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CASE STUDY

Lighting Best Practices for Vacuum-Packaged Fresh Proteins

In late 2016, Hillphoenix and Sealed Air sponsored a study that compared consumer assessments of Hillphoenix's new proprietary Clearvoyant® LED lighting technology to existing "cool" and "warm" levels of fluorescent lighting when used to illuminate vacuum package technology. The research compares light temperatures to determine its effect on consumer purchase intent regarding various packaged protein products. The study supports efforts to encourage the adoption of vacuum packaging for fresh proteins.

Vacuum packaging of meat products displayed in retail refrigerated display cases grew from 10 percent in 2002 to 24 percent in 2015 while PVC packaging decreased from 51 percent to 33 percent. For retailers, the benefits include extended shelf life, less handling within the store, less shrink and more time for employees to help shoppers and keep cases stocked and organized. Consumers also benefit from extended shelf life, which allows more flexible meal planning. In addition, vacuum packages are leak-proof and freezer-ready with no freezer burn during storage.

Promoting acceptance of Vacuum Packaged Meat

A key hurdle for faster and broader acceptance of VPM (vacuum packaged meat) is consumer acceptance of the meat color at the display case. Under vacuum, beef and pork have a darker color compared to what shoppers are used to seeing. Once opened, the meat is oxygenated, and the color changes to the shade shoppers recognize from meat overwrapped in foam trays.

Ninety percent of retail display cases in North America are equipped with fluorescent lighting in 3500K (a cooler blue tone) and 3000K (a warmer color tone) which are both very common color temperatures used for meat and other proteins. However, the transition to LED lighting in retail cases is growing, and with the tremendous ROI from operating efficiencies, this number will continue to grow. Additionally, LED technology enables tuning of the spectral output which creates opportunities to utilize cleaner, brighter color, which enhances product appearance and integrity. At the time of this study, Hillphoenix had developed the Clearvoyant® 3+ LED with a broader spectral output to provide more natural lighting that had a positive impact on the color of vacuum-packaged beef.

This test focused on comparing available lighting colors to determine their effects on consumer purchase intent on various protein products with a primary focus on beef.

Consumers initially reacted to each of three case lighting conditions, one at a time. As each case and product was evaluated independently, opaque curtains were closed in front of the other two cases. The order of case exposure was randomized to mitigate potential order biases. In the last step, all the curtains were raised, and consumers could select the case they preferred through direct comparison.
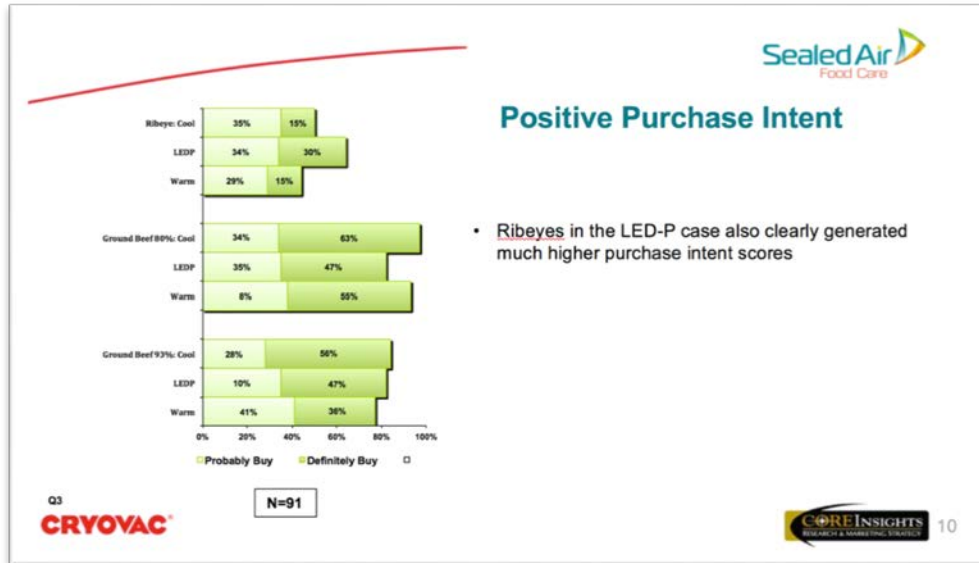

