Quality Comparison of Chuncheon Dakgalbi Made with Ross Broilers, Hy-line Brown Chicks and Mini Broilers Meat

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Abstract- **This study was conducted to compare the quality of Chuncheon Dakgalbi made with meat from three chicken breeds. Ross male broilers, Hy-line brown male chicks and White mini male broilers were raised for 18 d, 49 d and 35 d, respectively, and slaughtered. The thigh meat from carcasses on each breed was used for this experiment. The fat content was higher in White mini broiler meat than Ross broiler and Hy-line brown chick meat (P<0.05). No differences were observed in aroma patterns of raw meat and Chuncheon Dakgalbi between all breeds. The Chuncheon Dakgalbi made with White mini broiler meat had higher color stability and lipid oxidation stability and showed higher sensory scores such as visual color and overall acceptability. Therefore, the Chuncheon Dakgalbi made with White mini broiler meat showed the best quality among the three chicken breeds.**

Keywords-**Chuncheon Dakgalbi, Chicken breed, Quality.**

I. INTRODUCTION

Chuncheon Dakgalbi is a local cuisine in Korea, originally from Chuncheon city in Kangwon province. According to the development of mass transportation from Seoul metropolitan city to Chuncheon and also the Hallyu (Korean entertainment) fever in Southeast Asia, many tourists came to Chunheon and enjoyed Dakgalbi as local food. These phenomena are a challenge to develop and improve the quality of Chuncheon Dakgalbi.

The raw materials (meat) of Chuncheon Dakgalbi is limited only the fresh normal broiler. As the increasing of the popularity of Dakgalbi, in the future it is important to develop Dakgalbi as the local food industry, not only for restaurant. [1] mentioned that the good management of meat supply, diversification of spices, expansion sales and distribution, sanitary monitoring etc, should be developed. More over [1] also noted that the diversification of meat source also important to support the development of Dakgalbi as commodity of food industry.

Different chicken breed as raw material of Chuncheon Dakgalbi may effect on the quality of Dakgalbi. In korea, [2] reported that water holding capacity of Korean native chicken (KNC) tended to be higher that broiler. More over [3] noted that no different was found in shear force, water holding capacity, cooking loss, tenderness, flavor, and overall likeness (sensory) from White mini broiler, Hy-Line brown chicks and normal broiler, but it is noted that the antioxidant activity and growth performance of White mini broiler and broiler is superior than others.

According to the previous studies who reported the probability to use other chicken breed as raw material of Chuncheon Dakgalbi, and also so far there is no published paper reported about it, therefore this study was conducted to compare the quality of Chuncheon Dakgalbi made with meat from three chicken breeds. Ross male broilers, Hy-line brown male chicks and White mini male broilers

II. MATERIALS AND METHODS

A. Sample preparation

The Ross broiler, Hy-Line brown chicks and White mini broiler used in these experiments were slaughtered at 18 d, 49 d, and 35 d respectively. The weight of broiler was 714 g, Hy-line brown chick was 763 g, and White mini broiler was 1013 g. The Chuncheon Dakgalbi was prepared from thigh of those 3 breeds (10 chickens/breed), mixed with the sauce by combination 3:1 (sauce:meat). For chemical analysis, the Dakgalbi sample was ground by a 4 mm plate grinder (M-12S, Hankook Fujee Industries Co., Ltd., Korea).

B. The pH measurement

Briefly, 10 g of sample was added with 100 mL distilled water and then homogenized at 10,000 rpm for 60 sec using a homogenizer (PH91, SMT Co. Ltd., Japan), and the pH was measured using a pH meter (SevenEasy pH, Mettler-Toledo GmbH, Switzerland).

C. Proximate analysis

The proximate analysis including moisture, crude ash, crude protein and crude fat was performed by Association of Official Analytical Chemists (AOAC) methods as described in AOAC (1995).

D. Thiobarbituric acid reactive substance (TBARS) value analysis

The TBARS value was measured according to [8]. Briefly, 0.5 g sample was mixed with 3 drops of antioxidant solution, 3 mL of TBA solution, and 17 mL of 25% Trichloroacetic acid. The mixture was heated at 100^{o}C for 30 min, and centrifuged at 3,500 rpm for 30 min. An absorbance of supernatant was measured at 532 nm using a spectrophotometer (UV-mini-1240, Shimadzu, Japan). The results were calculated as mg malonaldehyde (MA) per kg sample.

D. Instrumental color measurement

CIE Lightness (L*), redness (a*) and yellowness (b*) was measured using a color difference meter (CR-400, Konica Minolta Sensing Inc., Japan) and an illuminant C. The color instrument was calibrated using white plate (Illuminant C: Y=93.6, x=0.3134, and y=0.3194).

E. Sensory evaluation

A Panel contained of tenth Laboratory members scored the visual color, taste, flavor and overall likeness of Chuncheon dalkgalbi. The hedonic scores were 1=very dislike, 3=dislike, 5=normal, 7=like, 9=very like.

