

Effect of aging days on tenderness of five muscles from Hanwoo cow with different quality grade

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Abstract— This study was investigated the effect of aging days on tenderness of Hanwoo cow beef with different quality grade. Five muscles were obtained from twenty Hanwoo cows by the Korean meat quality grade (QG 1⁺, 6; QG 1, 7; QG2, 7), respectively. *Psoas major* muscle (PM), *longissimus dorsi* muscle (LD), *longissimus lumbrum* muscle (LL), *longus colli* muscle (LC) and *semimembranosus* muscle (SM) were vacuum packed then stored for 2, 6, 10, 14, 21 and 28 d at 4°C and Warner-Bratzler shear force (WBSF) values were measured. Tenderness levels were classified depending on WBSF values as tough zone (> 3.9 kg), tender zone (3.2~3.9 kg) and very tender zone (< 3.2 kg). LC and SM had significant lower ($p<0.05$) intramuscular fat contents than the other samples regardless of QGs and cuts. Collagen contents were not different among QGs and cuts. PM was most tender among five muscles. Especially, WBSF values of PM with QG 1⁺ attained in very tender zone at 2 d, and those with QG 1 and 2 attained in very tender zone at 6 d. LD with QG 1⁺ attained in very tender zone at 10 d. WBSF values of LL attained in very tender zone at 14 d. LC with QG 1⁺ remained in tough zone until 10 d. SM attained in tender zone after 28 d. Therefore, the result of our study suggested that aging effects on tenderness of Hanwoo cow beef may related to the muscle fiber types.

Keywords— Hanwoo cow, tenderness, quality grade, shear force value

I. INTRODUCTION

The most important aspect of beef quality is the sensory or eating quality, defined as tenderness, juiciness and flavor, usually assessed by a trained taste panel (Dikeman et al., 2005). Meat tenderness tenderness is the extent of proteolysis of key target proteins within muscle fibres (Koohmaraie & Geesink, 2006). Also, tenderness is extremely variable between carcasses, between muscles and even within the same muscle (Alsmeyer, Thornton, & Hinter, 1965). Several factors may influence meat tenderness that animal related factors such as age, gender, breed and factors

related to processing conditions such as suspension, chilling and aging.

Consumers have consistently rated leanness as an important selection criterion when evaluation retail steaks, and marbling contributes to the visual appraisal of fat content. Tenderness is also a highly variable characteristic, depending on many intrinsic and extrinsic factors of the animal and on their interaction. This wide variability is a limiting factor for consumer product acceptability, besides being a reason for consumer dissatisfaction in beef consumption. Therefore, tenderness inconsistency is a priority issue for the meat industry (Koohmaraie, 1996).

Korean consumers prefer high marbling than high lean meat in beef. The reason is because thrust that high marbling with aged beef is tender better than non-aging or low marbling beef. Therefore, the objective of this study was investigated the effects of aging days on tenderness from Hanwoo cow with different quality grade.

II. MATERIALS AND METHODS

The twenty Hanwoo cows by the Korean meat quality grade (QG 1⁺, 6; QG 1, 7; QG2, 7), respectively. Different five muscles from Hanwoo cows were selected *Psoas major* muscle (PM), *longissimus dorsi* muscle (LD), *longissimus lumbrum* muscle (LL), *longus colli* muscle (LC) and *semimembranosus* muscle (SM) and vacuum packed then stored for 2, 6, 10, 14, 21 and 28 d at 4°C.

All samples were measured Warner-Bratzler shear force (WBSF) values using Instron (5543, USA). Obtained data were classified as follows;

WBSF < 3.2 kg, "Very Tender Zone"

WBSF = 3.2~3.9 kg, "Tender Zone"

WBSF > 3.9 kg, "Very Tough Zone"

III. RESULTS AND DISCUSSION

All figures showed that Warner-Bratzler shear force values of five muscles from Hanwoo cows with different quality grade (QG; 1⁺, 1, 2) during cold storage. *Psoas major* muscles without quality grade were belonging to 'Very Tender Zone' after cold storage at 6 d (Fig. 1). Cold storage at 6 d (Fig. 2), *longissimus dorsi* muscle of QG 1⁺ was tender than QG 1 or QG 2. Also, *longissimus dorsi* muscle of all QG was belonging to 'Very Tender Zone' after 14 d cold storage. However, *longissimus lumbrum* muscle of all QG showed tough until 6 d cold storage and only QG 1+ sample was belonging to 'Very Tender Zone' after 10 d cold storage (Fig. 3).

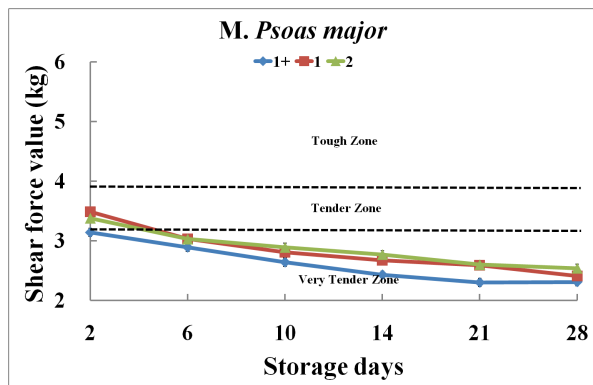


Fig. 1 Changes in Warner-Bratzler shear force values of *psoas major* muscle from Hanwoo cow with different quality grade during cold storage.