Judged independently, each of the three cases was rated similarly for overall appearance. Using a scale on which 1 represents "poor" and 10 indicates "excellent," the cool case was rated 7.1, the LED case was rated 6.9 and the warm case 6.8.

When consumers viewed each case individually, with no knowledge of the difference between them, overall approval for 80% and 93% ground beef remained consistent across all three lighting scenarios.
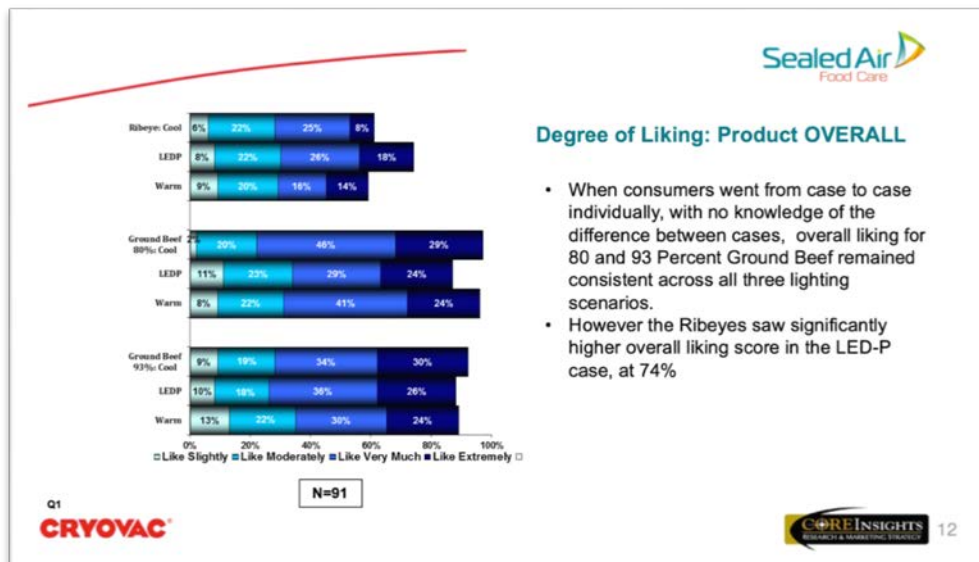
However, the noticeably redder ribeyes scored significantly higher in the Clearvoyant "LED-P" case and generated the highest ratings for appearance, freshness and overall quality. When consumers were asked to directly compare the cases and select the most appealing case for ribeyes, the Clearvoyant "LED-P" case was preferred. The ribeyes in the Clearvoyant "LED-P" case had a noticeable red color which made the marbling more noticeable and appealing, compared to a rather dull, brownish-yellow color in the cool and warm cases. The Clearvoyant "LED-P" maintained the natural appearance of both the red color and the white marble of the meat, neither of which can be seen with LEDs and fluorescent lights under normal conditions.
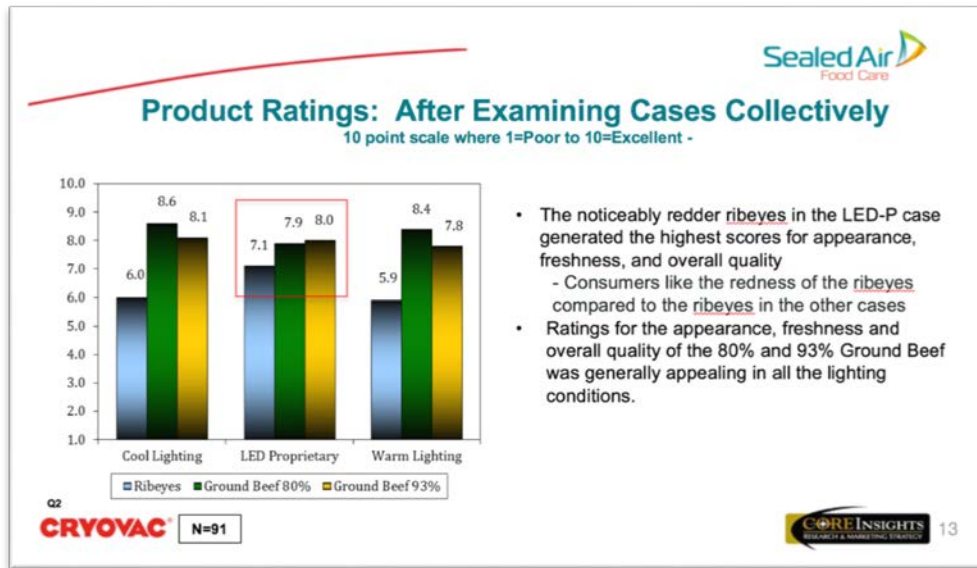