E. Aroma pattern

Briefly, 1 gr of sample was placed onto the 10 mL headspace vial and capped with PTFE/rubber septa and aluminum cap. The aroma pattern measurement was performed by using an aroma pattern auto sampler (HS 100, Alpha MOS, Toulouse, France).

F. Statistical analysis

All data were analyzed using SAS (1999).

III. RESULTS AND DISCUSSION

A. Proximate analysis and pH value

The moisture and crude protein contents of Hy-Line brown chick were higher ($p<0.05$) compared to two other breeds, in contrast the fat content was lower (Table 1). The pH value raw thigh meat and after mixed with Dakgalbi sauce of White mini broiler were lower compared to Ross broiler and Hy-line brown chick. The pH value of Dakgalbi was ranged from 5.5 to 5.8. [4] reported that the pH of sauce Dakgalbi was ranged from 4.85 to 5.10.

Table 1. Comparison of table proximate composition and pH vales of raw chicken thigh meat of Chuncheon Dakgalbi from Ross broilers, Hy-line brown chicks and White mini broilers

Items	Ross broiler	Hy-Line brown chick	White mini broiler
Raw chicken thigh meat			
Moisture (%)	75.17±1.83^{b}	77.11±1.63^{a}	74.41±2.01^{b}
Crude fat (%)	5.22±3.76^{a}	2.59±2.20^{b}	6.05±3.00^{a}
Crude protein (%)	18.56±1.05^{b}	20.44±1.21^{a}	18.79±0.96^{b}
Crude ash (%)	0.96±0.09	0.99±0.06	1.01±0.07
pH	6.57±0.18^{a}	6.56±0.17^{a}	6.12±0.15^{b}
Chuncheon Dakgalbi			
pH	5.87±0.17^{a}	5.78±0.15^{a}	5.55±0.13^{b}

^{a,b}Means±S.D. in the same row with different superscripts are significantly different (P <0.05).

B. TBARS value

The Chuncheon Dakgalbi was stored for 7 d, and TBARS value during storage was presented on Fig 1. The TBARS value of Hy-Line brown chicken was higher, followed by Ross broiler and White mini broiler. The different of TBARS value might be related with breed and slaughtering age. [5] reported that TBARS

value of chicken which was slaughtered at 8 weeks old was higher than those at 12 weeks old. In addition, higher unsaturated fatty acid in muscle higher TBARS value [6], and exercise can promote lipid oxidation [7].

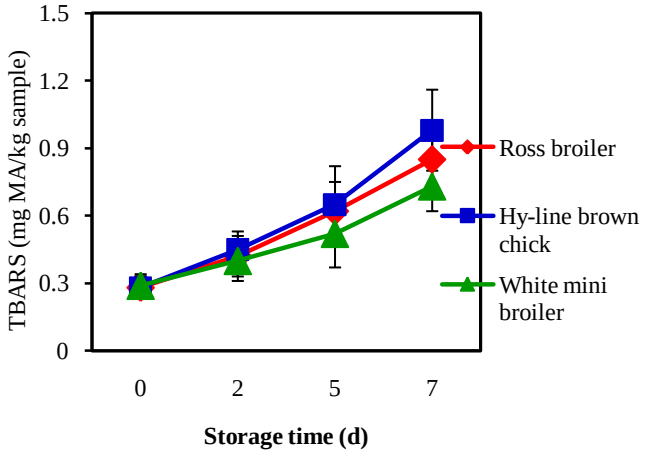


Fig. 1. Comparison of the lipid oxidation (TBARS level) of Chuncheon Dakgalbi from Ross broilers, Hy-line brown chicks and White mini broilers during storage at 4℃.

C. Instrumental Color

The instrumental color lightness (CIEL L*) of Chuncheon Dakgalbi made from White mini broiler was higher on 1 d, same with Ross broiler on 2 and 5 d, and lower than others on 7 d (Table 2). The redness (CIE a*) and yellowness (CIE b*) of Chuncheon Dakgalbi made from White mini broiler were higher ($p<0.05$) compared to other chicken breeds during the storage, while Ross broiler showed relatively lower CIE a* and CIE b* value than other breeds during storage.

D. Sensory evaluation

Panelists scored higher points of White mini broiler on Visual color and overall acceptability (Table 3). The flavor and texture score was not different in all chicken breeds. The color sensory evaluation results is in agreement with the instrumental color data in which the White mini broiler was higher in CIE a* and CIE b* value compared to other breeds. Redness is one of the important parameters of purchasing the meat products.

