MEAT QUALITY OF *SAMGYETANG* (GINSENG CHICKEN SOUP) MADE FROM FRESH/CHILLED OR FROZEN/THAWED CARCASS

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I. INTRODUCTION

Samgyetang is an authentic Korean ginseng chicken soup made up of whole carcass of 30-day-old broiler, stuffed with glutinous rice, ginseng and other herbs. The meat quality of *samgyetang* depends on the recipe and cooking method (traditional boiling or high pressure-high temperature with/without pre-cooking) [1,2]. There is no information regarding the effect of using frozen/thawed carcass on the meat quality of *samgyetang* considering the utilization of frozen/thawed carcass in both restaurant and industry. Yu *et al.* [3] reported that different thawing temperature affected the physical quality of chicken breast and leg muscles, in which rapid thawing at high temperature (18°C) resulted in muscle shortening and toughness. Therefore, the objective of this study was not only to compare the quality of traditionally cooked *samgyetang* made from fresh/chilled or frozen/thawed carcass but also to observe the effect of thawing temperature.

II. MATERIALS AND METHODS

Fresh/chilled carcasses of 30-day-old broilers were purchased at local poultry processor one day postmortem. Carcasses were weighed (650±50g) and frozen at -35°C within 40 min using rapid freezing technique and stored at -18°C for 20 days. Frozen carcasses (n=12) were then thawed at 0°C or immersed in 10°C-flowing water. Thawing time was determined when core breast temperature reached 0°C. Six carcasses were weighed to determine thawing loss prior being stuffed with 30 g glutinous rice, one ginseng, two dried jujubes and 2 cloves of garlic that were wrapped with rice paper. Dried herbs (milk vetch root, mulberry stem, kalopanax stem, Chinese liquorice stem, Siberian ginseng root), water and table salt (0.5% w/v of water) were used for preparing the broth. The stuffed carcasses were then cooked in boiling broth for one hour. Cooking loss (carcass), cooked breast pH and shear force value were determined. The moisture, fat and protein content of cooked breast meat were determined using AOAC procedure [4]. Quantitative descriptive analysis (QDA) for toughness, chewiness and juiciness was performed along with acceptance analysis using 12 semi-trained panelists. QDA intensity scale ranged from 1 (very weak) to 7 (very strong) and fresh/chilled group was given a 4-score (medium) as control, while overall acceptance score ranged from 1 (dislike very much) to 7 (like very much) [1,2]. Data of thawing time and loss were subjected to student t-test, while other data were subjected to one-way analysis of variance (ANOVA). Analyses were performed using R-version 3.3.3 with “Agricolae” library (The R-foundation for Statistical Computing, Austria). The statistical significance of the differences between means from different treatments was determined by Duncan’s multiple range test ($p<0.05$).

III. RESULTS AND DISCUSSION

According to Table 1, rapid thawing was occurred at 10°C. Thawing at 0°C was 4.8 times slower than thawing at 10°C. Rapid thawing resulted in higher cooking loss, while no differences were found between fresh/chilled and frozen/thawed at 0°C. Higher cooking loss in frozen/thawed at 10°C group resulted in lower moisture content in the cooked breast meat than that of the other groups. No differences were found on pH, fat and protein content among groups. The highest shear force value was found in frozen/thawed at 10°C group, demonstrating muscle shortening and toughness as a result of rapid thawing [3]. No differences were found on shear force value between fresh/chilled and frozen/thawed at 0°C.

Quantitative descriptive analysis (Table 2) revealed that the cooked breast meat from frozen/thawed at 10°C group was significantly tougher than the others and that of frozen carcass group was chewier than that of fresh/chilled group. No significant differences were found on juiciness among groups. The results are in line

with the instrumental value of shear force and also with previous study [3]. Furthermore, overall acceptance value revealed that rapid thawing resulted in less preferable *samgyetang*.

Table 1 Mean value (± standard error) of carcass thawing time and loss during processing and meat quality parameters of *samgyetang* (ginseng chicken soup) made from fresh/chilled or frozen/thawed carcass

Item	Fresh/chilled	Frozen/thawed at 0°C	Frozen/thawed at 10°C
Carcass			
Thawing time (h)	-	17.1 (0.34)[b]	3.50 (0.16)[a]
Thawing loss (%)	-	1.93 (0.34)[b]	2.41 (0.34)[a]
Cooking loss (%)	24.7 (0.69)[b]	24.5 (0.69)[b]	27.9 (0.53)[a]
Cooked breast meat			
Moisture (%)	67.6 (0.12)[a]	68.1 (0.26)[a]	66.0 (0.11)[b]
Fat (%)	2.00 (0.05)	2.32 (0.03)	2.84 (0.03)
Protein (%)	30.6 (0.43)	30.0 (0.58)	29.5 (0.31)
pH	6.30 (0.01)	6.40 (0.01)	6.35 (0.01)
Shear force (N)	12.7 (0.12)[b]	13.5 (0.08)[b]	17.5 (0.29)[a]

[a-b] means within each row with different superscripts are significantly different ($p<0.05$).

Table 2 Mean value (± standard error) of descriptive scale and overall acceptance of *samgyetang* (ginseng chicken soup) made from fresh/chilled or frozen/thawed carcass

Item	Fresh/chilled	Frozen/thawed at 0°C	Frozen/thawed at 10°C
Toughness	4.00 (0.00)[b]	4.63 (0.36)[b]	5.60 (0.45)[a]
Chewiness	4.00 (0.00)[b]	5.01 (0.27)[a]	5.48 (0.12)[a]
Juiciness	4.00 (0.00)	3.35 (0.48)	3.40 (0.19)
Overall acceptance	5.50 (0.36)[a]	4.62 (0.39)[ab]	4.17 (0.44)[b]

[a-b] means within each row with different superscripts are significantly different ($p<0.05$).

IV. CONCLUSION

The meat quality of *samgyetang* made from frozen chicken carcass that was thawed at 0°C was equal with that made from fresh/chilled carcass. Rapid thawing using conventional cold water is not recommended as it increased thawing and cooking loss, and toughness of *samgyetang*.

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