics

- Water-Binding Capacity
- Uniformity
- Structure
- Texture

Sensory Characteristics

- Appearance
- Color
- Tenderness
- Aroma
- Juiciness
- Flavor

Ideal Pork Quality

- Color
  - Reddish-pink
  - 3 -5 on scale
- Drip Loss
  - < 0.5%
- Ultimate pH
  - 5.6 - 5.9

- Marbling
  - Equivalent to 2 - 4% intramuscular fat
- Tenderness
  - <3.2 kg Warner-Bratzler Shear Force
- Flavor
  - Robust Pork Flavor

Pork Quality Solutions Committee of NPB, 1998

Firmness

- Evaluated on the cut surface of the loin eye
- Firm chops retain shape
- Soft chops deform easily and sag
- Better eating quality and processing characteristics are associated with firmer chops

Pork Color

- Measured or evaluated on the cut surface of the loin eye or ham
- Ideal
  - Reddish-pink
    - 66%
  - Range
    - Pale-pinkish gray
      - 16%
    - Dark red
      - 18%

Color Measurement

- Pork Color
  - Subjective Scores
  - Reflectance values
  - Lightness (L) values
    - 0= black
    - 100 = pure white

Color Standards

Minolta L* values use D65 daylight light source

1.0
Pale pinkish gray to white
61*

2.0
Grayish pink
55*

3.0
Reddish pink
49*

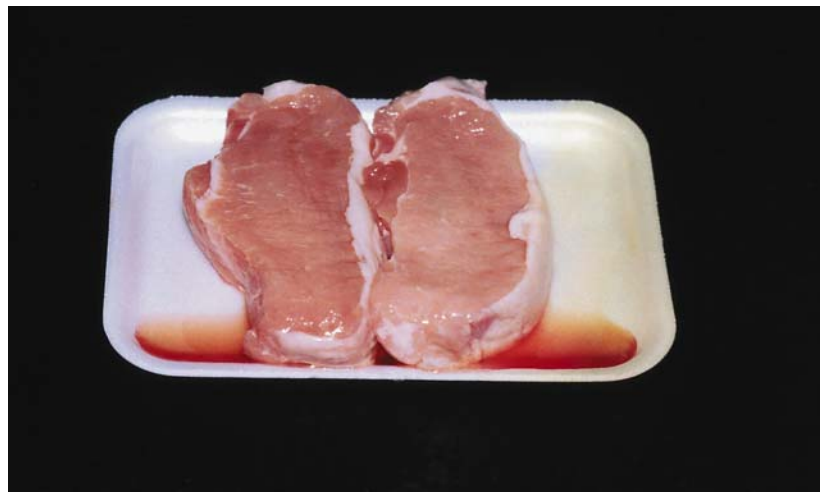
4.0
Dark reddish pink
43*

5.0
Purplish red
37*

6.0
Dark purplish red
31*

Water Holding Capacity

- Ability of meat to retain its water during the application of external forces
  - Affects
    - Appearance
    - Juiciness
    - Brine retention
  - Typical Range
    - < 0.5% to 10%
    - 1 to 2% average



Marbling

- Evaluated on the cut surface of the loin eye
- Subjective score of the amount of visible fat in the loin eye
- Can affect flavor and juiciness

Marbling Standards

Marbling scores correspond to intramuscular lipid content.

1.0

2.0

3.0

4.0

5.0

6.0

10.0

Why should we consider pork quality?

- Defects are costly
- Variation is costly
  - Difficult to “Add Value”
- Export Market
- Poor Quality Diminishes Demand

Why does variation in pork quality exist????

- Variation in genetics
- Variation in nutrition and handling
- Variation in harvest process

Color, Firmness, Water Holding Capacity

- These traits are typically the first impression the buyer or consumer has of the product.
- Defects in these traits diminish demand for and value of pork.

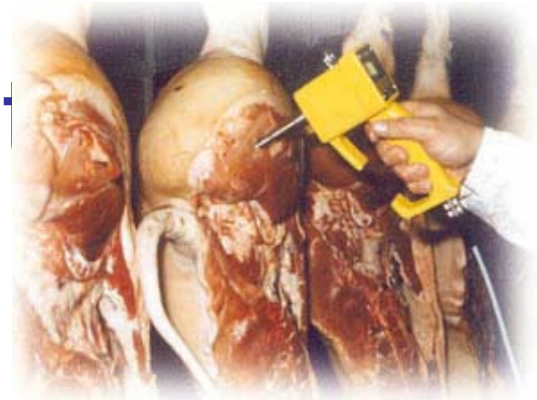
Why do defects in color, firmness and water holding capacity exist???

