

# Effect of aging and intramuscular fat grade on WBSf in Longissimus Thoracis Muscle of Hanwoo

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## I. INTRODUCTION

The tenderness of beef is a crucial factor influencing consumer satisfaction and overall dining experience [1]. Among the various factors that affect beef tenderness, aging and intramuscular fat grade play significant roles [2]. Intramuscular fat, commonly referred to as marbling, contributes to the sensory attributes of beef, including tenderness, juiciness, and flavor [3]. On the other hand, aging, a process of controlled enzymatic breakdown of muscle fibers post-slaughter, is recognized for its ability to enhance beef tenderness by allowing natural tenderization mechanisms to take place [2]. The aim of this study was to compare the relative impact of aging and intramuscular fat grade on the Warner-Bratzler shear force (WBSf) in the Longissimus thoracis (LT) muscle of Hanwoo.

## II. MATERIALS AND METHODS

From 2007 to 2020, data on Hanwoo beef analyzed at Jeonbuk National University and the National Institute of Animal Science were collected. The analysis results for the LT muscle from a total of 423 heads (32 bulls, 75 cows, 12 heifers and 304 steers) generated across four projects were utilized. All animals were conventionally raised in feedlots and slaughtered according to the regulations set forth by the Korea Animal Plant Quarantine Agency of the Ministry of Agriculture, Food and Rural Affairs for beef slaughter at commercial abattoirs. And then immediately moved to a chilling room and stored at 4 °C, after 24 h in the chilling room, all carcasses were graded according to the Korean Beef Carcass Grading System included intramuscular fat grade [4]. Aging was initiated 24 hours post-slaughter, designated as Day 0 of aging. Shear force measurements were conducted using a Warner-Bratzler blade. Meat blocks were heated in a water bath until the core temperature reached 70°C, then cooled in running water for 30 minutes. Cores(1.25cm) parallel to muscle fibers were took, and shear force was measured using an Instron Universal Testing Machine (Model 3342; Instron Corporation, Norwood, MA, USA) The statistical analysis was conducted using IBM SPSS Statistics (version 27.0, SPSS Inc., Chicago, IL, USA). The comparison of the impact of aging and intramuscular fat level on shear force was conducted using multiple regression analysis.

## III. RESULTS AND DISCUSSION

The results of the multiple linear regression analysis conducted to investigate the impact of aging and intramuscular fat level on shear force in LT muscle of Hanwoo are presented in Table 1. In the Hanwoo LT muscle, aging had a significant effect on shear force with  $\beta=-0.019$  ( $p<0.001$ ), and intramuscular fat grade also had a significant effect with  $\beta=-0.083$  ( $p<0.001$ ).

The relative impact of aging and intramuscular fat grade on shear force value was compared through the standardized coefficients  $\beta$  values.

The standardized coefficients  $\beta$  values for aging and intramuscular fat level were -0.311 ( $p < 0.001$ ) and -0.286 ( $p < 0.001$ ), respectively, indicating that aging has a relatively higher impact on shear force compared to intramuscular fat grade.

Table 1 – Comparison of the impact of aging and intramuscular fat grade on shear force in the longissimus thoracis Muscle of Hanwoo.

Variations	Unstandardized coefficient		standardization coefficient	t(p)	TOL	VIF
	$\beta$	SE	$\beta$			
(Coefficient)	4.366	0.078		55.928		
Aging days	-0.019	0.003	-0.311	-6.784***	0.896	1.116
Intramuscular-fat grade	-0.083	0.013	-0.286	-0.263***	0.896	1.116
F(p)			32.228***			
Adj.R <sup>2</sup>			0.117			
Durbin-Watson			0.628			

\*\*\* $P < 0.001$

## ACKNOWLEDGEMENTS

This study was supported with funds from the “Development of Technology Utilizing Data for Post-harvest Management of Agricultural and Livestock Products(RS-2022-RD010289; Project No. PJ017020032024)” project provided by the Rural Development Administration (RDA),

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