The other proteins tested were pork, poultry and fish (salmon and tilapia).

Pork: Purchase intent in the Clearvoyant "LED-P" lighting case was sometimes generated by the pink color tone of the meat, but some of the consumers who expressed negative purchase intent thought the accentuated pink looked unnatural compared to the color to which they were accustomed. The purchase intent for pork was lowest in the warm lighting case which created a dull brown color tone.
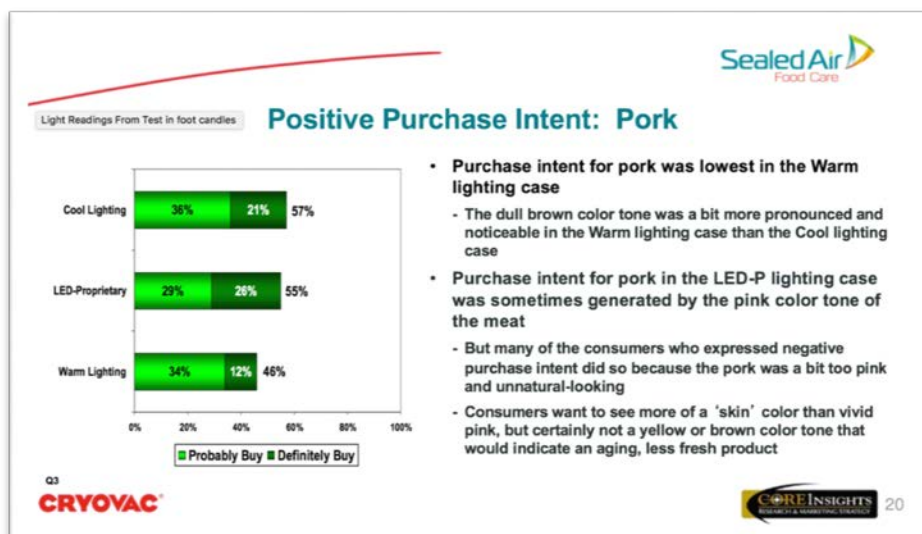
Chicken: The Clearvoyant "LED-P" case generated higher *definite* purchase intent, 49%, compared to 35% for the cool lighting and 34% for the warm.
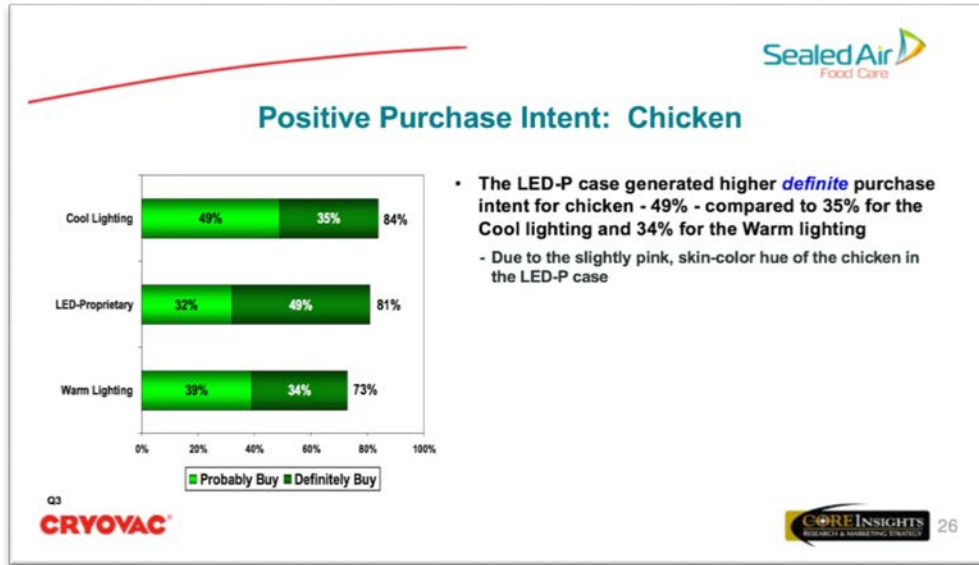

