

# How Animal Stress Affects Water-Holding Capacity (WHC)

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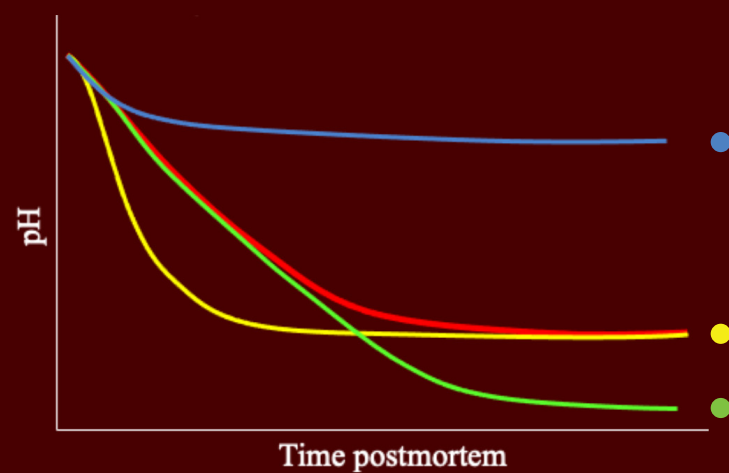
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## Yield

### The Process of Rigor

- At the time of death, the pH of muscle is near neutral (pH = ~7.1)
- The closer that we can keep the muscle to neutral, the better the WHC (See "How to Manage Water Holding" for Yield)
  - Low pH, lower WHC, and paler meat (susceptible to pale, soft, and exudative (PSE) meat).
- The muscle is metabolizing glucose in a process called glycolysis
  - Metabolizing 1 glucose = 2 lactic acid molecules
  - Glucose metabolism is a multi-step process that is impacted by anything that changes the metabolism



### Animal Stress Impact on WHC

- Sources of stress
  - Extremes in temperature, humidity, light, sound, and space
  - Unfamiliar surroundings
  - Human handling on the farm and at the processing plant
  - Transportation
  - Genetics
- High stress immediately before harvest stimulates the 'fight or flight' mechanism (**yellow line**) ●
- This speeds up the steps of metabolism and the rate of lactic acid production
  - Increased lactic acid production causes the pH to drop, leading to protein denaturation and reduced WHC
- High stress for long periods prior to harvest burns up excess glucose stores in the muscle (**blue line**) ●
  - There is less glucose which results in less lactic acid - a higher pH
  - Typical of dark, firm, and dry (DFD) or dark cutter meat

### Genetics

- Porcine stress syndrome (PSS) or the halothane gene
  - Animals are very susceptible to stress
  - Muscles are very high in glucose metabolism
  - While heavily muscled, meat quality and WHC is poor
  - *\*rarely seen due to genetic advancements*
- RN or Rendement Napole gene
  - Pigs synthesize greater amounts of glucose stores than normal
  - With greater amounts of glucose = greater amounts of lactic acid (**green line**) ●
  - Low pH results in low WHC

