Assessment of Warner-Bratzler shear for branded Hanwoo beef by quality grade and subprimal cuts

J.H. Kim*, P.N. Seong, S.H. Cho, D.W. Jeong, T.S. In, B.Y. Park, J.M. Lee, D.H. Kim & C.N. Ahn

National Institute of Animal Science, RDA., 564 Omockchun-Dong, Suwon 441-350, Republic of Korea.

*E-mail: jhkim702@rda.go.kr.

Abstract

Eight subprimal cuts [ansimsal (tenderloin), witdngsimsal (ribeye roll), cheggtsal (striploin), gurisal (chuck tender), hongdukesal (eye of round), bosupsal (top sirloin), doganisal (knuckle), moongchisatae (shank) purchased from the branded Hanwoo beef of 3 quality grades (1^{++}, 1^+, 1) at 13 stores in korea were evaluated the tenderness using Warner-Bratzler shear (WBS). The aging period of branded Hanwoo beef was ranged average 6.33 to 11.78 d. WBS values for ansimsal were 2.56 (1^{++}), 2.76 (1^+) and 3.10 kg (1), respectively, and those for doganisal (1^{++}), hongdukesal (1^+) and bosupsal (1) were 4.76, 4.96 and 5.66 kg, respectively ($p<0.05$). The distribution rate of WBS < 3.9 kg in the all subprimal cuts from branded Hanwoo beef of quality grade 1^{++} were 100% (ansimsal and cheggtsal), whereas that of WBS > 4.6 kg were 50.0% (hongdukesal and doganisal). The distribution rate of WBS < 3.9 kg in the all subprimal cuts of quality grade 1^+ were 100% (ansimsal and witdngsimsal), whereas that of WBS > 4.6 kg were 66.7% (hongdukesal). The distribution rate of WBS < 3.9 kg in the all subprimal cuts of quality grade 1 were 88.9% (ansimsal, whereas that of WBS > 4.6 kg were 100.0% (doganisal).

Introduction

Recently, beef industry in Korea increased certified branded Hanwoo beef, but the meat quality of branded Hanwoo beef was not enough consumers' perception of taste. The Beef Consumer Satisfaction Study (Lorenzen et al., 1999) showed that tenderness is a major and contributing factor to consumers' perception of taste. Other study revealed that tenderness is the single most important factor affecting Korea consumers' perception of taste (Cho, 2003). These studies have established the importance of tenderness to consumers who purchase beef products. Thus the objective of this survey was to determine tenderness of branded Hanwoo beef on WBS force.

Material and methods

Eight subprimal cuts [ansimsal (tenderloin), witdngsimsal (ribeye roll), cheggtsal (striploin), gurisal (chuck tender), hongdukesal (eye of round), bosupsal (top sirloin), doganisal (knuckle), moongchisatae (shank)] purchased from the Korean branded Hanwoo beef of three Korea quality grades (1^{++}, 1^+, 1) at 13 stores in Korea were evaluated the tenderness using Warner-Bratzler shear (WBS). Postfabrication aging period was estimated to information of slaughter and sail day obtained on the cattle and beef traceability system of Animal Product Grading Service (Korea). WB shear force was measured on cooked steaks (2.54 cm thick) in a pre-heated water bath for 60 min until the core temperature reached 70 and then cooled in running water (ca. 18) for 30 min to reach a core temperature below 30 . Eight cores of 1.27 cm diameter were made for each sample, and peak force was determined using a V-shaped shear blade with a cross-head speed of 400 mm/min (Hwang et al., 2004). Pooled data were analyzed using the General Linear Models (GLM) of the Statistical Analysis System (SAS, 1998).

Results and discussions

The aging period of branded Hanwoo beef was ranged average 6.33 to 11.78 days. WBS values for ansimsal (tenderloin) were 2.56 (quality grade 1^{++}), 2.76 (quality grade 1^+) and 3.10 kg (quality grade 1), respectively, and those for doganisal (knuckle, quality grade 1^{++}), hongdukesal (eye of round , quality grade 1^+) and bosupsal (top sirloin, quality grade 1) were 4.76, 4.96 and 5.66 kg, respectively ($p<0.05$). The distribution rate (%) of WBS < 3.9 kg in all subprimal cuts from branded Hanwoo beef of quality grade 1^{++} were 100 [ansimsal (tenderloin) and cheggtsal (striploin)], 87.5 (witdngsimsal, ribeye roll) and 62.5% (bosupsal, top sirloin), whereas that of WBS > 4.6 kg were 50.0% [hongdukesal (eye of round) and

