

Project Summary

Shelf-Life of Veal Shoulder Muscles During Cooler Aging

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Background

Recent studies conducted by scientists at the University of Florida and the University of Nebraska have characterized multiple muscles from the veal chuck. Six of these muscles were identified as desirable in tenderness, juiciness and flavor. The objective of this project was to further characterize the shelf-life stability and color evaluation of these promising veal muscles to determine their performance in a retail setting.

Methodology

Four Choice rib, square-cut veal chucks (IMPS #309) were randomly selected at two separate veal processors. These chucks were taken directly from the fabrication lines at the processing plant and then dissected by a professional de-boner to obtain the following muscles: Complexus (COM), Deep pectoral (DEP), Infraspinatus (INF), Serratus ventralis (SEV), Supraspinatus (SUP) and Triceps brachii (TRB). The time to extract and partially denude the muscles was recorded along with weights to determine yields. Muscles were then allowed to bloom for 15 minutes and color measurements were taken using a Minolta CR-310 Chroma meter. After color measurements, each muscle was cut in half, vacuum packaged and boxed for shipment to the University of Florida.

Upon arrival, the muscles were held at $34\pm 2^{\circ}\text{F}$ for a pre-determined aging period of 5, 12, 19 or 26 days postmortem. The carcasses and sides were randomly assigned to these aging periods and all muscles from a particular carcass and its side was represented in that same aging period. Following aging, muscles were removed from their packages and weighed to determine packaging purge. Muscles were placed in foam trays with soaker pads and covered with a single layer of polyvinyl chloride over-wrap and color measurements were taken using a Minolta meter each day of retail display. The muscles were also visually evaluated by a trained, five-member panel and scored for overall appearance and purge. All muscles were presented in the retail case for three days with color measurements and objective evaluation on each day of the study (day 0, 1, 2, 3). After the third day, muscles were removed from the foam trays and a final weight was taken to determine retail display purge.

Findings

Purge Measurement & Overall Appearance

Percent packaging purge was determined for each muscle by subtracting the blotted muscle weight and the dry package weight from the overall meat and package weight. Percent retail purge was calculated by subtracting the out-of-case weight from the in-case weight and dividing by the in-case weight. The muscle with the most purge in the study was the DEP with an overall purge of 0.05% from packaging through retail display. It was determined that days of post-mortem aging had a significant effect on subjective evaluations for overall appearance of some muscles. The three muscles that showed no effect due to days of aging were the DEP, INF and TRB. These three muscles are most likely to retain their overall appearance when aged in vacuum sealed packaging at $34\pm 2^{\circ}\text{F}$ for up to 26 days postmortem.

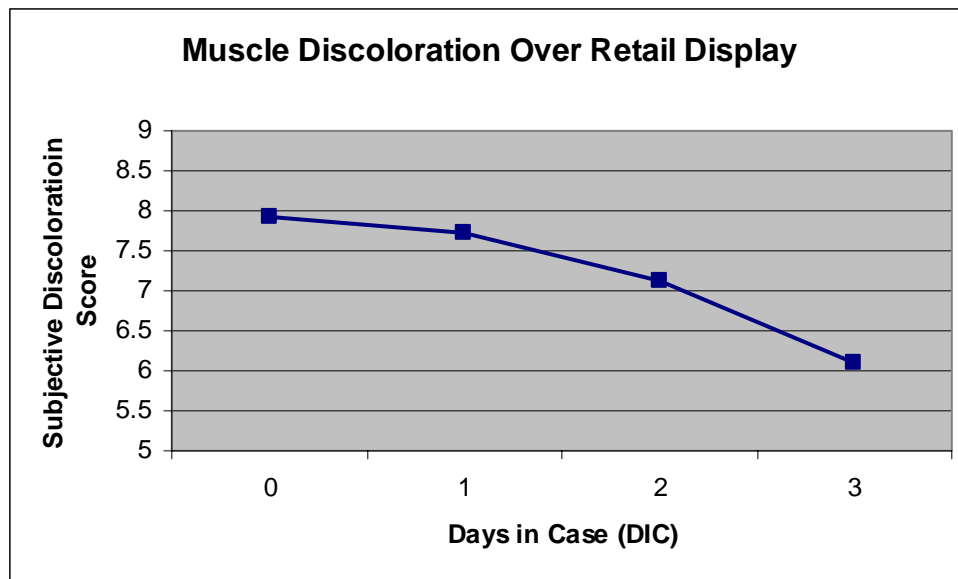
Subjective Color & Purge Evaluations

Days of postmortem aging had a significant effect on subjective color scores for all muscles represented in this study. Again, the three muscles that are most likely to retain their color over the

four aging periods include the DEP, INF and TRB. The SUP demonstrated a decline in color between 5 and 12 days of aging but retained this color value through 26 days of aging. Postmortem aging had significant effects on the color evaluation for each day in the case. Muscles with more postmortem age were lighter in color for all but day zero of retail display. On day zero, muscles with 26 days of age had the darkest subjective color scores.

