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Title: Shelf life of five meat products displayed under light emitting diode or fluorescent lighting

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Major Professor: Elizabeth A. E. Boyle

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Abstract: Light emitting diode (LED) and fluorescent (FLS) lighting effects on enhanced pork loin chops, beef longissimus dorsi and semimembranosus steaks, ground beef, and ground turkey displayed in two retail display cases set up with similar operational temperatures were evaluated using visual and instrumental color, Enterobacteriaceae (EB) and aerobic plate counts (APC), internal product and case temperatures, and thiobarbituric acid reactive substances (TBARS). Visual discoloration of the five meat products increased ($P < 0.05$) as display time increased. Beef longissimus dorsi steaks, ground beef, and the superficial portion of beef semimembranosus steaks had less ($P < 0.05$) visual discoloration under LED lighting than FLS. Compared to FLS, pork loin chops under LED lighting had higher ($P < 0.05$) L^* values and a lower ($P < 0.05$) a/b ratio. The deep portion semimembranosus steak under LED was redder ($P < 0.05$) and the superficial portion had a lower ($P < 0.05$) a/b ratio; LED deep and superficial portion semimembranosus steaks had higher ($P < 0.05$) saturation index values at 5.18 and 4.47, respectively, on d 0 than FLS. Pork chops under LED lighting had lower ($P < 0.05$) APC populations than FLS by the end of display. Enterobacteriaceae populations fluctuated throughout display on ground turkey under FLS lighting while populations remained stable under LED. APC populations increased as display time increased for pork loin chops, ground beef and ground turkey, but not beef longissimus dorsi steaks possibly due to initial case-ready postmortem age. As display time increased, EB populations increased ($P < 0.05$) for pork loin chops, ground beef and ground turkey. The internal temperature of all products, except beef longissimus dorsi steaks, was lower ($P < 0.05$) in the LED case. FLS case temperatures were higher ($P < 0.05$) by 0.56 to 1.11°C than LED over the duration of the study. Pork loin chops, ground turkey,

and beef semimembranosus steaks had higher ($P<0.05$) TBARS values by 0.06 to 0.24 mg malonaldehyde/kg under LED lighting, but lighting type did not affect ($P>0.05$) lipid oxidation of beef longissimus dorsi steaks or ground beef. LED lighting results in lower display case temperatures, lower internal product temperatures, and extended color life; however, lipid oxidation was increased in some cuts under LED lighting.

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