EFFECT OF DRY-AGING ON SENSORY PROPERTIES OF LOIN AND TRITIP MUSCLE FROM HANWOO BEEF

Sun Moon Kang, Seok Geun Chung, Pil-Nam Seong, Yunseok Kim, Youngchun Kim,

Hoa Van Ba, Jin-Hyoung Kim and Soohyun Cho*

Animal Products Utilization Division, National Institute of Animal Science, RDA, 1500, Kongjwipatjwi-ro, Iseo-myeon,

Wanju-gun 55365, South Korea.

*Corresponding author email: shc0915@korea.kr

Abstract – The objective of this study was to investigate the effect of 4 different dry-aging conditions on sensory properties of bone-in loin and tritip muscles of Hanwoo beef. The sensory scores in tenderness, juiciness, flavor-likeness and overall likeness of dry-aged loin and tritip muscles increased as the aging period increased. Among four treatments, T2 (2°C, RH 65%, 20 d + 2°C, RH 75%, 20 d + 4°C, RH 85%, 50 d) and T3 (2°C, RH 75%, 20 d + 4°C, RH 85%, 40 d) had significantly higher sensory scores whereas T1 (2°C, 85%, 60 d) had significantly lower scores in tenderness, juiciness, flavor-likeness and overall likeness scores evaluated at 20, 40, 60 d for bone-in loin muscles ($P < 0.05$). T2 also had significantly higher scores than the other treatments at 20 d for tritip muscle ($P < 0.05$). Thus, gradual increases in temperature and humidity by stages at 2–4°C and an RH of 65–85% for 60–90 d significantly improved the sensory properties of dry-aged beef. However, the effects of treatment conditions can be different depending on the location of the beef cut.

Key Words – aging condition, flavor-likeness, juiciness, tenderness.

I. INTRODUCTION

The role of aging on improvements in the tenderness and flavor of beef has been extensively reported [1]. Two aging methods, dry-aging (in which beef carcasses or primal/subprimal cuts are stored at a refrigerated temperature without protective packaging materials) and wet-aging (in which wholesale primal/subprimal cuts are stored in vacuum packaging), are commonly used [2]. In addition, dry-aged beef has been shown to have improved flavor characteristics compared with wet-aged or unaged beef samples [3]. However, little information is available on the effects of dry-aging conditions on sensory attributes, despite several studies on this subject. Therefore, the objective of this study was to investigate the effects of four different dry-aging conditions on sensory properties of loin and tritip muscles of Hanwoo beef.

II. MATERIALS AND METHODS

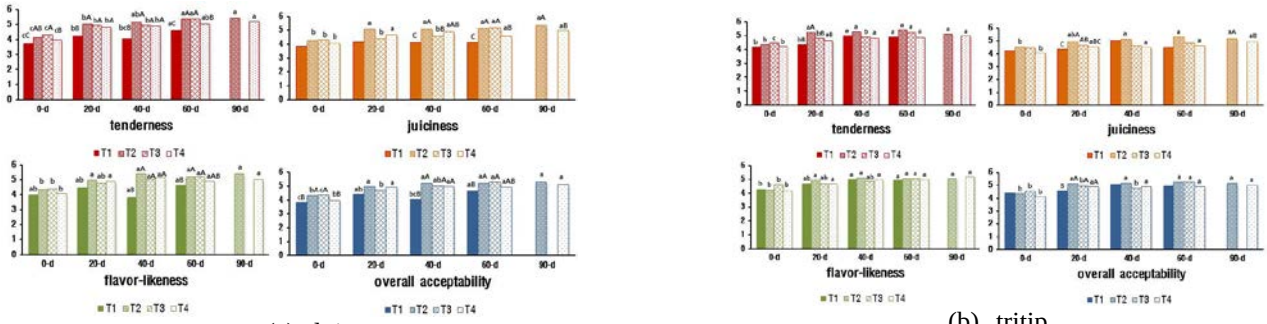
A total of fifty four pairs of Hanwoo beef loin (6th~13th, bone-in and fat cover) and bottom round muscles from Hanwoo steer carcasses with quality grade 1 at 2 days postmortem were obtained from a local meat processing plant. They were randomly assigned into 4 groups and hung in the dry-aging room to control and monitor the temperature, humidity and air velocity as Table 1. On each sampling day, the loin *(longissimus lumborum*, LD) and tritip (*tensor fasciae latae*, TL) muscles were separated, vacuum-packaged, and stored at 1°C for analysis of meat quality and sensory evaluation. For sensory evaluation, beef strips were cooked on a tin plate at approximately 245–255°C. Scoring was performed using 6-point scale evaluation by 7 trained panelists. Tenderness ranged from very tough (1) to very tender (6); juiciness ranged from very dry (1) to very juicy (6). Flavor ranged from extreme dislike (1) to extreme like (5); overall liking ranged from extreme dislike (1) to extreme like (6). Each animal within the same slaughtering age group was treated as a replicate. Data were analyzed by the Student-Newman-Keuls' multiple comparison using the General Linear Model Procedure of the SAS program [3]. The significance level was set at $P < 0.05$.

III. RESULTS AND DISCUSSION

In the sensory evaluation of four different dry-aging conditions, the tenderness, juiciness, flavor-likeness and overall likeness scores of loin and tritip muscles increased as the duration of aging increased. Among the four treatments, there were differences in tenderness scores of LD muscle at 20, 40 and 60 d and juiciness, flavor and overall likeness scores at 40 d, 60 d and 90 d ($P < 0.05$). T2 and T3 had significantly higher sensory scores whereas T1 had significantly lower scores for tenderness, juiciness, flavor-likeness and overall likeness scores at 20, 40, 60 d for loin muscles ($P < 0.05$). The TL muscle showed significant differences in tenderness, juiciness and overall likeness only at 20 d of drying period ($P < 0.05$). In particular, T2 had significantly higher scores, whereas T1 had significantly lower scores in tenderness, juiciness, and overall likeability compared with the other treatments on day 20 for tritip muscle ($P < 0.05$). Kim et al. [4] reported that many metabolites associated with taste are more abundant in dry-aged beef than in wet-aged beef; this may explain the intensified flavor of dry-aged beef found by sensory evaluation.

Table 1. Dry-aging conditions

Treatment	Condition	Drying method	Sampling day	Note
T1	2°C, 85%, 60 d	Hanging	0, 20, 40, 60	Maintain same temperature & humidity
T2	2°C, 65%, 20 d + 2°C, 75%, 20 d + 4°C, 85%, 50 d	Same as above	0, 20, 40, 60, 90	Increase temperature & humidity by 3 stage
T3	2°C, 75%, 20 d + 4°C, 85%, 40 d	Same as above	0, 20, 40, 60	Increase temperature & humidity by 2 stage
T4	4°C, 85%, 90 d	Same as above	0, 20, 40, 60, 90	Maintain same temperature & humidity



(a) loin (b) tritip

Figure 1. Sensory evaluation for loin and tritip muscles from Hanwoo beef dry-aged at 4 different conditions. [a-c]Means in the same treatment among the aging days within the same category with different letters are significantly different ($P < 0.05$). [A-C]Means in the same aging day among 4 treatments within the same category with different letters are significantly different ($P < 0.05$).

IV. CONCLUSION

Dry-aging of loin and tritip muscles at 2–4°C and an RH of 65–85% for 60–90 d significantly improved the sensory properties of the meats. Application of gradual increases in temperature and humidity by stages may improve drying, although the effects of treatment conditions varied depending on the location of the beef cut.

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