BEEF CUTS AFFECT EATING QUALITY OF SAUCED BEEF

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Abstract – Sauced beef is one of the most popular beef products in China. This paper reports on an investigation of the effects of beef cuts: Knuckle, Shank, Striploin, Topside on the eating quality of sauced beef. The results demonstrated that Shank is the most suitable beef cut to produce sauced beef, as this type cut exhibited the longest sarcomere length and had the highest collagen content which lead to gelation after cooking times.

Key Words – Sauced beef, Beef cuts, Sarcomere length, Collagen content.

I. INTRODUCTION

Sauced beef is a very popular food in China. Traditionally, this kind of beef product is usually produced by using low value beef cuts such as Rump, Inside meat, Outside, Topside, Knuckle, and Shank. Recent years, some beef processors have tried to use high value beef cuts such as the Striploin, with the objective of producing higher quality sauced beef. There is no reports showed whether or why low value beef cuts were more suitable for making sauced beef than other cuts. Therefore, this paper reports on an investigation of the effects of different beef cuts on the eating quality of sauced beef, and then to determine the optimum selection of beef cuts to make high quality sauced beef.

II. MATERIALS AND METHODS

Nine Chinese male crossbred yellow cattle carcasses were randomly selected on the slaughter line at a beef abattoir. The Knuckle, Shank, Striploin, and Topside were removed from both sides at 1 h postmortem and then transferred to the lab in foam box with ice in 2 hours. The four beef cuts were sub-cut and trimmed to about 500g and vacuum packaged in the chiller (3 ±1 ^{o}C) for 7d and ready for a traditional sauced stew procedure. Briefly, the sub-cuts were put into a ready heated water bath (70^{o}C) and then heated to 100^{o}C and kept for 15min. Then the meat surface were chilled by iced-water for a while. And then being transferred to another cooker with 70^{o}C water and then the spices were added. The cuts were heated to boiling and kept 30min, and then kept at 92^{o}C for 4.5h. After that, the meat were cooled down in a refrigerator (3 ± 1 ^{o}C). The sauced beef were cut to two parts, half for shear force, and half was cut into 3mm thick slices to serve to consumer panel. One hundred and twenty panelists participated in the sensory testing. The testing was carried out 6 times with 20 panelists each time. Each consumer tasted four samples for tenderness, flavor, juiciness, elasticity, chewiness and overall evaluation from each muscle cuts by using a hedonic scale from 1 to 9 (1=dislike extremely, 5 = neither like nor dislike, and 9 = like extremely). The serving order of the samples were based on a random and balance principle. The Warner-Bratzler shear force was measured as previously described [1] but with long cooked beef (sauced) samples. Sarcomere length was measured according to the method described previously [2]. The collagen content was measured and expressed according to GB/T9695.23-2008 [3]. One-way ANOVA was conducted by using SPSS software (Version 18). Tests of differences were considered significantly different at $P < 0.05$

III. RESULTS AND DISCUSSION

The results of sensory evaluation were presented in Table 1. Shank got the highest score in every aspect of eating quality. And Knuckle took the second place. Both Striploin and topside were not good for sauced beef in eating quality. So the Striploins and topsides are not recommended to produce sauced beef. The results of shear force negatively correlated to tenderness. Sauced Shank got the lowest shear force and so showed the best tenderness while striploin got the highest shear force and the worst tenderness. This result

was contrary to the eating quality of roast beef [4], which might be due to the hot-boned procedure caused a contract of this muscle. The longest sarcomere length explained why Shank got the best tenderness [5]. While shank also got the highest collagen content, which should be negatively relation with shear force [6]. However, in Chinese traditional way to cook sauced beef, the long time slow cooking made almost of the connect tissue be gelation, resulted in a good elasticity and chewiness, and thus improve the tenderness of sauced beef.

Table1 Sensory evaluation of sauced beef from four muscle cuts

	Striploin	Knuckle	Topside	Shank
Tenderness	4.6 ± 0.2^{c}	5.7 ± 0.3^{a}	4.9 ± 0.3^{b}	7.1 ± 0.2^{a}
Flavor	5.9 ± 0.19^{b}	6.0 ± 0.2^{b}	5.7 ± 0.3^{b}	6.2 ± 0.2^{a}
Juiciness	5.1 ± 0.2^{b}	5.7 ± 0.2^{a}	4.8 ± 0.3^{b}	6.2 ± 0.2^{a}
Elasticity	5.1 ± 0.4^{b}	5.5 ± 0.2^{b}	5.1 ± 0.4^{b}	6.3 ± 0.2^{a}
Chewiness	4.6 ± 0.2^{c}	5.7 ± 0.3^{b}	4.9 ± 0.3^{c}	6.9 ± 0.1^{a}
Overall evaluation	5.2 ± 0.2^{c}	6.0 ± 0.2^{b}	5.24 ± 0.4^{c}	6.9 ± 0.2^{a}

Note: The means with different letter are significantly difference at the 0.05 level ($P < 0.05$) within rows.

Table2 Shear force, Sarcomere length and Collagen content of sauced beef from four muscle cuts

	Shear Force (N)	Sarcomere length (μm)	Collagen content (%)
Striploin	60.3 ± 6.3^{a}	1.36 ± 0.79^{a}	0.64 ± 0.09^{a}
Knuckle	50.1 ± 3.1^{b}	1.48 ± 0.84^{b}	0.82 ± 0.24^{a}
Topside	54.1 ± 1.3^{a}	1.42 ± 0.34^{b}	0.72 ± 0.16^{a}
Shank	40.7 ± 1.3^{b}	1.63 ± 0.02^{c}	2.20 ± 0.26^{b}

Note: The means with different letter are significantly difference at the 0.05 level ($P < 0.05$) within columns.

IV. CONCLUSION

Shank and Knuckle are the suitable beef cuts to produce sauced beef. While high value beef cuts such as the Striploin should not be used to produce sauced beef. The good eating quality of sauced Shank derived from long sarcomere length and high collagen content. As the traditional selection of beef cut is not all correct and the new try is failed, more researches should carry out to study the material selection for sauced beef.

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