- Due in large part to the process of the conversion of muscle to meat
  - Increase in acidity
  - Chilling the carcass
- This process is also influenced by genetics and handling of live pigs.

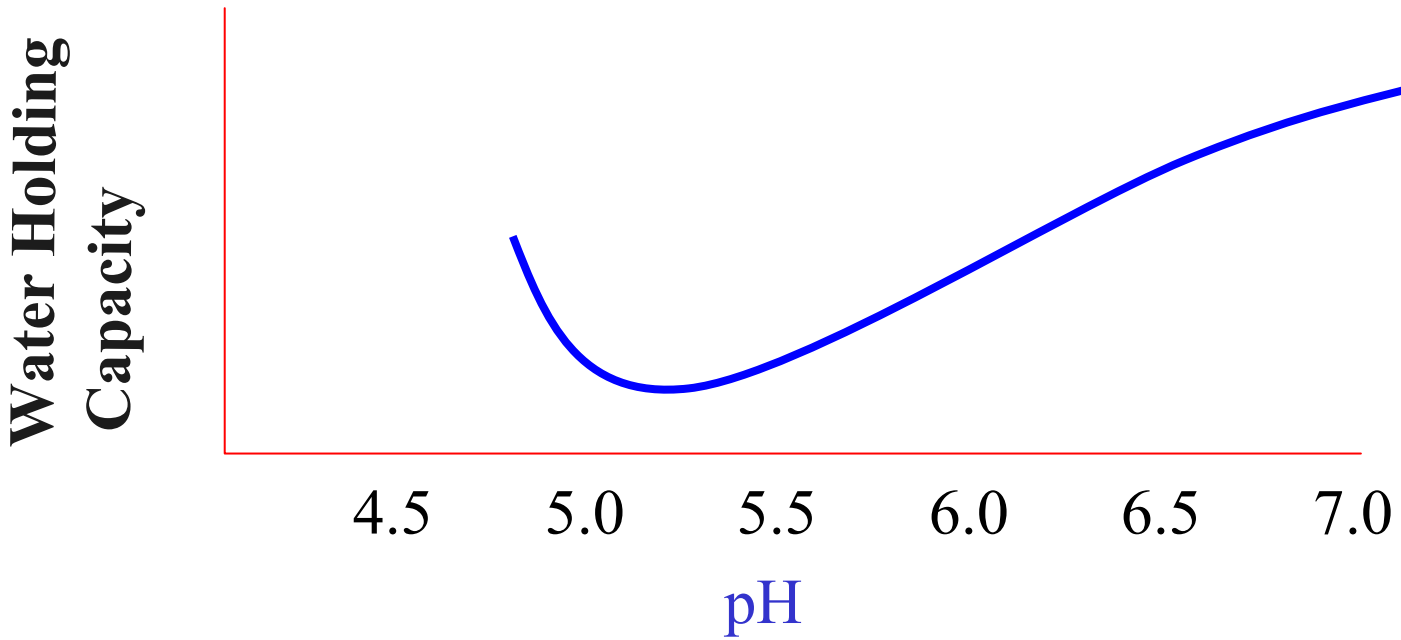
pH

- Measure of the relative acidity of meat
- Related to:
  - Color
  - Drip loss
  - Firmness

