CHEMICAL COMPONENTS OF THIRTY SIX SUB-PRIMAL CUTS FROM HANWOO CARCASSES

Hyun-Woo Seo[1], Hoa Van Ba[1], Pil-Nam Seong[1], Yunseok Kim[1], Sun Moon Kang[1], Soohyun Cho[1], Sung-Sil Moon[2], Se-Ju Kang[3], Beom-Young Park[1], Yong-Min Choi[4] and Jin-Hyoung Kim[1]*

[1]National Institute of Animal Science, RDA, Wanju 55365, Korea; [2]Sunjin Meat Research Center, Ansung 17532, Korea; [3]Korea Institute for Animal Products Quality Evaluation, Sejong 30100, Korea; [4]National Institute of Agricultural Sciences, RDA, Wanju 55365, Korea.

*Corresponding author email: jhkim702@korea.kr

Abstract – To determine chemical components related to palatability of 36 sub-primal cuts, 14 Hanwoo carcasses were selected from 3 or 4 carcasses × 4 quality grades (QRs). Significant differences ($P < 0.05$) in chemical component were found among all sub-primal cuts. The highest pH was found in the Kotkalbi or Anchangsal among the QG1++ and 1 or QG1+ and 2. The highest moisture content was found in the Absatae among the QG1++, 1 and 2. The highest fat content was found in the Upjinsal among the QG1++, 1+ and 1. The highest protein content was found in the Mungchiatae among the QG1 and 2. QG1+, 1 and 2 Chadolbagi were rated the lowest in protein among all sub-primal cuts.

Key Words – Hanwoo, sub-primal cuts, chemical component, meat quality grade.

I. INTRODUCTION

Hanwoo is the most famous for branded beef cattle in Korea. The annual per capita consumption of beef has more than fourfold during the last 2.5 decades in Korea, rising to approximately 10.9 kg in 2015 from 2.6 kg in 1980 [1]. Hanwoo carcasses are generally divided into 10 primal cuts and 39 sub-primal cuts for distribution [2]. The nutritional composition and physico-chemical properties of beef differ by cut [3, 4]. However, the proximate composition and quality characteristics of individual cuts are not well known. It is necessary to assess the nutritive and palatability attributes of the sub-primal cuts or major muscles of modern Hanwoo carcasses. This study investigated chemical compositions 36 sub-primal cuts of Hanwoo beef.

II. MATERIALS AND METHODS

A total of 14 Hanwoo steer carcasses were selected at commercial plants and fabricated into 36 sub-primal cuts. Fourteen carcasses were consisted of three or four carcasses by four QGs (1++, 1+, 1 and 2) primarily determined by the degree of marbling using the Korean Beef Marbling Standard (BMS). Moisture, fat and protein contents were analyzed using the method of the Association of Official Analytical Chemists [5]. Particularly, the moisture and fat contents were determined by using a moisture & fat analyzer (SMART Trac, CEM Corp, USA); while, the nitrogen content was determined by using a nitrogen analyzer (Rapid N cube, Elementar, Germany). The statistical analysis was performed by SAS program [6].

III. RESULTS AND DISCUSSION

The pH of all sub-primal cuts was within acceptable ranges (pH 5.56-6.36) (Table 1). QG2 Anchangsal had greater pH values than other cuts. The pH value of Boseopsal was lower than other cuts in QG1++, 1+ and 1. The moisture content of all cuts was within acceptable ranges (43.29-71.91%). (Table 1). QG1 Absatae had greater moisture contents than other cuts. The moisture content of Upjinsal was lower than other cuts. The lowest fat content was found in Mungchisatae (Table 1). The fat content of QG1+ Upjinsal was 41.44%, which was about 18 times higher than that of QG2 Mungchisatae (2.32%). The lowest protein content was found in Chadolbagi (Table 1). These results were consistent with previous findings about their differences in moisture and fat [7, 8]. Our results were in agreement with previous observation that high marbled meat had less protein and moisture levels [9].

IV. CONCLUSION

Boseopsal showed the lowest pH compared to other sub-primal cuts. Upjinsal showed the lowest moisture content and the highest fat content compared to other sub-primal cuts.

ACKNOWLEDGEMENTS

This study was supported by 2016 year Postdoctoral Fellowship Program (Project No. PJ01212501) of National Institute of Animal Science, Rural Development Administration, Republic of Korea.

