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Investigation of consumers' preference on colour of sliced beef in hot pot (#114)

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Introduction

In China, as a traditional food, hot pot is very popular among consumers. And sliced beef is one of most important raw material. Sliced beef in hot pot beef is usually sold by means of frozen storage. It was founded that frozen storage darkens the colour of the beef pieces, which reduces the attractiveness of the product. However, what kind of colour of sliced beef in hot pot is accepted or preferred by consumers is still not explicit. Therefore the objective of the present study was to quantify the relationship of instrumental colour and consumers' preference of sliced beef in hot pot, and establish a practical and indicative threshold for colour acceptability.

Methods

A meat colour gradient (9 in total) was created by taking samples of hot pot beef slices from different colours in the supermarket. The procurement of images was standardised as outlined below:

Samples were measured by using a X-Rite spectrometer (Model SP62) fitted with a 4 mm aperture size and using illuminant D65 and 10° observer settings. Then objective colour of L^*, a^*, b^* were recorded. And a photo of each sample was taken with a Nikon camera (Model D7200, f /5.3, 1/20 s exposure time, ISO-200, 90 mm focal length). Auto-focus was used, but no flash, filters or other lenses were applied when capturing images. All images were then uploaded as JPEG format, and then cropped (1792 pixels × 1544 pixels) at the site of colorimetric analysis.

The 9 images that represented a range of meat colour traits were selected and used in online surveys created by the *https://www.wjx.cn/* websites. A total of 15 required questions were designed, including the consumers' gender, age, love for hot pot, frequency of hot pot consumption, frequency of beef slices when eating hot pot, the importance of beef color, such as tenderness, flavor and other qualities, as well as their preference for nine meat color pictures. The 9 images were presented individually and in a random order to each respondent, who were asked to score each presented image in terms of colour acceptability using a six level interval scale: very unacceptable (1 point), unacceptable (2 points), not quite acceptable (3 points), just acceptable (4 points), acceptable (5 points), and very acceptable (6 points). Among them, 4 points are acceptable thresholds.

Instrumental measures and consumers' preference were fitted in R software. Fixed effects and splines were identified as significant if the associated P-value was less than 0.05, and insignificant terms were subsequently removed from the model.

Results

According to the survey, 97.14% of the 1467 surveyed people like to eat hot pots; 98.43% of the people have hot pot consumption every month; and only 3.34% do not eat beef slices while eating hot pot. Therefore, hot pot and beef slices are very popular among consumers in China. In addition, beef color was considered as an important quality indicator by 89.36% of consumers. Hence, the color of beef slices in hot pot is an important indicator affect consumers' buy decision.

Through linear regression, it was showed that a^* value is the best indicator to reflect the consumer score. The acceptance threshold is $a^* \geq 14.5$, and the optimal value is $a^* \geq 18$ (Fig.1 and Fig.2). This result is consistent with the results of Holman et al. (Holman et al.,2017). Taking consumers' satisfaction as y and a^* value as x, the following equation is created: $y = -0.5765901 + 0.4603197 * x - 0.0099960 * x^2$ ($P < 0.001$)

Conclusion

Color is one of the important quality characteristics that affect the consumption of hot pot beef slices. And a^* value is the most suitable indicator to reflect consumer preference. The acceptance threshold is $a^* \geq 14.5$, the optimal value is $a^* \geq 18$.
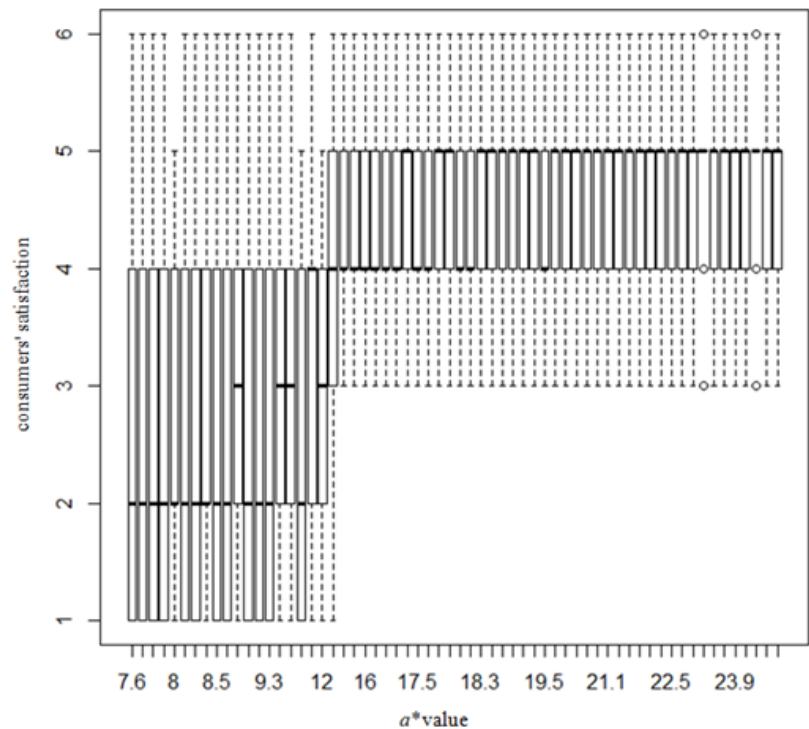
Notes

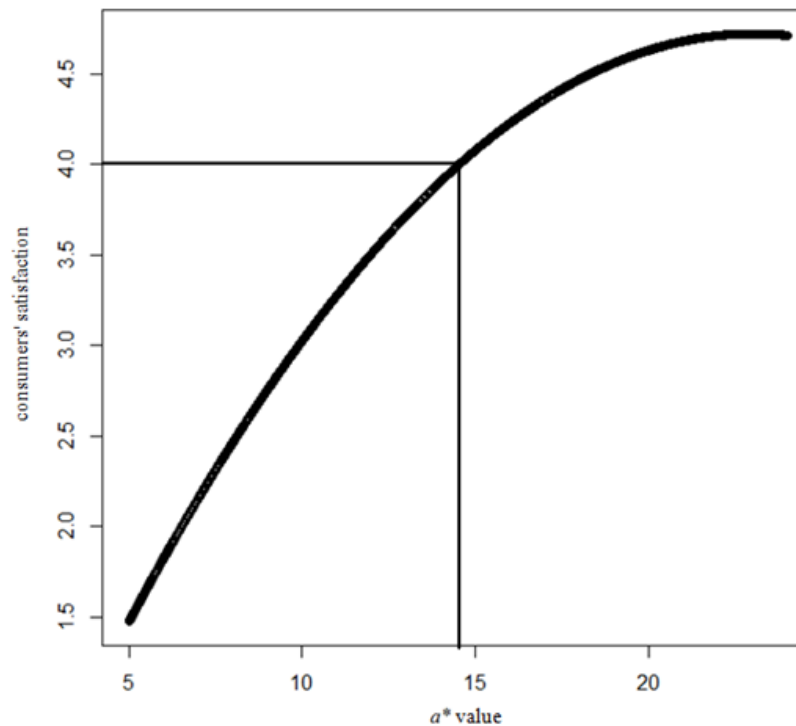**Fig.2** The boxplot of a* value and consumers' preference.

Fig.1 The fitting diagram of a* value and consumers' preference