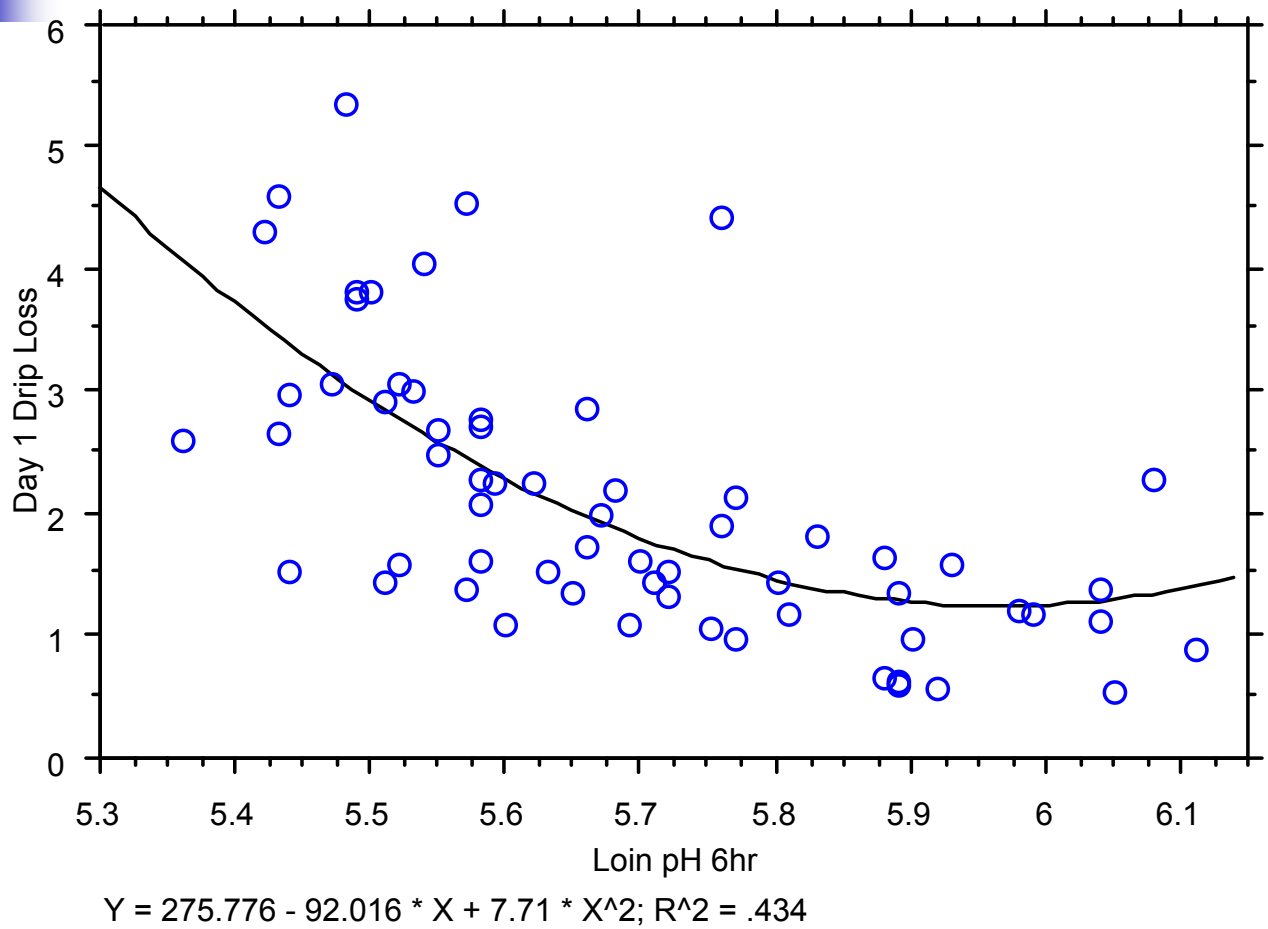
Measuring pork quali



Low pH may suggest low water binding



Relationship between early postmortem pH and drip loss



Gardner et al., 2002

Postmortem Conversion of Muscle to Meat

- Postmortem pH decline

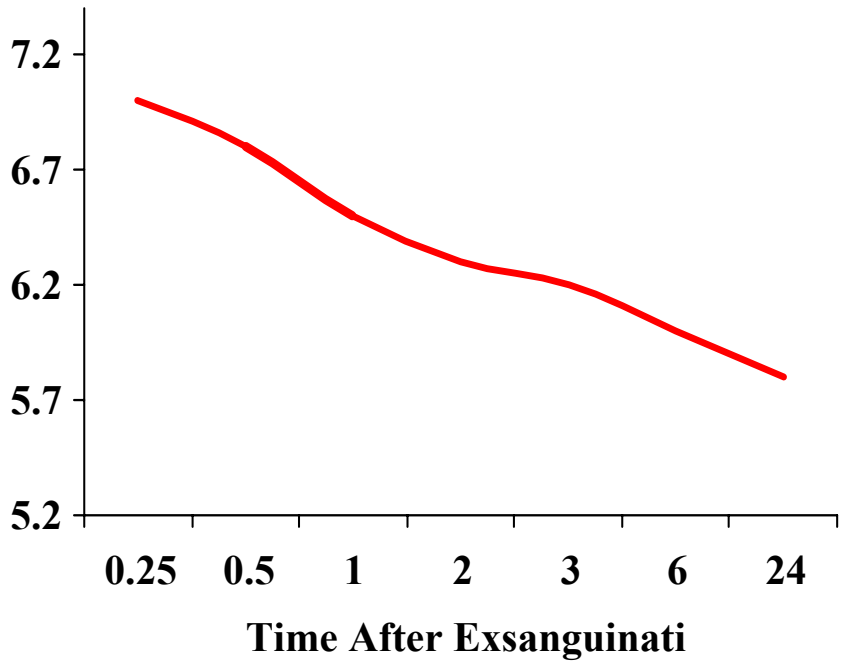
pH 7.4 Living Muscle

24 hours postmortem