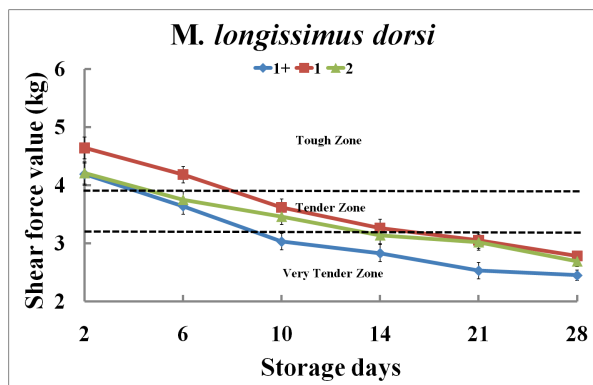


Fig. 2 Changes in Warner-Bratzler shear force values of *longissimus dorsi* muscle from Hanwoo cow with different quality grade during cold storage.

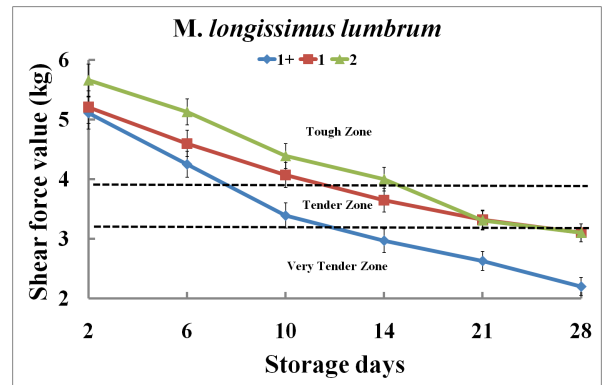


Fig. 3 Changes in Warner-Bratzler shear force values of *longissimus lumbrum* muscle from Hanwoo cow with different quality grade during cold storage.

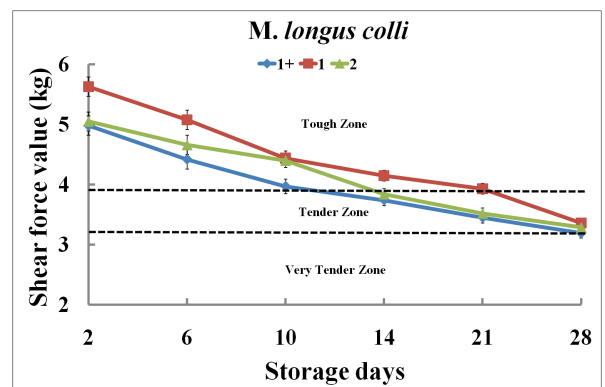


Fig. 4 Changes in Warner-Bratzler shear force values of *longus colli* muscle from Hanwoo cow with different quality grade during cold storage.

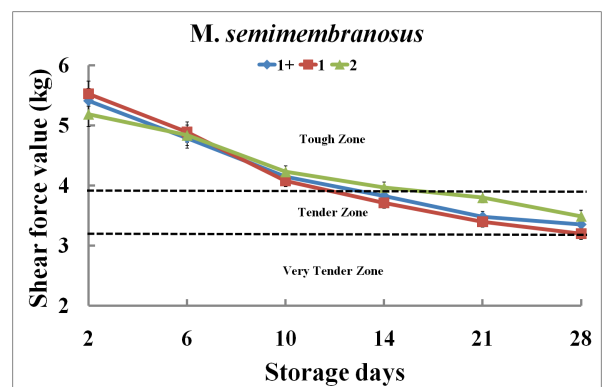


Fig. 5 Changes in Warner-Bratzler shear force values of *semimembranosus* muscle from Hanwoo cow with different quality grade during cold storage.

The changes in tenderness of *longus colli* muscle (Fig. 4) showed similar trend with *semimembranosus* muscle (Fig. 5). In other words, samples of all QGs showed belonging to 'Tough Zone' until 10 d cold storage. Also, those samples were not belonging to 'Very Tender Zone' during 28 d cold storage. Gruber et al. (2006) found that as the quality grade of beef cuts increased.

This result suggested that *psoas major* muscle, *longissimus dorsi* muscle and *longissimus colli* muscle from Hanwoo cows of QG 1⁺ showed tender compared to QG 1 or QG 2, however, between QG 1 and QG 2 showed no difference in patterns of Warner-Bratzler shear force value. Specially, *longus colli* muscle and *semimembranosus* muscle showed not relate to QGs.

IV. CONCLUSIONS

Therefore, our results suggested that tenderness from Korean cows may be related to intramuscular fat contents such as *longissimus* muscle or muscle type such as *psoas major* muscle.

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