

Effects Of Marbling Flecks Characteristics On Meat Quality And Storage Stability Of Hanwoo Beef (#565)

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Introduction

In Korea, marbling degree (intramuscular fat, IMF) is the most important factor determining the acceptability and purchasing decision by consumers for beef [1]. According to the recent survey results, Korean consumers prefer beef steaks with fine marbling flecks to ones with coarse marbling flecks [2]. There was a significant correlation between the IMF with tenderness, juiciness and flavor scores [3]. Morphologically, there are two different types of marbling flecks such as, coarseness and fineness existing in beef muscle. However, it still remains unknown whether the type of marbling flecks affects the beef quality parameters. Thus, the present study aimed at investigating the effect of marbling fleck characteristics (coarseness and fineness) on quality traits of high marbling Hanwoo beef.

Methods

Sampling: After slaughter, Hanwoo steer carcasses were evaluated for quality grade (degree of marbling, meat color, fat color, texture and maturity) according to the Korean beef grading system. The carcasses with grade 1+ and 2++ were finally selected and their longissimus thoracis (LT) muscles (n=89) were obtained. The LT muscles in each grade group were then evaluated for the marbling fleck characteristics at the 13th thoracic vertebra by using a digital image system. Based on the analytic results by the digital camera system, 2 types of marbling flecks (fineness or coarseness) were formed for each grade group (Table 1, Fig 1). Each the muscle from each marbling fleck group within each grade were divided into 3 equal portions and stored for 0, 7 and 14 days at 2°C. The samples were analyzed for chemical composition, color traits (CIE L*, a*, b*), water-holding capacity (WHC), cooking loss, WB-shear force, 2-Thiobarbituric acid reactive substance (TBARS) content [4], and Volatile basic nitrogen (VBN) content [5]. Data were analyzed by the Student-Newman-Keuls' multiple comparison using the GLM Procedure of the SAS program [6].

Results

No differences in the chemical composition occurred between the coarse and fine marbling fleck groups within each quality grade (Table 2). The total fat content in the loin samples ranged from 18.86 to 26.02% for the quality grade 1+ and 1++, respectively. The samples with coarse marbling flecks in the grade 1++ had significantly higher WB-shear force value and lower WHC compared to those with fine marbling flecks (Table 3). Regarding color, the samples with coarse marbling flecks in the grade 1+ had significantly

higher a* (redness), b* (yellowness), c* (chroma) and h* (hue) values than those with fine marbling flecks ($p < 0.05$) (Fig 2). The lipid oxidation (TBARS) and protein degradation (VBN) contents were found significantly higher in the samples with coarse marbling flecks than those with fine marbling flecks after 7 d and 14 d storage at 2°C (Fig 3).

Conclusion

Depending on the quality grade group (1+ and 1++), the marbling fleck characteristics (coarseness and fineness) partly showed its effects on the meat quality traits and storage stability. The beef samples with fine marbling flecks presented a better water holding capacity and lower shear force values while, the ones with coarse marbling flecks showed a lighter and redder in color. Also, the samples with fine marbling flecks in the both grade groups presented lower lipid and protein oxidation levels during storage. Further study on the effects of marbling fleck characteristics on eating quality is necessary.

Acknowledgements

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References

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Notes



Coarse marbling **Fine marbling**

Fig 1. Marbling fleck groups: Coarseness (left) and fineness (right) of graded 1⁺ Hanwoo beef loin muscles.

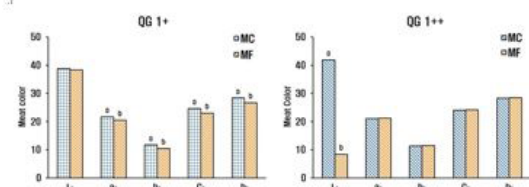


Fig 2. Meat color traits as affected by marbling fleck groups (MC: coarseness and MF: finesse) for the quality grade 1⁺ and 1⁺⁺.

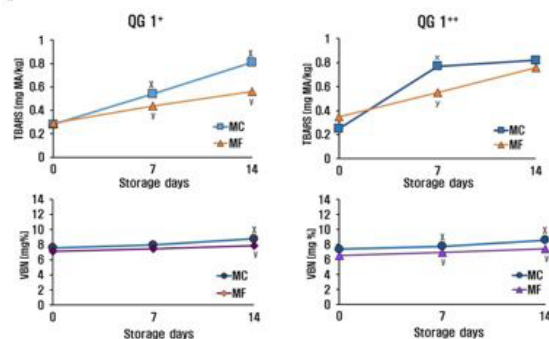


Fig 3. TBARS and VBN contents as affected by marbling fleck groups (MC: coarseness and MF: finesse) for the quality grade 1⁺ and 1⁺⁺ during storage.

Fig 2.

Notes

Table 1. Numbers of muscle samples used for the experiment.

Marbling fleck group,	Quality grade,	
	1 ⁺ ,	1 ⁺⁺ ,
Coarseness,	21,	18,
Fineness,	27,	23,

Table 2. Chemical composition of Loin muscle as affected by different marbling fleck groups within each grade group.

Item,	Quality Grade,	Marbling fleck group,	
		Coarseness,	Fineness,
Protein (%),	1 ⁺ ,	18.35±0.23 ^a ,	18.51±0.20,
	1 ⁺⁺ ,	17.51±0.21,	16.98±0.25,
Moisture (%),	1 ⁺ ,	60.15±0.65,	60.46±0.57,
	1 ⁺⁺ ,	57.50±0.68,	55.49±0.75,
Fat (%),	1 ⁺ ,	19.66±0.53,	18.86±0.70,
	1 ⁺⁺ ,	26.02±0.94,	24.09±0.62,
Collagen (%),	1 ⁺ ,	1.99±0.05,	2.07±0.06,
	1 ⁺⁺ ,	2.22±0.04,	2.35±0.06,

^aMean ± standard error.

Table 3. Technological quality traits of loin muscles as affected by different marbling fleck groups within each grade group.

Item,	Quality grade,	Marbling fleck group,	
		Coarseness,	Fineness,
Cooking loss (%),	1 ⁺ ,	22.67±0.36,	22.87±0.51,
	1 ⁺⁺ ,	22.73±0.40,	22.08±0.43,
WB-Shear force, (WBS, kg),	1 ⁺ ,	2.93±0.10,	2.81±0.10,
	1 ⁺⁺ ,	3.08±0.05 ^a ,	2.73±0.07 ^b ,
Water holding capacity, (WHC, %),	1 ⁺ ,	54.78±1.29,	55.08±1.06,
	1 ⁺⁺ ,	47.00±1.65 ^b ,	51.64±0.99 ^a ,
pH,	1 ⁺ ,	5.54±0.01,	5.51±0.03,
	1 ⁺⁺ ,	5.52±0.01,	5.49±0.02,

^aMean±SE, ^bMeans in the same muscle among the aging days within the same category with different letters are significantly different ($p<0.05$).

Fig 1

Notes