pH 5.4 - 5.9 pH of Meat

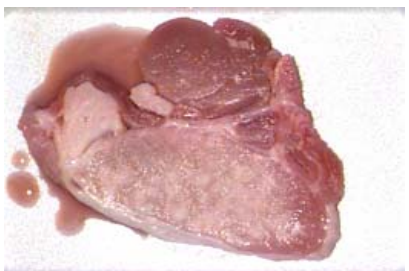
pH

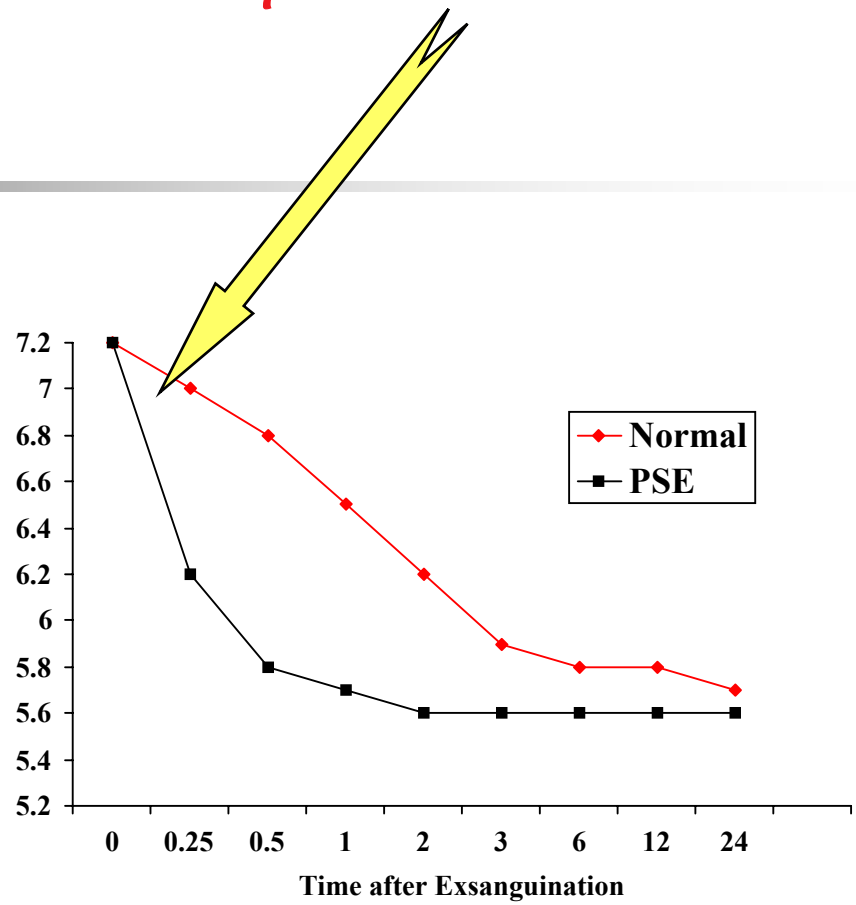
- Postmortem pH decline
  - Rate and extent of pH decline affects quality
  - Slow steady decline to an ultimate pH of 5.8 or greater may predict higher quality pork
  - Rate of metabolism can affect the rate of pH decline



