Published February 1, 2019

2017 Reciprocal Meat Conference – Undergraduate Research Competition

Meat and Muscle Biology™

The Effect of Aging Time on Metmyoglobin Reducing Activity

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Keywords: aging, meat color, metmyoglobin, reductase
Meat and Muscle Biology 1(3):161 **doi:10.221751/rmc2017.156**

Objectives

Color is the most important factor that a consumer uses to perceive meat quality and freshness. Meat color is primarily imparted by myoglobin. When meat discolors, myoglobin oxidizes from a bright cherry red oxymyoglobin form to a dark-brown metmyoglobin form. However, meat has the ability to limit discoloration and reduce the ferric brown metmyoglobin to ferrous deoxymyoglobin. The ability of meat to undergo reduction has been considered as the most important indication of color stability. Previous research showed that as meat ages, color stability decreases throughout display; however, the role of metmyoglobin reducing activity on beef color stability is unclear. Therefore, the objective of this study was to determine the effect of aging on metmyoglobin reducing activity.

Materials and Methods

USDA choice strip loins (n = 8) were sliced into 5 equal sections, vacuum packaged, and designated to 1 of 5 aging period treatments (0, 7, 14, 21, or 28 d). At each respective aging period, 2.54 cm steaks were sliced from each section. The first steak was packaged into PVC overwrap and stored in a simulated retail display for 6 d. The second steak was used to characterize d 0 metmyoglobin reducing activity (MRA) and NADH-dependent reductase activity. The surface color was measured every 24 h using a HunterLab colorimeter. Following surface color measurements, MRA was measured on 6 d of display. Data was analyzed using the Mixed Procedure of SAS (SAS Inst. Inc., Cary, NC) and the results were considered significant at $P < 0.05$.

Results

Aging time decreased color stability of steaks during display. By the end of 6 d display, the redness reduced by 58% for 28 d aged steaks, compared to 0 d aged. On d 0 at each aging period, MRA showed no difference between aging periods ($P > 0.05$). However, on d 6 of display MRA decreased ($P < 0.05$) with an increase in the aging period. Interestingly there were no differences ($P > 0.05$) in NADH-dependent reductase activity on d 0 of each aging period.

Conclusion

In conclusion, as aging period increases, beef color stability decreases. There were no differences in MRA and NADH-dependent reductase activity before display at each aging period. However, combined effect of aging time and display time decreased MRA and color stability. The results suggest that oxidative stress during display time may deplete reducing equivalents for MRA faster than the aging time.

