Published April 25, 2019

2018 Reciprocal Meat Conference – Meat and Poultry Quality and Composition- Measurement and Prediction

Meat and Muscle Biology™

Effect of Machine, Anatomical Location, and Replication on Instrumental Color of Boneless Pork Loins

K. Barkley[1]*, A. Dilger[1], B. Fields[2], and D. Boler[1]

[1]University of Illinois, Urbana-Champaign, IL, 61801, USA; [2]PIC, Hendersonville, TN, 37075, USA
*Corresponding author. Email: kaylaeb2@illinois.edu (K. Barkley)

Keywords: color, instrumental color, Minolta, pork, variation
Meat and Muscle Biology 2(2):40 **doi:10.221751/rmc2018.035**

Objectives

When determining instrumental color, even when researchers use standardized equipment and the same device with the same operational settings, differences may still persist. It is also not known if the loin, machine, or replication is the greatest contributor to variability in instrumental pork. The objectives were to 1) evaluate the effects of machine, anatomical location and measurement replication on instrumental color and 2) characterize the variation to color contributed by each of these factors.

Materials and Methods

Boneless loins were collected from 2 groups of pigs (250 total) that were slaughtered 14 d apart. The first set contained 100 loins and the second set had 150 loins. Loins were aged until 14 d postmortem in the dark at 4°C. After aging, loins were removed from packaging and positioned on tables so that the ventral side was exposed to oxygen, then allowed to oxygenate for at least 20 min. Instrumental color was measured 3 times on the anterior end and 3 times on the posterior end of the loins with 2 different Minolta CR-400 Chroma meter devices. Each Minolta was programmed to use a D65 illuminant, 0° observer with an 8 mm aperture, and calibrated with white tiles specific to the machine. A total of 12 instrumental color measurements were collected on each loin. Color data were analyzed with the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) as a split-split plot design where loin served as the experimental unit. The whole plot was machine, the split plot was location, and the split-split plot was replication. The VARCOMP procedure in SAS was used to estimate the proportion of variation contributed by each factor to CIE L*, a*, b*, chroma, and hue.

Results

Loins evaluated with machine 1 were instrumentally 0.71 L* units darker ($P < 0.01$), 1.09 b* units more yellow ($P < 0.01$), 0.47 chroma units more saturated ($P < 0.01$), and had a hue angle 5.12 units greater ($P < 0.01$) than when evaluated with machine 2 but were not different ($P = 0.24$) in terms of redness. The anterior portion of the loin was lighter, less red, more yellow, more saturated and had a greater hue angle than the posterior end ($P < 0.01$). All color traits increased ($P < 0.01$) as replication number increased. Inherent color differences in the loin contributed the greatest proportion of variability for lightness (58%), redness (57%), yellowness (70%), saturation (70%) and hue angle (49%). Machine contributed a small amount of variation to lightness (1%) and saturation (3%), a greater amount to yellowness (23%) and hue angle (31%) but did not contribute to variability for redness. Anatomical location contributed 41% to lightness, 43% to redness, 7% to yellowness, 27% to saturation and 31% to hue angle. Replication did not contribute to total variation for any color traits.

Conclusion

Overall, there were differences in instrumental color values between the 2 machines tested but those differences were likely less than the threshold for detectability by a consumer. Even so, inherent differences in the loin was a greater contributor to total variability than the differences between the 2 machines.