pH

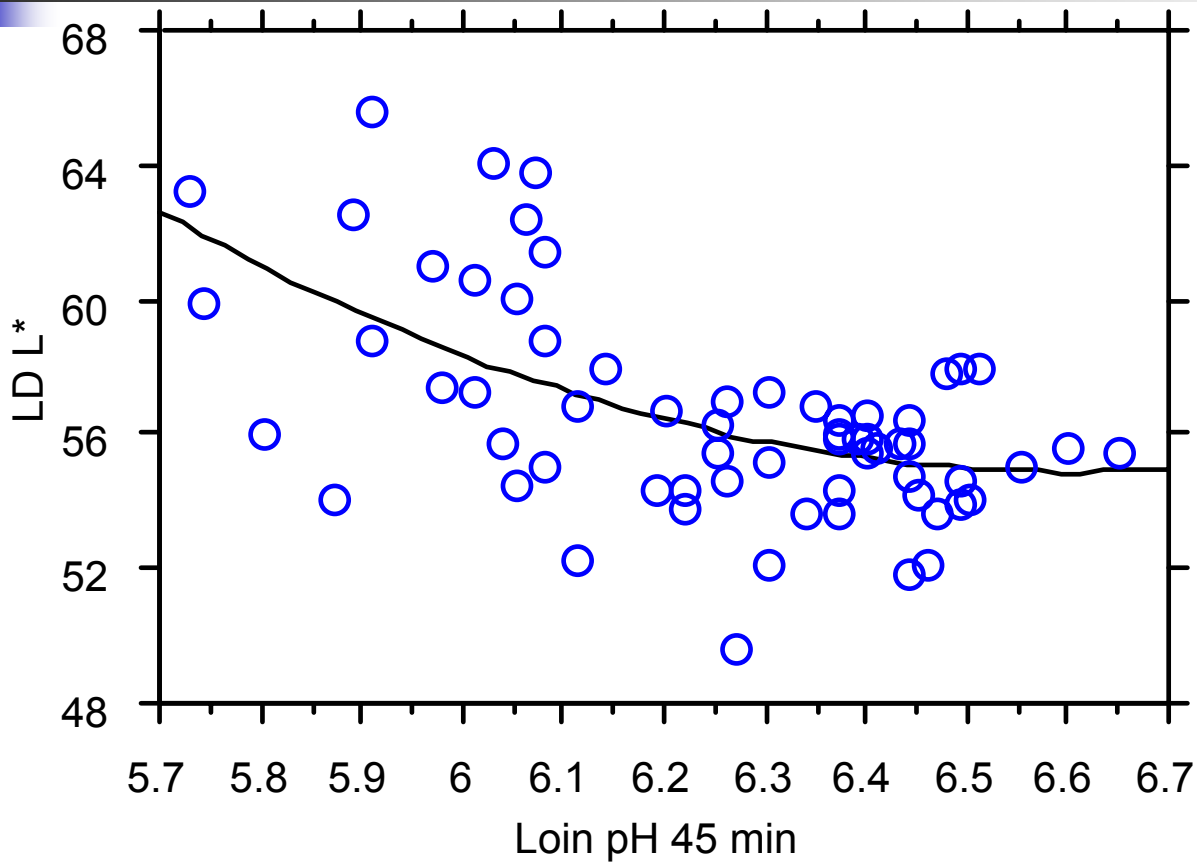
- pH decline
  - Rapid, early pH decline can cause Pale, Soft, and Exudative (PSE) pork





Genetics and Handling (both live animal and carcass) are the most common causes of PSE

Relationship between early postmortem pH and loin lightness



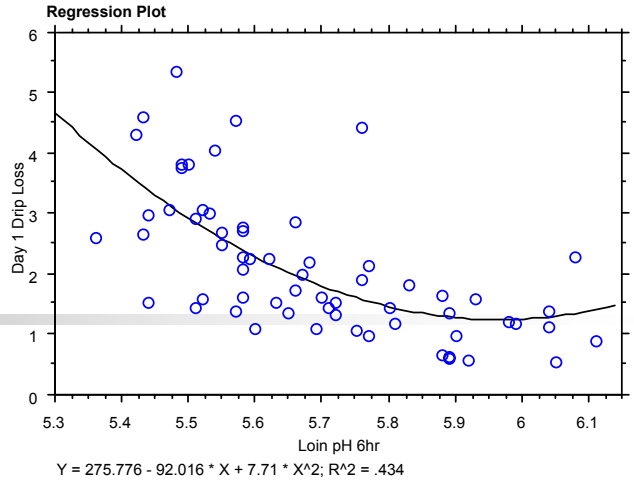
Gardner et al., 2002

Can Rearing System influence Pork Quality?