Table 1. The pH and proximate composition (%) of the 36 sub-primal cuts from Hanwoo carcasses

	pH				Moisture				Fat				Protein			
Grades	1++	1+	1	2	1++	1+	1	2	1++	1+	1	2	1++	1+	1	2
Ansimsal	5.65	5.66	5.66	5.81	65.33	65.11	67.26	66.82	10.61	10.90	10.52	7.97	21.39	19.52	19.49	20.85
Witdungsimsal	5.78	5.89	5.75	6.13	55.92	56.31	60.54	62.57	20.42	20.68	16.49	12.36	18.69	16.54	18.08	20.32
Kotdungsimsal	5.64	5.62	5.70	5.90	56.95	60.79	60.97	63.94	20.33	15.14	16.27	11.51	19.65	18.61	19.16	20.74
Araedungsimsal	5.66	5.63	5.66	5.85	57.92	60.88	62.43	66.16	17.36	13.88	13.52	7.98	20.36	20.26	19.59	21.68
Salchisal	5.85	5.90	5.80	6.16	51.31	50.23	50.37	54.74	28.58	29.91	29.68	21.97	16.65	13.47	14.61	17.50
Chaekeutsal	5.64	5.70	5.66	5.80	55.86	56.44	60.33	62.42	19.73	20.72	14.82	11.38	19.23	17.25	18.79	20.80
Moksimsal	5.81	5.73	5.74	6.08	61.46	59.98	66.01	61.75	13.55	16.26	9.82	13.82	20.48	17.16	19.46	19.97
Kurisal	5.74	5.73	5.72	6.02	65.69	65.57	67.86	66.89	8.44	9.88	8.16	6.49	21.37	18.50	19.39	21.19
Buchaesal	5.86	5.80	5.85	6.15	57.83	57.47	65.08	67.11	19.64	19.96	11.58	7.48	18.34	15.92	18.54	20.50
Abdarisal	5.72	5.69	5.64	5.93	64.00	62.46	65.85	68.25	9.91	11.08	9.17	4.80	21.19	19.01	19.78	22.34
Kalbidutsal	5.66	5.77	5.72	5.92	61.50	60.24	62.48	63.09	13.67	14.76	13.33	10.38	20.94	18.34	18.58	20.39
Buchaedupkaesal	5.77	5.73	5.73	6.07	69.04	67.85	71.15	68.55	6.84	7.95	6.92	5.38	21.90	19.48	19.59	22.10
Udunsal	5.60	5.59	5.63	5.77	63.17	64.14	66.35	67.89	10.46	10.20	8.61	5.36	21.57	19.48	20.50	22.31
Hongdukaesal	5.63	5.64	5.66	5.88	66.71	68.13	69.92	67.23	7.83	6.64	5.39	7.01	22.11	19.95	20.44	21.25
Boseopsal	5.56	5.59	5.62	5.82	66.55	65.46	68.63	68.42	6.93	7.09	5.98	3.48	22.28	20.71	20.73	23.05
Seolgitsal	5.63	5.66	5.64	5.73	58.95	64.68	60.86	67.35	15.56	9.17	13.70	4.69	19.64	18.85	18.31	21.82
Seolgitmeorisal	5.67	5.67	5.67	5.80	62.05	62.37	64.07	65.78	11.29	10.93	10.32	6.60	20.53	18.71	18.99	20.85
Doganisal	5.71	5.72	5.68	5.92	65.78	65.16	68.92	67.49	9.15	9.97	6.35	5.13	21.25	18.56	20.32	21.79
Samgaksal	5.67	5.65	5.64	5.97	57.12	60.08	61.09	63.99	19.62	15.95	17.14	10.33	19.28	17.75	16.89	20.90
Yangjeemeorisal	5.66	5.69	5.78	5.97	65.37	64.94	66.29	66.84	9.24	9.17	9.80	5.84	20.82	18.98	18.69	20.89
Chadolbagi	5.93	5.95	6.06	6.08	53.34	44.51	55.47	46.98	26.15	40.30	24.41	34.30	15.81	8.72	14.21	12.50
Upjinsal	5.83	5.80	5.88	6.14	44.19	43.92	51.48	61.79	39.15	41.44	29.70	14.38	13.13	10.69	13.96	17.87
Upjinansal	5.95	5.89	5.92	6.20	57.18	52.74	60.99	61.92	20.97	27.12	16.76	13.01	18.40	14.96	18.33	19.76
Chimayangjee	5.80	5.82	6.00	6.05	62.31	60.98	67.26	68.51	13.88	15.54	9.20	4.96	19.64	17.13	19.66	21.71
Chimasal	6.00	5.74	6.01	6.18	59.40	56.39	59.72	61.72	17.11	20.36	17.14	12.95	18.95	16.44	17.40	19.29
Abchimasal	5.96	5.81	5.83	6.25	61.73	60.54	64.48	64.23	14.54	15.40	12.23	10.54	20.23	18.78	18.90	19.94
Absatae	5.78	5.79	5.84	6.17	69.70	68.65	71.91	70.51	4.29	6.40	3.68	3.12	22.08	19.44	20.09	21.48
Dwitsatae	5.91	5.81	6.00	6.28	67.35	68.84	71.23	68.30	6.32	5.22	4.73	5.25	23.52	20.02	20.15	20.71
Mungchisatae	5.76	5.72	5.70	6.01	69.39	67.72	71.48	69.17	3.63	4.31	3.26	2.32	23.03	20.57	21.09	23.50
Sangbacksal	5.85	5.79	5.82	6.18	65.06	66.52	67.44	67.49	8.31	8.31	8.65	5.40	21.70	19.52	19.26	21.05
Bonkalbi	6.07	5.95	5.92	6.17	51.40	50.21	52.65	54.97	27.23	30.78	27.13	21.58	16.63	13.49	15.64	16.49
Kotkalbi	6.11	6.00	6.13	6.35	48.46	46.76	51.12	50.62	32.09	35.04	30.19	28.74	14.89	12.27	14.58	14.62
Chamkalbi	5.94	5.85	5.96	6.21	47.25	49.93	52.31	54.79	33.37	30.35	28.13	23.39	15.70	14.00	15.04	16.87
Toshisal	5.93	6.03	6.00	6.25	58.98	57.97	60.74	63.71	17.31	18.76	16.64	10.93	19.08	16.69	17.83	20.53
Anchangsal	6.05	6.20	6.09	6.36	53.41	52.51	58.35	61.32	24.71	26.86	20.10	13.80	16.47	15.29	16.48	19.34
Jebichuri	6.05	5.90	5.97	6.17	66.00	65.25	69.55	68.90	7.96	9.13	7.37	5.69	22.33	19.57	20.22	21.35