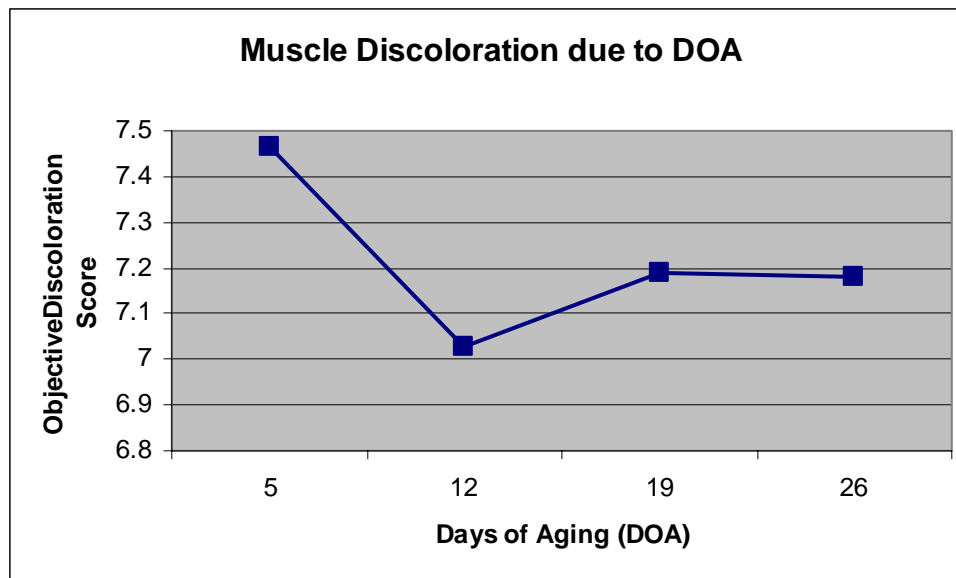
All muscles in the study reacted similarly for color evaluation over the retail display period. The largest decline in color was observed between the first and second day of retail display, but none of these days were significantly different from each other. Postmortem aging also had a significant effect on muscle discoloration during retail display. The three muscles that did not show a postmortem age effect on discoloration were the DEP, INF and SUP. The COM and SEV muscles with greater than 5 days of postmortem age had more discoloration. As expected, an increase in discoloration was noted for all days of retail display with the largest increase coming after day 1. The mean discoloration score for day 3 was comparable at 10% discoloration when averaged across all six muscles. Muscles aged for 12 days were found to have the most discoloration when averaged over the retail display days.

Muscle discoloration over retail display ¹.



¹Scale of 1-8 with 8 = No discoloration, 1 = 100% discoloration.

Overall means for discoloration for each aging period¹.



¹ Scale of 1-8 with 8 = No discoloration, 1 = 100% discoloration.

² Means for each aging period over three days of retail display.

Days of postmortem age had a significant effect on subjective muscle purge scores. The aging period that most commonly represented the highest amount of purge was the 26 day aging period. Days of aging also had a significant effect on subjective purge evaluations over the retail display period and interaction was detected between aging periods and between days in retail display. It should be noted that no aging period or retail display period was undesirable in subjective purge (all values between barely detected and none detected).

Objective Color Evaluations

Days of postmortem aging had a significant effect on L^* values (lightness). L^* values remained constant for the 5 and 12 day aging periods but an increase in these values was noted between the 12 and 19 day postmortem aging periods. L^* values reacted to retail display day similarly for all muscles. A slight increase in L^* values occurred between days zero and 1 of retail display and a decrease in these values was found between day 1 and 2 of display, concluding that these muscles become darker after day 1 or retail display.

Days of postmortem aging had a significant effect on a^* values (redness). The greatest change in these values was from the 5 day aging period to the 12 day aging period. Days of retail display also had a significant effect on a^* values. The COM and SEV became less red in color during retail display. Other muscles were not consistent in terms of a^* value changes and differences were small during these three days of retail display.

Days of postmortem aging had a statistically significant effect on b^* values (yellowness). Similar to a^* values, the largest increase in b^* values was between the 5 and 12 day aging period. Days of retail display also had a significant effect on b^* values. The most apparent difference in the muscles occurred between day zero and day 1 of retail display. All muscles increased in b^* values after being displayed for one day. This reveals that the muscles became more yellow after the first day of retail

display, but retained their b^* value throughout the remaining retail display days. There was also a significant increase in b^* values between the 5 and 12 day aging periods while not other aging periods were significantly different.

Implications

Muscle discoloration of the DEP, INF and TRB was not affected by postmortem aging, nor did postmortem aging have an effect on overall appearance for the 3 day retail display period for these muscles. The greatest impact of postmortem aging on objective color (L^* , a^* , b^*) values was observed between the 5 and 12 day postmortem aging periods. Between these two periods the muscles became darker, redder and more yellow. The muscles then retained this color throughout the remaining aging periods (up to 26 days of age). Although there was a significant effect of postmortem aging on objective color, the overall impact on veal muscle characteristics was small.

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