

# Lighting type affects ground beef color

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Ground beef is a very popular protein option at the grocery store. In fact, in terms of volume, 64% of total beef purchased is ground beef. When choosing a package of ground beef from the retail case, consumers rely heavily on the color of the meat to make their decision. The most desirable color is bright, cherry red. Once the meat changes to a brownish color, consumers tend to leave it, resulting in discounted meat and a total loss to retail stores of over \$1 billion dollars annually.

Is there a way to slow this process of fading of redness? Jade Cooper and colleagues at the University of Missouri recently looked at the effect of retail display lighting on ground beef color. Their research was published in the October 2016 issue of the *Journal of Animal Science*. The article is freely available (open access). It examines how lighting affects myoglobin (the protein responsible for meat pigmentation) and lipid oxidation.

Typically, retailers use fluorescent lighting in their cases. However, the present study and previous research show that fluorescent lighting can increase the temperature in the cases, increasing the rate of discoloration. LED lights have a higher light intensity, but produce less heat, are more efficient, and last longer. The corresponding author, Dr. Carol Lorenzen, says LED lights are less common because of initial cost of case conversion. According to the Department of Energy, only 5% of all lights in the US are LEDs but by 2035 it is expected to be 85%, which will lead to a 75% decrease in energy consumption.

To conduct the trial, ground beef patties at both 5 and 25% fat were

placed in deli cases with either low UV fluorescent lighting, LED lighting, or no light. Patties were removed on days 1, 3, 5, and 7 to determine objective color, myoglobin concentrations, and lipid oxidation.

The longer the ground beef was in the display case, the more discoloration occurred, regardless of lighting. On each of the days of retail display, the case with no light had more desirable red color, compared to the other two cases. Interestingly on day 5, the patties under LED lighting retained a better red color than the patties under fluorescent lighting.

Lorenzen says that ground beef is likely to be in the retail case for less than 4 days, due to supply and demand. She explained that extending retail display to seven days within the study allowed for analysis of patties through the end of shelf life.

Ground beef fat content also played a role in redness. Patties with 25% fat were less red than 5% patties on days 1, 3, and 7, regardless of light treatment. According to the authors, these results were expected as there is less visible lean in the 25% fat patties compared to the 5% patties. When purchasing ground beef, consumers should remember that ground beef with greater fat content will have less red lean meat content, and so will often be visually lighter in color.

In summary, Lorenzen states, "LED light bulbs are a viable alternative to fluorescent lights for [ground beef](#) display." Currently, the group of researchers is working on a similar study using whole muscle cuts to see if the results can be replicated on other cuts of beef.

**More information:** J. V. Cooper et al, RAPID COMMUNICATION: Impact of contemporary light sources on oxidation of fresh ground beef, *Journal of Animal Science* (2016). [DOI: 10.2527/jas.2016-0728](https://doi.org/10.2527/jas.2016-0728)

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