REFERENCES

1. KMTA. (2016). Livestock trade statistics. Korea Meat Trade Association, Retrieved from http:// www.kmta.or.kr.
2. KAPE. (2014). 2013 Animal products grading statistical yearbook. Gunpo, Korea: Korea Institute for Animal Products Quality Evaluation.
3. Lee, Y. J., Kim, C. J., Kim, J. H., Park, B. Y., Seong, P. N., Kang, G. H., Kim, D. H. & Cho, S. H. (2010). Comparison of fatty acid composition of Hanwoo beef by different quality grades and cuts. Korean Journal for Food Science of Animal Resources 30: 110-119.
4. Jung, E. Y., Hwang, Y. H. & Joo, S. T. (2015). Chemical components and meat quality traits related to palatability of ten primal cuts from Hanwoo carcasses. Korean Journal for Food Science of Animal Resources 35: 859-866.
5. AOAC. (2000). Official methods of analysis. 17th ed (pp. 1-8). Arlington, USA: Association of Official Analytical Chemists.
6. SAS. (2014). SAS/STAT Software for PC. Release 9.4, SAS Institute Inc., Cary, NC, USA.
7. Hunt, M. C. & Hedrick, H. B. (1977). Profile of fiber types and related properties of five bovine muscles. Journal of Food Science 42: 513-517.
8. Jeremiah, L. E., Dugan, M. E. R., Aalhus, J. L. & Gibson, L. L. (2003). Assessment of the chemical and cooking properties of the major beef muscles and muscle groups. Meat Science 65: 985-992.
9. Hunt, M. R., Garmyn, A. J., O'Quinn, T. G., Corbin, C. H., Legako, J. F., Rathmann, R. J., Brooks, J. C. & Miller, M. F. (2014). Consumer assessment of beef palatability from four beef muscles from USDA Choice and Select graded carcasses. Meat Science 98: 1-8.