

QUALITY CHARACTERISTICS OF DRY AGED BEEF OF HANWOO COW

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I. INTRODUCTION

Tenderness of meat is a very important factor affecting purchase decision by consumers. Scientists have been making efforts to improve the tenderness for tough or low graded beef. However, there are difficulties in ensuring the uniformity of quality because the characteristics of muscles are different from each other. The aging market will grow if it can guarantee the uniformity of quality according to the aging time and conditions which provide the purchasing guideline to consumer. The aim of this study was to investigate the effects of dry aging on the quality characteristics of different muscles, with final aims were to find out the optimal aging period and aging conditions for the beef muscles.

II. MATERIALS AND METHODS

Different muscles: *Longissimus lumborum* (LL), *Triceps brachii* (TB), *Biceps femoris* (BF), Hind shank (SN), *Diaphragm* (DP), and *supraspinatus* (SS) of Hanwoo cow (n=8) were dry aged.[1] Three different aging conditions were used : (i): all muscles at 0d and 20d aged at 2°C and 65% air humidity; (ii): all muscles at 40d aged at 2°C and 75% air humidity; (iii): all muscles at 60d aging at 4°C and 85% air humidity. After aging, all muscles were transferred to Meat Science laboratory for analyses.

Texture measurements were done using an Instron Universal Testing Machine (Model 3342, USA) contacted shearing, and compression devices. The WBSF were determined on six pieces core samples with 0.5-inch diameter. Samples sheared at a crosshead speed of 400 mm/min, using a 40 kgf load cell.[2] Hardness was done on 3 cuts in a rectangular trapezoid shape with shallow end 0.5mm, deep end 1.5mm, 70 mm long and 60 cm wide per sample under 2 cycles of 60% compression at constant speed 50 mm/min. Data were analyzed using the GLM procedure and Duncan's multiple range test of SAS Version 9.4 (SAS Institute, Cary, NC, USA).

III. RESULTS AND DISCUSSION

The dry aging period had a significant effect on pH, CIE a *, CIE b *, and hardness (P<0.001) and also affected cooking loss, CIE L * and WBSF (P<0.05). The results of this study showed that the tenderness of all the muscles was improved by the reduction of shear force and hardness as increasing the aging time, and the same results as those of the previous study showed that the meats were softened due to the degradation of myofibrillar proteins by the proteolytic activities in the meat during storage [3]. It seems to be more affected by aging period than aging condition, further study using greater sample sizes may be required in order to reduce the error of the experiment, also the uniformity of quality is a problem that should be solved in the future. In addition to quality characteristics, study on optimal aging period and technology is needed in terms of food safety and economy.

Table 1 Dry aged beef quality traits as a function of aging parameters and muscle type

	Aging	Muscles						SEM	F value	
		BF	DP	LL	SN	SS	TB		Aging	Muscles
pH	0d	5.59 ^{ab}	5.64	5.54 ^{ab}	5.56 ^{bc}	5.60 ^b	5.54	0.04		0.7
	20d	5.59 ^{abC}	5.59 ^A	5.44 ^{dC}	5.52 ^{cB}	5.52 ^{bB}	5.55 ^B	0.03	12***	6.7**
	40d	5.65 ^{aB}	5.81 ^A	5.61 ^{aB}	5.74 ^{aB}	5.74 ^{aB}	5.64 ^B	0.04		3.6*

