The Influence of Retail Display Lighting and Packaging System on Beef Flavor

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Introduction

•Meat flavor can be affected by the retail display lighting and packaging system.

•Characteristics of color, lipid oxidation, and sensory can be altered depending on the type of packaging used.

Objective

The objective of this investigation is to determine the effect that the different types of packaging may have on meat as well as the retail displaying lighting.

Materials and Methods

•Subprimals were collected from USDA choice beef carcasses.

•At 7d postmortem muscles were sliced to 1" steaks which were assigned (n = 120/muscle) to packaging treatments

•Steaks were stored an additional 13 days prior to retail display.

•Retail display occurred for 72 hours under fluorescent lights (FL) or light-emitting diodes (LED), with a third treatment remaining in dark storage (DARK).

•Steaks were cooked to a medium doneness (71C) and cut to 0.5" cubes.

•Consumers (n=300) rated flavor, juiciness, tenderness, and overall liking on a 100 point scale (0 = dislike strongly, 100 = like strongly).

•Subprimals used were: Longissimus lumborum (LL), Psoas major (PM), Gluteus medius (GM), Triceps brachii (TB), Semimembranosus (SM)

•Packages used were: Carbon monoxide, CO; high-oxygen modified atmosphere, HIOX; traditional overwrap, OW; vacuum rollstock, ROLL.

Results

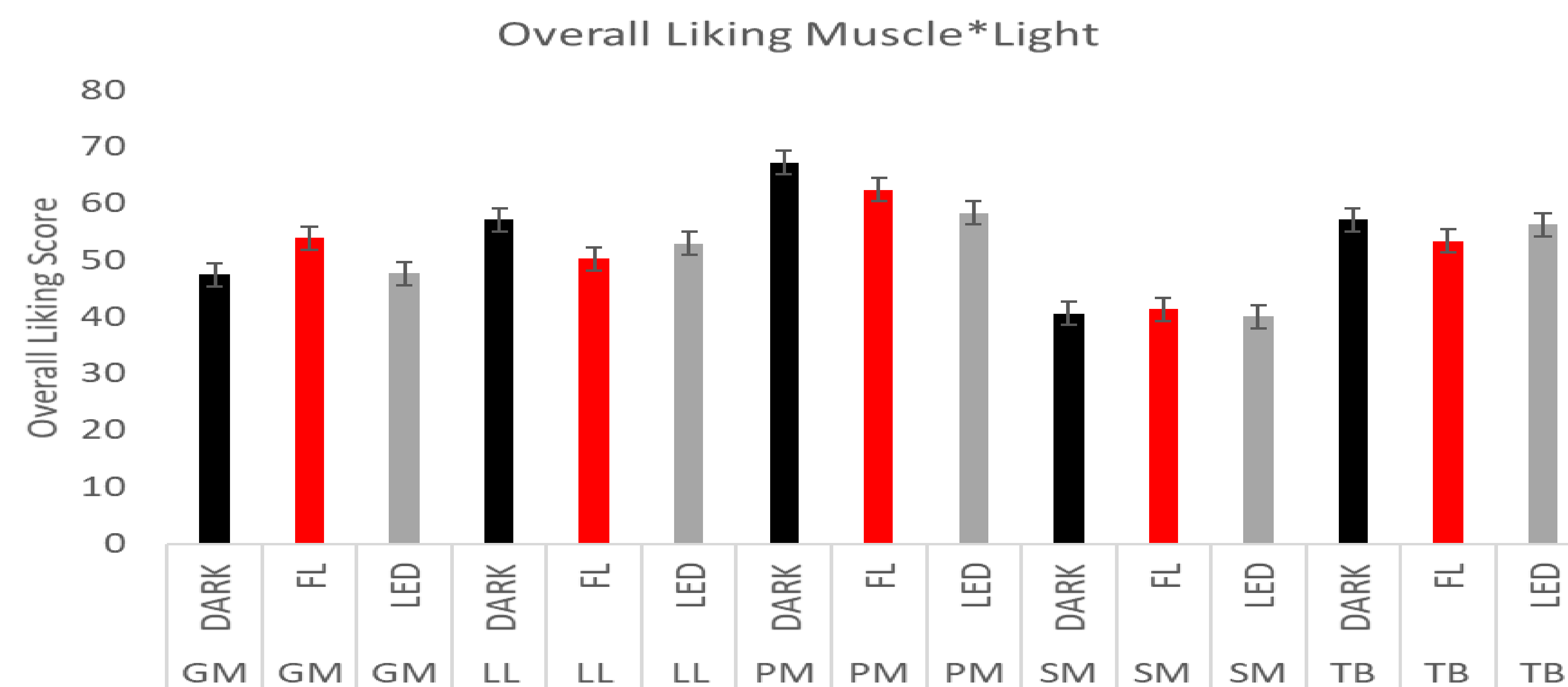**Graph 1.** Interaction between muscle and lighting, overall liking scores.

Table 1. The effect of package type on trained sensory panel flavor attributes.

Package	Beef ID	Brown/ Roasted	Bloody/ Serumy	Fat-like	Oxidized	Cardboard	Umami	Sweet	Salty	Bitter	Sour
CO	50.1[b]	45.0[ab]	13.4[b]	17.0[b]	24.5[b]	10.4[b]	34.6[b]	7.4[b]	9.9[b]	13.9[b]	13.5[b]
HIOX	48.8[c]	46.2[a]	11.8[c]	17.0[b]	29.1[a]	12.4[a]	33.6[c]	6.5[c]	9.8[b]	15.0[a]	14.5[a]
OW	50.8[b]	44.9[b]	13.9[b]	17.5[b]	23.4[b]	9.9[b]	35.2[b]	7.7[b]	10.2[b]	13.4[b]	12.4[c]
ROLL	53.5[a]	43.9[b]	16.2[a]	18.7[a]	20.9[c]	8.3[c]	38.6[a]	8.6[a]	11.2[a]	12.0[c]	12.2[c]
p-value	<0.0001	0.0025	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

[1]Carbon monoxide, CO; high-oxygen modified atmosphere, HIOX; traditional overwrap, OW; vacuum rollstock, ROLL.

[2]Least squares means within a column lacking a common superscript differ ($P < 0.05$).

Conclusion

•Overall, vacuum rollstock had the highest score in beef id attribute. HIOX had the highest scores in undesirable attributes such as oxidized, bitter and sour.

•Dark storage had the best likability in three out of five muscles.

Recommendation

Future studies can include free iron, TBARS and volatile compound analysis to determine the relationship between these compounds and how they are generated upon lipid oxidation; and the contribution of each compound to developing meat flavors.

Figure 1. HIOX packaging under fluorescent and LED lighting.

Figure 2. Vacuum Rollstock packaging under fluorescent and LED lighting.

References

• Ponce, J. A., J. F. Legako, J. C. Brooks. 2018. Beef muscle and packaging type influence descriptive sensory attributes. J. Anim. Sci. 96 suppl 1-1:29

• AMI/FMI. 2012. "The Power of Meat". Published by AMI and FMI

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