Table 2. Comparison of the CIE color values of Chuncheon Dakgalbi from Ross broilers, Hy-line brown chicks and White mini broilers during storage at 4℃

Items	Storage time (d)	Ross broiler	Hy-line brown chick	White mini broiler
L*	0	44.6±1.8^{b}	44.4±2.2^{b}	45.3±2.3^{a}
	2	44.9±3.0^{a}	44.1±1.7^{b}	44.7±1.9^{a}
	5	44.1±3.1^{a}	42.9±2.0^{b}	44.3±2.2^{a}
	7	52.6±2.3^{a}	50.8±2.0^{b}	49.1±2.4^{c}
a*	0	14.8±1.5^{b}	14.5±2.0^{b}	16.0±1.8^{a}
	2	12.9±1.9^{c}	13.4±2.2^{b}	14.8±1.8^{a}
	5	13.4±1.7^{c}	14.0±2.5^{b}	14.6±1.9^{a}
	7	14.8±1.5^{c}	15.9±1.9^{b}	16.7±1.9^{a}
b*	0	22.0±1.6^{b}	21.6±2.4^{c}	24.2±2.0^{a}
	2	20.1±3.2^{c}	20.7±1.8^{b}	21.8±1.5^{a}
	5	20.6±3.0^{c}	21.5±2.3^{b}	22.2±2.0^{a}
	7	25.8±2.1^{c}	28.3±1.6^{a}	27.5±2.1^{b}

^{a,b}Means±S.D. in the same row with different superscripts are significantly different (P <0.05).

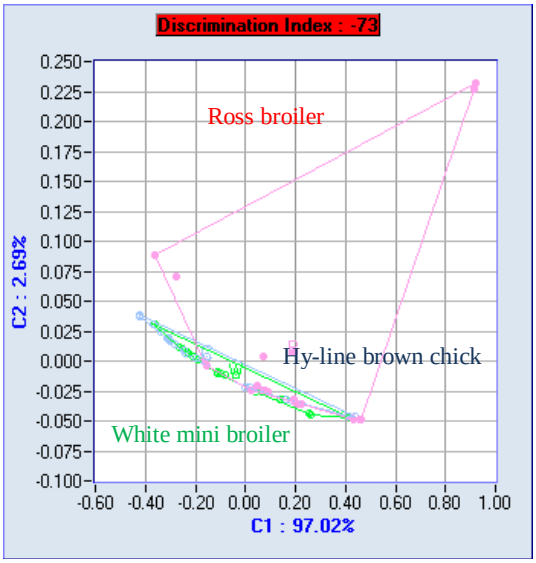
Table 3. Comparison of the sensory evaluation of Chuncheon Dakgalbi from Ross broilers, Hy-line brown chicks and White mini broilers

Items	Ross broiler	Hy-line brown chick	White mini broiler
Visual color	6.2±0.8^{b}	6.7±0.5^{b}	8.0±1.1^{a}
Flavor	6.4±1.0^{a}	6.4±1.0^{a}	6.9±1.5^{a}
Texture	6.9±1.4^{a}	7.0±0.7^{a}	7.4±0.7^{a}
Overall acceptability	6.6±0.9^{b}	6.7±0.5^{b}	7.8±0.8^{a}

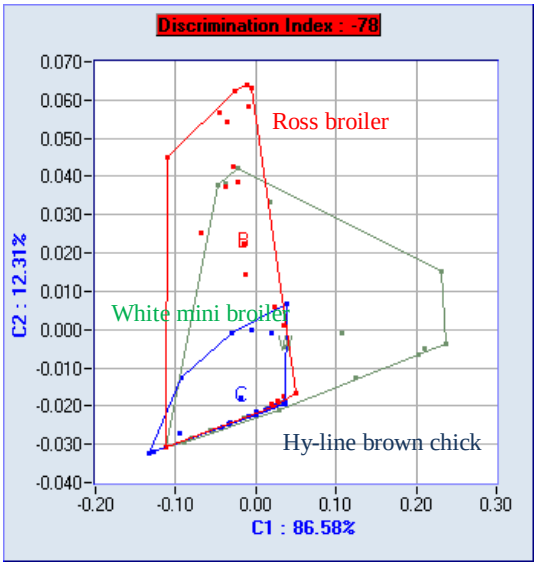
^{a,b}Means±S.D. in the same row with different superscripts are significantly different (P <0.05).

E. Aroma Pattern

The aroma pattern of three different chicken breeds was presented on Fig 2. Even though the aroma pattern was in a wide range, but there was no different in aroma pattern between three different chicken breeds, both in raw and cooked state. On the raw chicken, the discrimination index was -73, and cooked Chicken was -78. Discrimination index is an index representing the different between the samples. The higher index (more the positive) mean the higher different between the sample [8].



a) Raw Chicken



b) Cooked chicken

Fig. 2. Comparison of aroma patterns of raw chicken meat and Chuncheon Dakgalbi from Ross broilers, Hy-line brown chicks and White mini broilers.

IV. CONCLUSION

It is concluded that the Chuncheon Dakgalbi made with White mini broiler meat showed the best quality among the three chicken breeds.

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