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## Effects of Lactic Acid Dipped Beef Trim Stored 24 or 48 H and Chub Storage Duration on Ground Beef Color in Retail Display

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## Objectives

The study evaluated objective and subjective retail display color of ground beef produced from beef trim treated with or without lactic acid dip and stored 24 or 48 h prior to chub packaging and storage for 7, 14, or 21 d.

## Materials and Methods

Ground beef produced from trim treated (TRT) with lactic acid dip (LA) or without (CON) and stored 24 h (24TS) or 48 h (48TS) was used. Samples ( $n = 84$ ; 21/TRT, TS combination) were chub vacuum packaged (4.54 kg) and stored for 7, 14, or 21 d (CS) and finely ground when storage time completed. Ground beef was placed on a polystyrene tray overwrapped with low-barrier polyvinylchloride film. Packages were displayed for 3 d (2 to 3°C) under continuous fluorescent lighting. CIE  $L^*$   $a^*$   $b^*$  values were taken daily during simulated retail display to calculate hue angle ( $\tan^{-1} a/b$ ) and saturation index  $[(a^2 + b^2)^{1/2}]$ . Trained panelists ( $n = 6$ ) evaluated worst-point lean color daily during retail display with an 8-point verbally anchored numeric scale with 0.5 increment scores (1 = very bright red, 8 = tan to brown). Data were analyzed as a split plot design with whole plot as a  $2 \times 2$  factorial of TS and TRT and subplot combined CS with retail day.

## Results

Visual color scores and  $L^*$  values differed ( $P < 0.0001$ ) among CS times and retail display day, as expected. Treatment, CS and retail display day interacted ( $P < 0.05$ ) for  $a^*$ , saturation index, and hue angle. Hue angle and  $a^*$  values indicated a loss of redness ( $P <$

0.05) within TRT and CS as retail display increased. Initial display  $a^*$  values within TRT did not differ ( $P > 0.05$ ) across CS, but LA treated chubs were more red ( $P < 0.05$ ) than CON regardless of CS. Chubs stored 7 or 14 d had similar ( $P > 0.05$ ) hue angles and were less discolored ( $P < 0.05$ ) than 21 d stored chubs regardless of TRT at 0 d of display. Hue angle and  $a^*$  values did not differ ( $P > 0.05$ ) between LA and CON within CS after 0 d of display. Saturation index, or vividness, for 7 d stored chubs decreased ( $P < 0.05$ ) the longer packages were displayed in retail, but chubs stored 14 and 21 d had similar vividness ( $P > 0.05$ ) within d 2 and 3 of display. At initial display, chubs treated with LA were more vivid ( $P < 0.05$ ) than CON within CS. Lactic acid treated and CON chubs did not differ ( $P > 0.05$ ) within CS at d 1 and 3 of display. Chubs stored 7 d were more vivid ( $P < 0.05$ ) than 14 and 21 d stored chubs, which did not differ ( $P > 0.05$ ) at d 1, 2, and 3 of display. The vividness of LA treated chubs was greater ( $P < 0.05$ ) than CON for 7 d stored chubs at d 2 of display. A TS  $\times$  CS retail day interaction ( $P < 0.05$ ) was observed for  $a^*$  and saturation index. Saturation index and  $a^*$  values for TS were similar ( $P > 0.05$ ) within chubs stored 7 and 21 d at retail d 1 and 2 of display, but no redness differences ( $P > 0.05$ ) within CS were observed at d 3 of display. Saturation index and  $a^*$  values decreased ( $P < 0.05$ ) as package display time increases within TS and CS, except 48TS vividness did not differ ( $P > 0.05$ ) between d 2 and 3 of display.  $L^*$  and  $b^*$  values indicated LA treated chubs were lighter and more yellow ( $P < 0.05$ ) than CON. Hue angle indicated 48TS was less red ( $P < 0.05$ ) than 24TS.

## Conclusion

Longer trim and chub storage is detrimental, but LA combined with other factors can delay discoloration.