

Public Abstract

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Title:Contemporary Light Sources and Their Impact on the Discoloration and Oxidation of Fresh Beef Products

Discolored fresh meat products in a retail setting are often perceived negatively by consumers when making purchasing decisions. Variation in retail display settings can impact meat color shelf life from both a discoloration and oxidation standpoint. Lighting technologies are known to impact meat discoloration due to light intensities and temperature variations. A growing demand for the use of energy efficient lighting sources such as light emitting diode (LED) bulbs is being adopted in the United States. Three trials were conducted to determine the impact of LED lighting technologies in comparison to commonly used fluorescent (both low [FLO] and high – UV [HFLO]) bulbs, and no light source (DRK). In a study conducted on ground beef from the Semimembranosus (SM) (n = 20) patties at two different fat levels (5 and 25%) had superior a* values, oxymyoglobin concentrations (MbO₂), and lipid oxidation levels (TBARS) than those treated with LED or FLO light sources over 7 days of retail display. Patties displayed under LED bulbs had higher a* values and MbO₂ concentrations than patties displayed under FLO light sources. Data indicated that the use of LED bulbs on ground beef promoted greater red color retention and less oxidation than FLO bulbs in a retail display setting. To evaluate retail display settings and fresh beef cuts further, two whole muscle cuts one color labile cut (Triceps brachii [TB]) (n = 20) and steaks from the SM (n = 20), known to be moderately color stable were evaluated under HFLO, FLO, and LED light sources over 7 days of retail display. For both whole muscle cuts, the use of HFLO light sources promoted greater redness retention as indicated by MbO₂ and a* values, less lipid oxidation as indicated by TBARS values, and less undesirable metmyoglobin (MMb) formation in comparison to steaks displayed under FLO or LED light treatments. The use of LED bulbs for prolonged ground beef retail display was superior to other light sources. However, ground beef is rarely displayed in retail settings for an extended period of time. The use of LED bulbs showed no advantages when displaying whole muscle cuts.