EFFECT OF DRY-AGING ON PHYSICO-CHEMICAL QUALITY PROPERTY OF LOIN AND TOP ROUND MUSCLES FROM HANWOO COW

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I. INTRODUCTION

The dry-aging is the process that beef carcasses or primal/subprimal cuts are directly exposed to environmental conditions under strictly controlled ambient conditions, including temperature, relative humidity, and airflow, without packaging [1]. Several studies have shown that the dry aged meats have an excellent eating quality resulting from tenderization and enhanced flavor [2]. In Korea, most of Hanwoo cows had low quality grades (<2, 3 QG) (KAPE, 2016) and they are distributed in the market with low prices due to low demand. Therefore, the objective of this study was to investigate the effects of dry-aging on the meat quality of Hanwoo cow beef with low quality grade.

II. MATERIALS AND METHODS

A total of twenty seven carcasses from Hanwo cow beef (Korean quality grade 2) at 2 days postmortem were obtained from a local meat processing plant. The carcasses were hung in the dry-aging room at the condition of 2℃ 65%, 20 d + 2℃, 75%, 20 d + 4℃, 85%, 50 d as it established from previous study (In press). On each sampling day, the loin *(longissimus lumborum*, LD) and top round (*semimembranosus*) muscles were separated for analysis. Protein, fat, moisture, and collagen content were analyzed using the Food Scan™ Lab 78810 [3]. Color values (CIE *L**, *a**, *b*)* [4], Water-holding capacity (WHC) [5], cooking loss [6]. WB-shear force [7], 2-Thiobarbituric acid reactive substance (TBARS) content [8] and Volatile basic nitrogen (VBN) content [9] were measured. Data were analyzed by the Student-Newman-Keuls' multiple comparison using the GLM Procedure of the SAS program [10].

III. RESULTS AND DISCUSSION

During the dry-aging period, the chemical compositions (fat, protein, moisture and collagen) and meat color (CIE *L**, *a**, *b**) values were not significantly changed ($p>0.05$) for loin. The CIE a* and b* values were significantly increased and the cooking loss (%) was significantly decreased only for top round muscle. For both muscles, the WB-shear force values were decreased while the WHC values were increased as the aging period increased ($p<0.05$). The lipid oxidation (TBARS) and protein oxidation (VBN) values increased as the aging period increased ($p<0.05$). The loin muscles had significantly higher intramuscular fat and lower moisture contents than those of top round muscle ($p<0.05$). Also, the WB-shear force and TBARS values were significantly higher for top round muscle when compared to those for loin muscle at the same aging days ($p<0.05$). Although the VBN values of loin and top round muscles were significantly increased as the dry aging days increased, there was no significant difference between two muscles for aging days for 60 d. The results from this study could be related with muscle location in the carcass as well as air exposure degree during the dry aging periods.

Table 1. Chemical composition, meat color (*L**, *a**, *b**), cooking loss, Warner-Bratzler shear force (WB-shear force), water holding capacity (WHC), TBARS and VBN values of low quality grade Hanwoo cow beef

Item		Dry-aging period (days)				
		0	20	40	60	90
Protein (%)	Loin	20.61±0.99	21.14^{B} ±0.26	20.88^{B} ±0.20	21.21±0.27	21.41±0.32
	Top round	22.17±0.55	22.74^{A}±0.32	22.67^{A}±0.42	22.40±0.55	22.73±0.59
Moisture (%)	Loin	65.74^{B}±1.53	65.19^{B} ±0.84	65.58^{B} ±0.87	65.56^{B} ±0.50	65.30^{B}±1.06
	Top round	72.30^{A}±0.79	72.05^{A} ±0.65	71.80^{A} ±0.79	71.82^{A}±0.33	71.48^{A}±0.32
Fat (%)	Loin	11.72^{A}±1.92	13.45^{A}±0.44	13.08^{A}±0.82	12.74^{A}±0.30	12.58^{A}±1.42
	Top round	4.19^{B}±0.72	5.02^{B}±0.07	4.99^{B}±0.68	4.09^{B}±0.24	4.19^{B}±0.74

Collagen (%)	Loin	1.93±0.23	1.96±0.19	1.73±0.09	1.73±0.02	1.59±0.04
	Top round	1.86±0.18	1.82±0.19	2.11±0.20	1.60±0.11	1.82±1.90
CIE meat color Lightness (*L**)	Loin	39.02±1.27	34.44±1.74	36.27±2.47	37.21±0.32	37.89±0.87
	Top round	37.90±0.38	34.53±0.45	35.03±2.29	36.60±0.60	37.76±0.37
CIE meat color redness (*a**)	Loin	25.92±1.12	24.89±1.06	25.16±1.18	25.56±0.41	23.49±1.00
	Top round	22.77^{b}±0.75	23.54^{ab}±0.94	25.96^{a}±1.41	26.41^{a}±0.42	25.26^{a}±0.94
CIE meat color yellowness (*b**)	Loin	14.35±0.84	13.69±0.94	14.55±0.74	14.69±0.21	14.11±0.29
	Top round	11.01^{b}±0.25	13.09^{ab}±0.38	14.75^{a}±1.24	14.90^{a}±0.30	14.34^{a}±0.68
Cooking loss (%)	Loin	27.31±0.37	26.66±0.78	25.59±1.60	24.97±0.27	24.35±0.42
	Top round	28.33^{a}±0.58	27.15^{ab}±0.	26.04^{b}±0.51	25.51^{b}±0.61	25.24^{b}±0.38
WB-Shear force (WBS, kg)	Loin	4.43^{aB}±0.05	2.54^{bB}±0.16	2.43^{bB}±0.16	2.31^{bB}±0.08	1.36^{bB}±0.11
	Top round	5.08^{aA}±0.16	4.26^{bA}±0.06	3.15^{cA}±0.05	2.55^{dA}±0.03	2.31^{dA}±0.11
Water holding capacity (WHC, %)	Loin	56.63^{b}±1.04	57.67^{b}±1.58	59.92^{ab}±0.55	62.86^{a}±0.44	62.60^{a}±0.45
	Top round	57.28^{b}±0.72	60.21^{ab}±1.47	61.02^{ab}±0.35	60.13^{ab}±1.91	64.28^{a}±1.81
TBARS (mg MA/kg meat)	Loin	0.17^{b}±0.02	0.21^{bB}±0.02	0.33^{abB}±0.04	0.31^{abB}±0.04	0.47^{aB}±0.11
	Top round	0.21^{c}±0.02	0.40^{bA}±0.03	0.45^{bA}±0.05	0.51^{bA}±0.03	0.61^{aA}±0.02
VBN(%)	Loin	9.11^{c}±0.20	10.32^{bc}±0.24	11.35^{b}±0.79	13.59^{a}±0.76	13.80^{a}±0.28
	Top round	10.92^{c}±0.42	11.65^{c}±0.53	14.10^{b}±1.02	15.11^{ab}±0.26	16.46^{a}±0.49

*Mean±SE. [a-d]Means in the same muscle among the aging days within the same category with different letters are significantly different ($p<0.05$). [A-B]Means in the same aging day between two muscles within the same category with different letters are significantly different ($p<0.05$).

IV. CONCLUSION

The application of dry-aging in carcass of low Korean quality grade (QG 2) Hanwoo cow beef showed the improvement of meat quality for loin and top round muscle. The chemical composition and meat colors were maintained, while tenderness and water holding capacity increased with low oxidation during the dry aging period for 60 d. Further research is needed to determine the effects of dry aging on the eating quality and economic feasibility..

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