Definitely!

Rearing system can influence the early postmortem muscle metabolism, which can influence pork quality.

pH Decline



Measure	*Conventional*	*Free Range*	*P-Value*
pH 1h	6.33 ± 0.05	6.52 ± 0.04	<0.01
pH 4h	6.02 ± 0.06	6.19 ± 0.04	0.02
pH 24h	5.61 ± 0.02	5.55 ± 0.02	0.03
Glucose – 1hr	9.8 ± 0.5	7.7 ± 0.4	<0.01
Glycogen – 1hr	25.4 ± 2.4	34.9 ± 1.9	<0.01

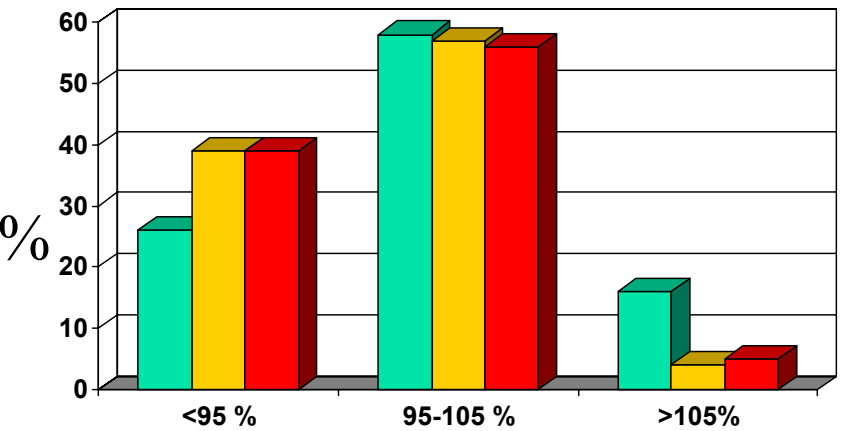
Lambooij et al. 2004. Meat Science 66:855-862

Firmness

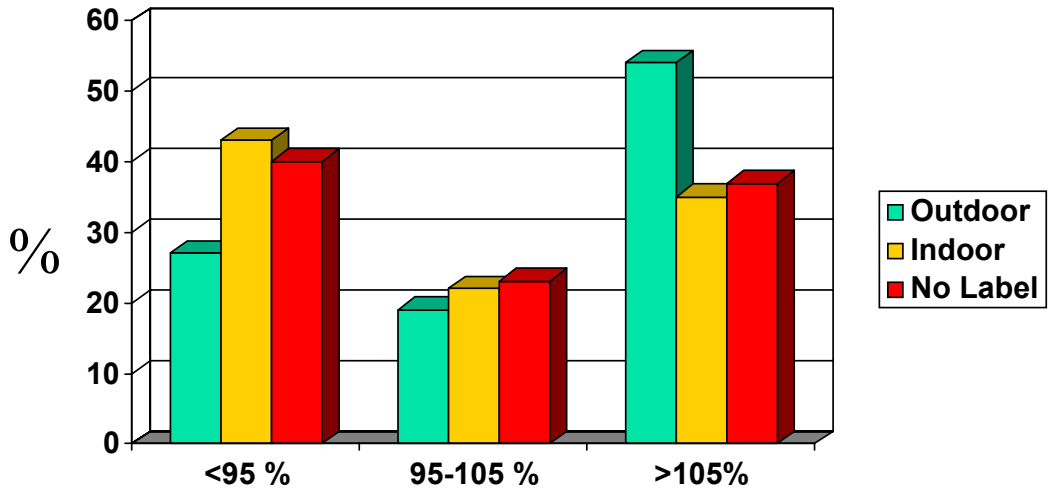
	Bedding	*Slats*	*SEM*	*P-Value*
Gentry et al., 2002, JAS 80:1781-1790	**2.7**	**2.3**	**0.14**	**0.02**
Patton et al., 2004, JAS 82, Supp 2	**1.8**	**1.6**	**0.045**	**<0.05**

System of production does influence consumers willingness to pay

British consumers



French Consumers



Dransfield et al., 2004.
Meat Science (In press)