	60d	5.57 ^{abB}	5.73 ^A	5.57 ^{abB}	5.65 ^{abB}	5.62 ^{bB}	5.63 ^B	0.04	2.2
Cooking loss. %	0d	22.8 ^A	9.1 ^C	13.5 ^{bB}	15.9 ^{bB}	23.9 ^A	15.5 ^{cB}	1.5	12 ^{***}
	20d	21.8 ^B	12.7 ^C	19.3 ^{aB}	17.5 ^{bB}	27.6 ^A	21.1 ^{bB}	1.7	8.3 ^{**}
	40d	22.2 ^B	12.3 ^C	18.1 ^{aB}	21.9 ^{abB}	25.7 ^A	19.1 ^{bcB}	1.4	10 ^{***}
	60d	23.9 ^B	14.2 ^D	18.7 ^{aC}	29.6 ^{aA}	27.6 ^A	20.6 ^{bB}	2.6	5.0 [*]
CIE L* (lightness)	0d	34.1 ^{bB}	35.7 ^A	32.8 ^{bC}	31.2 ^C	36.2 ^A	34.9 ^B	0.9	4.2 [*]
	20d	37.7 ^{abA}	34.4 ^B	34.1 ^{abB}	33.3 ^C	37.7 ^A	37.1 ^A	0.9	5.0 ^{**}
	40d	38.7 ^a	37.2	39.2 ^a	34.3	36.2	36.5	1.6	1.2
	60d	33.9 ^b	38.2	36.8 ^{ab}	34.6	35.9	36.3	2.1	0.6
CIE a* (redness)	0d	19.2 ^b	17.9 ^b	17.5 ^b	17.1 ^{ab}	18.6	18.9	1	1.1
	20d	20.9 ^{ab}	19.8 ^{ab}	18.6 ^b	18.0 ^{ab}	20.3	19.2	1	1.8
	40d	24.9 ^a	21.9 ^{ab}	21.7 ^{ab}	20.0 ^{ab}	21.2	20.1	1.5	1.4
	60d	19.8 ^{ab}	24.7 ^a	23.6 ^a	22.1 ^a	22.5	22.7	2.2	0.5
CIE b* (yellowness)	0d	12.7	12.5	10.9 ^b	10.5	12.7 ^b	12.8 ^{ab}	0.9	1.3
	20d	17.8	14.5	14.1 ^{ab}	13.8	15.7 ^{ab}	15.1 ^{ab}	2.5	0.3
	40d	17.8 ^A	15.1 ^A	15.5 ^{abA}	12.3 ^B	13.9 ^{abA}	13.7 ^{abA}	1.5	1.5
	60d	13.1	19.2	17.1 ^a	16.1	18.0 ^a	16.4 ^a	1.9	1.1
WBSF (kgf)	0d	3.83 ^{aA}	2.49 ^C	3.75 ^{aB}	3.73 ^{aB}	4.27 ^{aA}	3.68 ^{aA}	0.9	3.8 [*]
	20d	3.26 ^{bA}	2.92 ^B	2.47 ^{bB}	3.16 ^{bA}	2.87 ^{bB}	3.20 ^{bA}	1.2	3.8 [*]
	40d	3.63 ^{bA}	2.77 ^B	1.84 ^{bB}	2.84 ^{bA}	3.15 ^{bcB}	2.92 ^{bA}	0.3	2.9 [*]
	60d	2.66 ^{bA}	3.22 ^A	1.75 ^{cC}	2.66 ^{bA}	2.50 ^{cB}	3.03 ^{bA}	0.2	6.8 ^{**}
Hardness (kgf)	0d	7.29 ^{aA}	4.06 ^{aC}	4.58 ^{aB}	6.55 ^{aA}	6.09 ^{aA}	5.44 ^{aB}	1.8	3.3 [*]
	20d	3.03 ^b	5.29 ^a	3.13 ^b	3.23 ^b	4.46 ^b	2.35 ^b	0.6	2.1
	40d	3.25 ^{bA}	4.29 ^{aA}	4.42 ^{aA}	5.89 ^{aA}	5.13 ^{abA}	4.13 ^{abB}	0.4	2.6 [*]
	60d	3.30 ^b	3.82 ^b	5.29 ^a	6.28 ^a	5.73 ^{ab}	5.92 ^a	2.9	0.3
									df3/73
									df5/71

a—c, A-D, means within row and column with different superscripts are significantly different;

*** P<0.001, ** P<0.01, * P<0.05;

IV. CONCLUSION

This study was carried out with 20 days interval until 60 days aging using Hanwoo cow beef muscles as samples. The dry aging period affected all the quality traits. The aging time significantly reduced the WBSF and hardness values for all the muscles studied. Cooking loss was found to be the highest in the 60d-aged samples. Further study is needed to reduce the experimental error, and especially to find out the optimum dry aging time for individual muscles.

ACKNOWLEDGEMENTS

It should be acknowledged that this work was carried out with the support of a grant for FTA issues (Project No. PJ P012027) of Rural Development Administration, Republic of Korea

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