Salmon: Its bright pink and orange color tones consistently communicated freshness and overall product quality, achieving very strong scores for purchase intent in all three cases.
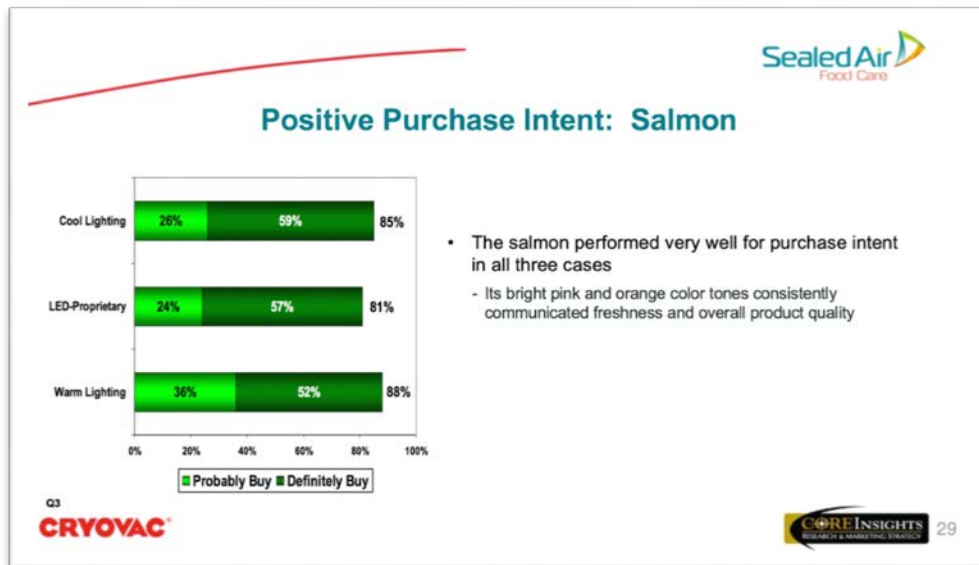
<u>Tilapia:</u> When viewed independently, the three cases generated similar purchase intent scores. Only a small minority of consumers viewed the tilapia in the warm lighting case as too brown, dull, or "off-colored." Many consumers would like to see whiter, pinker tilapia before they express *definite* purchase intent. It is important to note that purchase intent for tilapia is likely to be comparatively low generally because it is not purchased as frequently as more mainstream products such as chicken and ground beef.
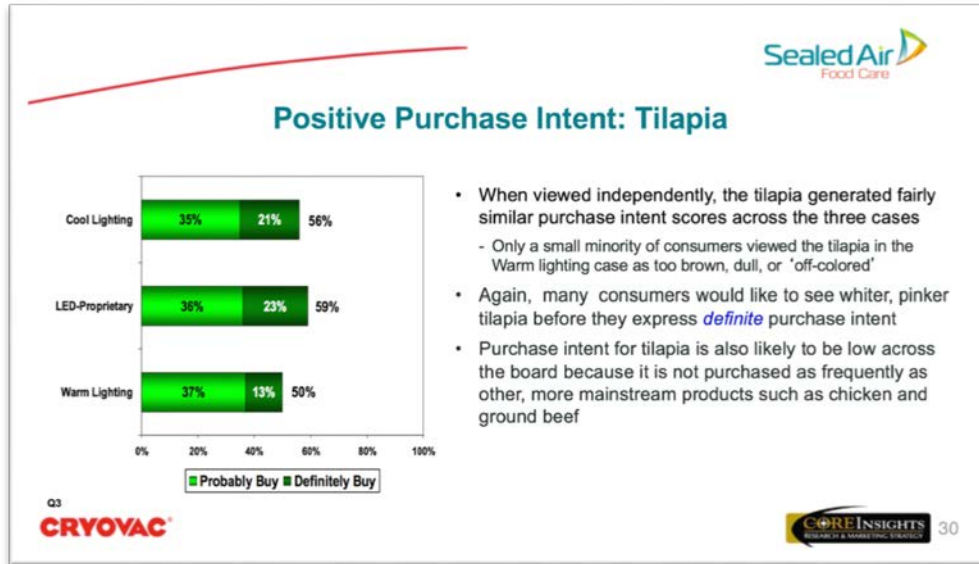
Overall, pork and tilapia did not perform as well as ground beef and salmon. While overall desire was high for chicken, in the cool and warm lighting cases, ratings often fell in the "like moderately" or "like very much" categories. All four additional products tested similarly in the three lighting treatments, with warm lighting slightly less favorable for pork and tilapia. When asked to compare