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Effects of searing cooking on sensory and physicochemical properties of beef steak (#333)

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Introduction

Eating quality traits of meat, including tenderness, flavor, and juiciness, is important as it contributes to meat palatability. Meat flavor is a combination of two sensations, taste and aroma, and it is considered to be one of the decisions making factors for re-purchasing meat. Juiciness enables the chewing process easy and transfers and propagates flavor ingredients.

Meanwhile, cooking methods can affect the final eating quality traits of meat; therefore, their effect has been studied for decades. Searing cooking is one of the cooking techniques by cooking meat surfaces at high temperature until a brown crust is formed. For centuries, it has been believed to improve juiciness as it can seal the juice of meat and increase meaty and roasted aroma with the formation of Maillard reaction products. However, its actual effect has still been in controversy. Therefore, this study was conducted to evaluate the effects of searing cooking on sensory and physicochemical properties of beef steak.

Methods

Sample preparation and cooking

Beef strip loins were cut (7 × 12 × 5 cm^3; length × width × height) and randomly divided into two cooking groups: oven and searing cooking. For oven cooking, beef samples were cooked in an oven (MA324DTN, LG Electronics, Seoul, Korea) at 180°C, flipped over when the internal temperature reached 40°C and cooked again until 60°C. On the other hand, searing cooking was conducted in an oven until the internal temperature reached 35°C and seared on the pan at 250 ± 5°C until the internal temperature reached 60°C with 5-6 times of flipping.

Sensory evaluation and physicochemical properties

For the descriptive sensory analysis, 10 trained panelists evaluated the intensities of texture and flavor using the 9-point scale. For physicochemical properties, water content, cooking loss, water holding capacity (WHC), and Maillard reaction products were measured based on the method of Kim et al. (2019) and Ajandouz et al. (2001).

Statistical analysis

Statistical analysis was performed using t-test and significant differences were determined with the Tukey's multiple range test (SAS 9.4, SAS Institute Inc., NC, USA).

Results

The intensities for juiciness and tenderness of beef steak did not show significant differences with the application of searing cooking, whereas its overall and roasted flavor was improved when compared to those from oven cooking (Table 1). This result indicates that searing cooking can increase beef flavor only.

In addition, the results from physicochemical properties support the sensory results. Regardless of cooking method, water content, which is related to beef juiciness, was similar (Fig. 1a). Also, their cooking loss and WHC did not show significant differences (Figs 1b and 1c). However, when their intermediate products of the Maillard reaction and browning intensity were measured, both values were significantly higher in searing cooked-beef steak than those in an oven-cooked sample (Fig. 2). It indicates that the Maillard reaction could increase significantly by searing cooking, thereby increasing its flavor intensity.

Conclusion

Based on our results, searing cooking did not affect the juiciness intensity of beef steak as its water content, cooking loss, and WHC had no significant changes. Meanwhile, it promoted the formation of the Maillard reaction intermediate products and browning, resulting in the increases in the intensities of overall and roasted flavor. Taken together, searing cooking may not make beef steak juicer but at least can improve its flavor through the acceleration of the Maillard reaction.

Notes

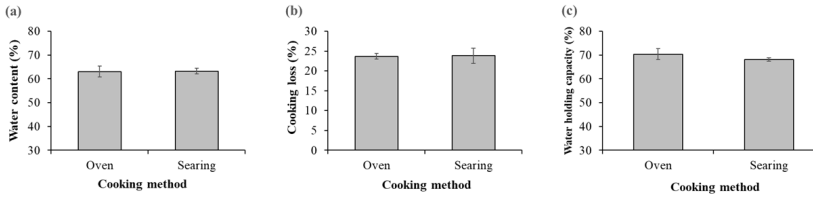

Fig. 1. Fig. 1. Effects of different cooking methods on the (a) water contend,
(b) cooking loss and (c) water holding capacity of beef steak.

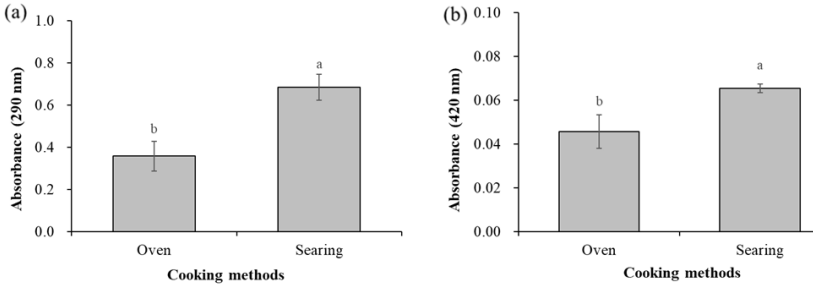

Fig. 2. Fig. 2. Effects of different cooking methods on the Maillard reaction products of beef steaks.[a,b]Different letters within different cooking methods differ significantly ($P < 0.05$).

Sensory parameters	Cooking methods		SEM[2]
	Oven	Searing	
Texture intensity			
Juiciness	5.43	5.33	0.499
Tenderness	5.50	6.07	0.240
Flavor intensity			
Overall flavor	5.43[b]	6.37[a]	0.325
Roasted flavor	4.87[b]	7.00[a]	0.318

Table 1. Effects of different cooking methods on the sensory property of beef steak evaluated by descriptive sensory analysis[1]Evaluated with 10 trained panelists using a 9-point scale (1, very weak; 9, very strong). [2]Standard errors of the means (n=6).[a,b]Different letters within the row differ significantly ($P < 0.05$).

Notes