The Effect of Korean Traditional Sauces on Physicochemical, Texture and Sensory Properties of Dry-cured Beef Ham

Pilnam Seong P.N. [1], Jeong D.W. [2], Kang G.H. [1], Cho S.H. [1], Park B.Y. [1], Kim J.H. [1], Jeong S.G. [1], Kim H.S. [1], and Kim D.H. [1]

[1]National Institute of Animal Science, Rural Development Administration, Suwon, Korea
[2] Institution/Department, Affiliation, City, Country

Abstract— **This study was conducted to develop processing method for dry cured beef ham with Korean traditional sauces and to investigate quality properties of the dry cured beef hams. For this experiment, *semitendinosus* muscle from Hanwoo was spread with sun-dried salt (C), sun-dried salt + red paper sauce (T1) and sun-dried salt + soybean paste sauce (T2), and inserted into washed Hanwoo large intestine. After then, it was dried and fermented for total 75 days. Moisture contents of these hams were within 46~48%, there was any significant difference. pH of T2 was the lowest among the three dry-cured hams, aW of T1 was lower than others ($p<0.05$). In mechanical colour determination, C was shown higher a* and b* than traditional sauces hams ($p<0.05$), however L* value was not shown significantly different. In texture, T1 was measured significantly lower adhesiveness and higher springiness than C ($p<0.05$). There wasn't any significant difference between the all dry-cured hams on sensory properties, but T1 was tended to be higher taste, saltiness and overall acceptability than others, whereas C was higher score of colour and flavour than dry-cured hams made with traditional sauces. As this result, we expected that sun-dried salt + red paper sauce was valued for dry-cured ham method used Korean traditional sauce**.

Keywords— **Physicochemical, sensory properties, dry-cured beef.**

I. INTRODUCTION

Dry-curing is the common ways to keep pork in the South European countries. The traditional dry cured hams have been produced using only pork, sea salt, fresh mountain air and time in Southern Europe for 2000 years. Dry cured ham is famous for its unique sensory characteristics such as the intense red colour and cured aroma. The characteristic flavour and aroma of dry cured ham can be attributed to the ingredients used in its processing namely garlic, red pepper, paprika, and ground seeds (Gök et al., 2008; Gökalp et al., 1999; Tekinsen et al., 1999).

Koreans did not used to taste raw ham traditionally due to short history of meat processing. Therefore, dry cured ham was not available on the commercial market. These days, traditional sauce has been used to develop new taste-enriched meat products in Korea.

The goal of this study is to develop processing method for dry cured beef ham with Korean traditional sauces and to investigate quality properties of dry cured beef ham.

II. MATERIALS AND METHODS

Dry cured beef hams were processed by using fifteen *semitendinosus* muscles from Hanwoo. Dry cured beef hams were manufactured following. *Semitendinosus* muscles were seasoned with a mixture of salt (2%), water (2%), nitrites (0.02%), onion powder (1%), garlic powder (1%), ginger powder (1%) and Korean traditional sauces (4%). *Semitendinosus* muscles were kept for 7 days at 4℃ to allow the seasoning mixture to penetrate. After that, *semitendinosus* muscles were stuffed into natural casings from Hanwoo and held for 30 days at 4℃ at a relative humidity (RH) of 75-80%. Finally, *semitendinosus* muscles were ripened for 45 additional days at 10-12℃ and at 65-75% RH.

Percentages of moisture, protein and fat contents were determined using the procedure of AOAC (1996). Ham pH was measured in a homogenized sample solution (3 g/27 ml distilled H_2O) with a pH meter (SENTRON ARGUS-X, Netherland). Water activity (aW) measurement was carried out at 25℃ with a Novasina AW SPRINT-TH 300 instrument (Axair Ltd, Pfaffikon, Switzerland). Color of dry cured beef hams were measured using a Minolta Chroma Meter CR-300 (Osaka, Japan) set for L* (lightness), a* (redness), b* (yellowness), Chroma, and h° values. It was

standardized with a white tile (D65 Y= 93.0, x = 0.3133, y = 0.3194). The texture analyzer (Instron Model 4465, Instron Corp, UK) was used to carry out a Texture Profile Analysis (TPA) (Malcolm, 1978). Sensory properties were assessed by a trained panel of 8 members for five different properties. Results were analyzed using the General Linear Models (GLM) of the Statistical Analysis System (SAS, 1998). Significant differences were analyzed by Duncan's multiple range test at $p<0.05$.

