

Ultimate pH affects Microbial Growth in Vacuum Packaged Pork



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Introduction

pH is a fast and easy measurement to collect and is currently one of many factors used to differentiate pork of varying quality. It is used as a selection criteria because it is a good indicator of pork color and water holding capacity. This is especially important when selecting product for branded programs or export. Yet, as pork is held for extended periods during transportation, the impact of higher pH on the shelf life of the product needs to be understood.

Objective

The objective of our research was to determine the effect of pH on the shelf life of vacuum packaged pork loins.

Methods

Product – Boneless pork loins (n=39) were selected from a population over a two week period (19 and 20 loins per week, respectively). pH for the population was measured at the 10th rib and this measurement was used for selection. Starting at a pH of 5.40, loins were randomly selected every 0.05 pH units (Fig. 1). When there were not enough loins in a given category, all loins within that category were selected. This occurred at the upper range of the pH scale.

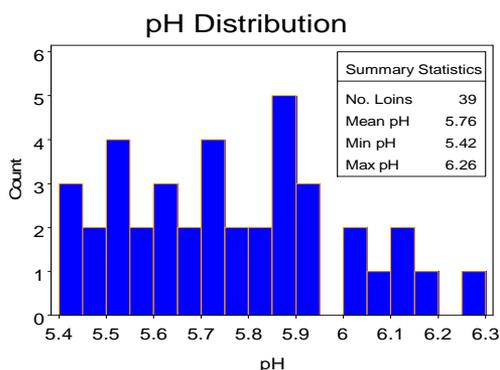
Fabrication and Processing – From each loin, a fresh surface was cut and swabbed for an initial microbial count (0d). The remainder of the loin was cut into 4 sections that were randomly assigned to storage periods of 7, 14, 21, and 28d in a vacuum bag at 2°C. After the respective storage times, loins were removed and swabbed for microbial count determination. A fresh chop was cut from each loin section, placed on a foam tray, covered with PVC and displayed at 4°C.

Visual Display– After being displayed for 15h, an initial evaluation (day 1) was made, followed by evaluation at 24 and 48h. Initial evaluation was performed for subjective color. Discoloration was evaluated at all three time points using a 10cm scale, where every 1cm was equal to 10% discoloration on the face of the chop. A five member panel was used for evaluations.



Aerobic Plate Counts – A sterile cotton tipped applicator and 5x5cm template were used for all microbial swabs. The template was sterilized by flaming between each sample. Each swab was placed in 10ml sterile 0.1% peptone, vortexed and serially diluted. Appropriate dilutions were plated in duplicate to enumerate aerobic bacteria on 3M Petrifilm™. Plates were incubated at 37°C for 48h. Plates with 25 to 250 colonies were counted and results are reported as log CFU/cm².

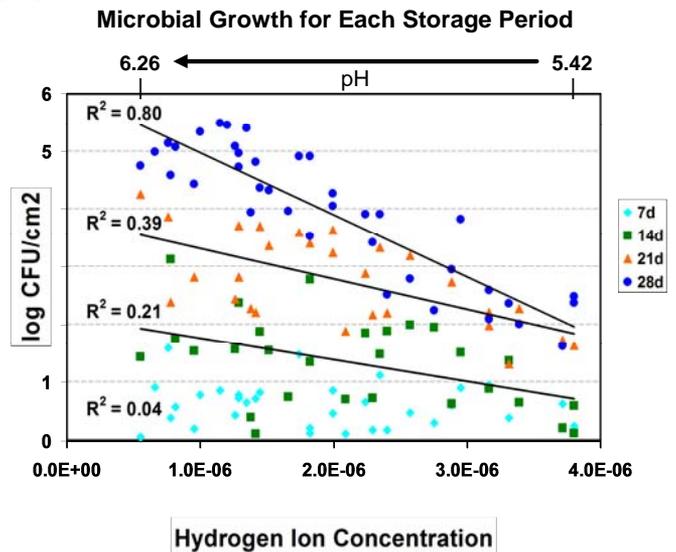
Figure. 1



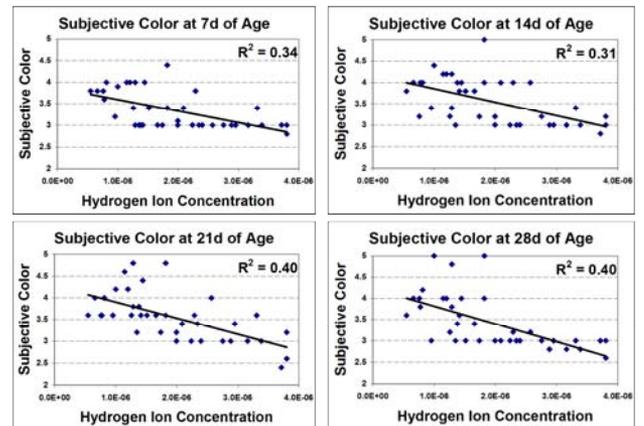
Statistical Analysis

Data were analyzed with the Proc Reg procedure in SAS. Linear regression models included the effect of hydrogen ion concentration (pH) on log CFU/cm², initial subjective color, or final discoloration for each of the aging times.

Results



Results



Conclusions

- > pH played a critical role in microbial growth for vacuum packaged pork loins, especially at extended periods of storage. High pH product had a 1000 times greater microbial load than that of the low pH samples at 28d.
- > Thirty to 40% of the variation in subjective color was explained by pH
- > There was minimal impact of pH on discoloration, after 3d of display. This was due in part to stable temperature conditions and minimal initial microbial contamination.
- > Selecting product based on pH may result in improved quality, but may predispose product to accelerated microbial growth and reduced shelf life.