the cases side by side, consumers still rated the additional proteins similarly across all three lighting treatments, with the exception of pork, which had a lower rating under warm lighting.
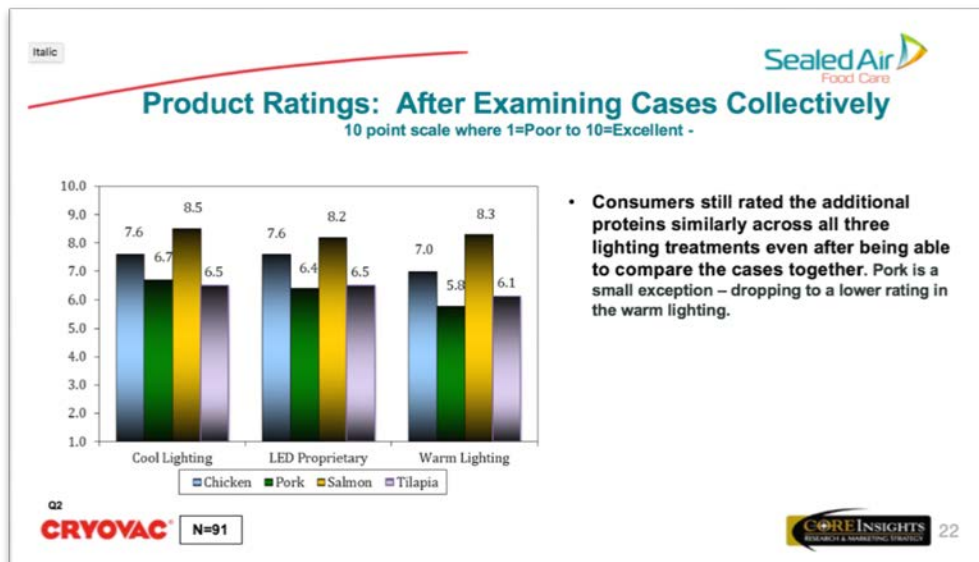
When all three cases were viewed simultaneously, the Clearvoyant "LED-P" lighting was considered to be most appealing, chosen by 50% of the consumers, who ranked ribeyes, ground beef, salmon and tilapia most appealing in that case. The 22% who preferred the cool lighting and the 28% who preferred the warm did so because both were noticeably brighter than the Clearvoyant "LED-P" case. These consumers said that the increased brightness allowed them to inspect the products more closely prior to making a purchase decision. The light readings in foot candles (a measurement of light intensity) are far lower for the Clearvoyant "LED-P" lighting. In an actual store environment, this difference would not be apparent because the various types of lighting would not appear next to each other. A lower light level reduces glare and helps maintain the integrity of certain products.
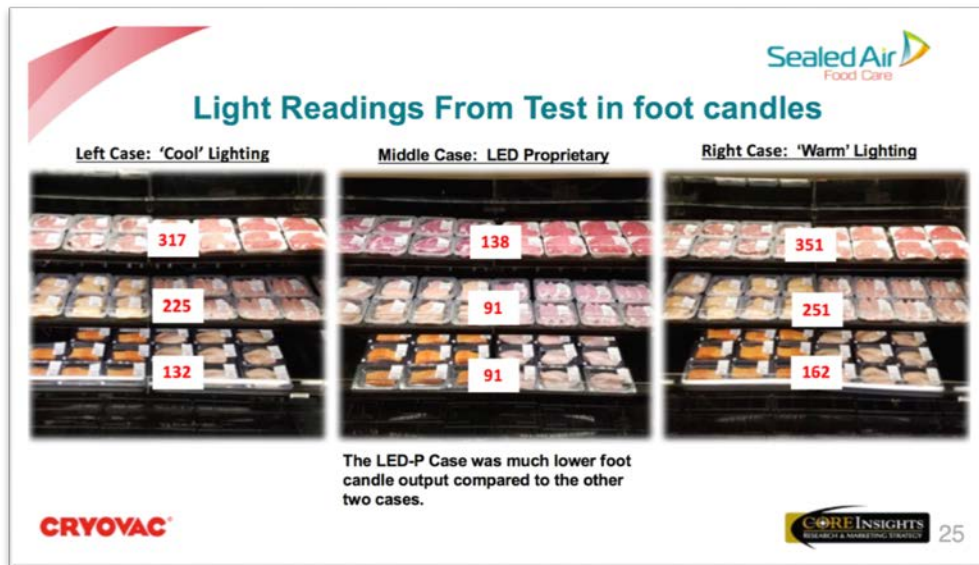
CONCLUSION

The Clearvoyant "LED-P" lighting provided by Hillphoenix, running at a much lower foot candle output than the other cases, performed well for all proteins, evaluated both in isolation and in direct comparison across all three alternatives. The Clearvoyant "LED-P" case was also preferred overall by consumers when compared to the other two cases. Further study is planned to continue to optimize lighting for multiple proteins.

STUDY SPECIFICATIONS

This study was conducted by Core Insights on June 29 and 30, 2016. Ninety-one consumers of fresh beef, chicken, pork and fish attended mock-grocery store case and product evaluation sessions at the Packforum® Americas facility in Atlanta, Georgia. Participants were 25 to 69 years of age. One-third of the research participants were screened to be newer residents of metro Atlanta, living in the area five years or fewer. All consumers were either lone or joint grocery shoppers for their household.

After completing their surveys, a representative subset of 26 consumers was chosen to participate in one-on-one interviews. Individual percentages are sometimes rounded plus or minus one percentage point to allow aggregated results to total exactly 100%.