III. RESULTS AND DISCUSSION

1. Physicochemical properties

Moisture contents of these hams were within 46~48% and no major differences were found($p>0.05$). Fat contents were within 11~14%, there wasn't any significant difference ($p>0.05$). pH of T2 (sun-dried salt+soybean paste sauce) was the lowest among the three dry-cured hams, Water activity (aW) of T1 (Sun-dried salt+Red pepper sauce) was lower than others ($p<0.05$)(Table 1).

Table 1 The effects of Korean traditional sauces on proximate composition and physicochemical properties of dry-cured beef ham

Items	Control	T1	T2
Moisture, %	48.04±0.80	46.56±0.76	46.45±1.65
Fat, %	12.64±1.23	11.95±2.03	14.04±1.61
pH	5.44±0.04a	5.47±0.02a	5.33±0.04b
Water activity (aW)	0.91±0.00a	0.89±0.00b	0.90±0.01ab

[a,b]: Values with different superscripts in the same row differ significantly ($p<0.05$).
Mean±standard error.
T1 : Sun-dried salt+Red pepper sauce, T2 : Sun-dried salt+Soybean paste sauce.

2. Colour

Results of the colour measurements are shown in Table 2. C (control) was shown higher a* and b* than traditional sauces hams ($p<0.05$), however L* value was not shown significantly different ($p>0.05$). Chroma value of T2 (sun-dried salt+soybean paste sauce) was lower than control ($p>0.05$). h° of three groups was 23.50~25.46, there wasn't any significant difference ($p>0.05$).

Table 2 The effects of Korean traditional sauces on colour characteristics of dry-cured beef ham

Items		Control	T1	T2
Color	L*	25.68±0.53	24.29±0.45	24.60±0.78
	a*	9.85±0.30a	8.87±0.12b	8.68±0.43b
	b*	3.97±0.21a	3.66±0.13ab	3.31±0.18b
C		15.23±0.41a	14.08±0.16ab	13.50±0.55b
h°		25.01±0.85	25.46±1.05	23.50±0.33

[a,b]: Values with different superscripts in the same row differ significantly ($p<0.05$).
Mean±standard error.
T1 : Sun-dried salt+Red pepper sauce, T2 : Sun-dried salt+Soybean paste sauce.

3. Texture

Table 3 shows the results of texture properties of dry-cured beef ham. T1 (Sun-dried salt+Red pepper sauce) was measured significantly lower adhesiveness and higher springiness than C ($p<0.05$). However, hardness, cohesiveness, gumminess and chewiness were not shown significantly different ($p>0.05$).

Table 3 The effects of Korean traditional sauces on texture properties of dry-cured beef ham

Items	Control	T1	T2
Hardness, kg	4.62±0.22	5.39±0.43	4.54±0.44
Cohesiveness	0.59±0.01	0.56±0.01	0.56±0.02
Adhesiveness	22.00±0.20a	20.59±0.15b	21.01±0.52ab
Springiness, mm	12.60±0.20b	14.01±0.15a	13.59±0.52ab
Gumminess, kg	2.71±0.11	3.00±0.24	2.51±0.20
Chewiness, kg×mm	34.10±1.18	41.97±3.46	34.43±3.65

[a,b]: Values with different superscripts in the same row differ significantly ($p<0.05$).
Mean±standard error.
T1 : Sun-dried salt+Red pepper sauce, T2 : Sun-dried salt+Soybean paste sauce.

4. Sensory properties

Table 4 shows the results of the sensory evaluation of dry-cured beef ham. There was any significant difference between the all dry-cured hams on sensory properties, but T1 was tended to be higher in taste, saltiness and overall acceptability than others, whereas C was higher score of colour and flavour than dry-cured hams made with traditional sauces (Table 4).

Table 4 The effects of Korean traditional sauces on sensory properties of dry-cured beef ham

Items	Control	T1	T2
Color	5.05±0.33	4.90±0.17	4.82±0.42
Flavor	4.92±0.07	4.88±0.16	4.67±0.40
Taste	4.74±0.11	5.05±0.08	4.80±0.36
Saltiness	4.12±0.17	4.30±0.10	4.21±0.09
Overall acceptability	4.83±0.19	5.08±0.03	4.96±0.38

Mean±standard error.
T1 : Sun-dried salt+Red pepper sauce, T2 : Sun-dried salt+Soybean paste sauce.

IV. CONCLUSIONS

Overall, we found that sun-dried salt + red paper sauce was valued for dry-cured beef ham method used Korean traditional sauce.

V. REFERENCES

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