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Freezing Temperature and Thawing Methods in Sensory Quality of Beef Strip Loin Steaks

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Objectives

Freezing is one of the most important methods to preserve meat and meat products. However, it may affect some of the quality traits, depending on freezing rate, frozen storage conditions and thawing methods. For this reason, the objective of this study was to investigate the descriptive sensory profile (QDA) of beef strip loin steaks stored at -10°C or -20°C and thawed after 1 mo by refrigerator temperature ($4^{\circ}\text{C}/\sim 24$ h), ambient temperature ($20^{\circ}\text{C}/\sim 4$ h) or microwave, comparing to non-frozen samples.

Materials and Methods

Each strip loin ($n = 3$) was cut in 2.5cm thick steaks and destined for 1 of the 7 treatments. Steaks were weighed before freezing and after thawing, as well after cooking to calculate weight losses. After thawing (considered 4°C) or for fresh meat, the samples were cooked in an electric oven until reaching 71°C . Eleven trained assessors were selected and evaluated the samples in monadic form and according to a complete balanced block design. The intensity of 16 descriptors chosen during the training sessions was evaluated using a linear scale of 9 cm (unstructured), anchored at the extremities by weak, little or none to the left and strong and much to the right. The data were analyzed using the GLM procedure and the means were compared by the Tukey test with the aid of the SAS software (SAS Inst. Inc., Cary, NC).

Results

Microwave thawed samples, independent of freezing temperature storage, showed the highest values of thawing loss ($P < 0.05$; $\sim 11\%$), while thawing at 4°C or 20°C had similar losses ($P > 0.05$; $\sim 2\%$). There was no difference in weight losses during cooking between either for temperature of storage or thawing method ($P > 0.05$; $\sim 21\%$). For the appearance attributes (internal brown color, degree of doneness, apparent juiciness and crumbling) only the apparent juiciness was affected ($P < 0.05$) by the treatments, where samples thawed by microwave presented a drier appearance (2.70 and 3.13 at -10°C and -20°C , respectively). There were no differences ($P > 0.05$) between treatments for aroma attributes (roast beef, cooked beef, metallic and rancid). For flavor attributes (roast beef, cooked beef, metallic and rancid) the assessors found less rancidity ($P < 0.05$; 0.16) for samples frozen at -20°C and thawed in refrigeration (4°C), when compared to the other treatments (~ 0.65). The assessors verified a difference ($P < 0.05$) between the treatments for fibrosity, one of the texture attributes (initial tenderness, initial juiciness, chewiness and fibrosity), where the non-frozen sample had the highest values (4.45), while the samples frozen at -10°C and thawed at ambient temperature and refrigeration showed the lowest values (2.81 and 3.12, respectively).

Conclusion

The results indicate that the frozen storage temperature, as well the methods used in the thawing can affect some sensory attributes, however they would not be able to compromise the overall quality of beef.