doganisal). The distribution rate of WBS < 3.9 kg in all subprimal cuts of quality grade 1[+] were 100 [ansimsal (tenderloin) and witdngsimsal (ribeye roll)] and 44.4% [cheggtsal (striploin) and gurisal (chuck tender)], whereas that of WBS > 4.6 kg were 66.7 (hongdukesal, eye of round), 55.6 (doganisal, knuckle) and 44.4% (bosupsal, top sirloin). The distribution rate (%) of WBS < 3.9 kg in all subprimal cuts of quality grade 1 were 88.9 (ansimsal, tenderloin), 62.5 (cheggtsal, striploin) and 44.4% (witdngsimsal, ribeye roll), whereas that of WBS > 4.6 kg were 100.0 (doganisal, knuckle) 62.7 (hongdukesal, eye of round), 62.5 (gurisal, chuck tender) and 55.6% (moongchisatae, shank).

Table 1. Least squares means and standard error (SE) of WB shear values (kg) and frequency distribution rate for different subprimal cut of branded Hanwoo beef with quality grade 1[++]

Subprimal cut	Mean±SE	Frequency distribution rate (%)		
		WBS <3.9 kg	WBS 3.9 to 4.6 kg	WBS > 4.6 kg
Ansimsal (tenderloin)	2.56±0.11[e]	100.00	0.00	0.00
Witdngsimsal (ribeye roll)	3.32±0.14[cd]	87.50	12.50	0.00
Cheggtsal (striploin)	2.77±0.20[de]	100.00	0.00	0.00
Gurisal (chuck tender)	4.22±0.15[ab]	12.50	75.00	12.50
Hongdukesal (eye of round)	4.69±0.33[a]	25.00	25.00	50.00
Bosupsal (top sirloin)	3.79±0.38[bc]	62.50	25.00	12.50
Doganisal (knuckle)	4.76±0.34[a]	25.00	25.00	50.00
Moongchisatae (shank)	4.09±0.24[ab]	50.00	25.00	25.00

[a-e] : Means with different letter in the same column are significantly different (p<0.05).

Table 2. Least squares means and standard error (SE) of WB shear values (kg) and frequency distribution rate for different subprimal cut of branded Hanwoo beef with quality grade 1[+]

Subprimal cut	Mean±SE	Frequency distribution rate (%)		
		WBS <3.9 kg	WBS 3.9 to 4.6 kg	WBS > 4.6 kg
Ansimsal (tenderloin)	2.76±0.09[e]	100.00	0.00	0.00
Witdngsimsal (ribeye roll)	3.29±0.16[de]	100.00	0.00	0.00
Cheggtsal (striploin)	3.88±0.27[cd]	44.44	33.33	22.22
Gurisal (chuck tender)	4.18±0.21[bc]	44.44	33.33	22.22
Hongdukesal (eye of round)	4.96±0.25[a]	0.00	33.33	66.67
Bosupsal (top sirloin)	4.55±0.28[abc]	11.11	44.44	44.44
Doganisal (knuckle)	4.70±0.20[ab]	11.11	33.33	55.56
Moongchisatae (shank)	4.29±0.21[bc]	22.22	55.56	22.22

[a-e] : Means with different letter in the same column are significantly different (p<0.05).

Table 3. Least squares means and standard error (SE) of WB shear values (kg) and frequency distribution rate for different subprimal cut of branded Hanwoo beef with quality grade 1

Subprimal cut	Mean±SE	Frequency distribution rate (%)		
		WBS <3.9 kg	WBS 3.9 to 4.6 kg	WBS > 4.6 kg
Ansimsal (tenderloin)	3.10±0.15[e]	88.89	11.11	0.00
Witdngsimsal (ribeye roll)	4.20±0.28[cd]	44.44	33.33	22.22
Cheggtsal (striploin)	3.70±0.28[de]	62.50	25.00	12.50
Gurisal (chuck tender)	4.64±0.20[bc]	12.50	25.00	62.50
Hongdukesal (eye of round)	5.03±0.33[ab]	0.00	37.50	62.50
Bosupsal (top sirloin)	4.24±0.20[cd]	25.00	50.00	25.00
Doganisal (knuckle)	5.66±0.25[a]	0.00	0.00	100.00
Moongchisatae (shank)	4.99±0.27[ab]	0.00	44.44	55.56

[a-e] : Means with different letter in the same column are significantly different ($p<0.05$)

Conclusions

Eight subprimal cuts from branded Hanwoo beef were marketed with short aging periods and high distribution rate (%) of WBS > 4.6 kg. Future research must investigate the interaction of antemortem and postmortem factors associated with variation in beef tenderness.

References

Cho, S. H. 2003. Technology development of livestock food products in the 21st century. Rural Development Administration, National Livestock Research Institute. pp. 171-206.

Hwang, I. H., Park, B. Y., Cho, S. H., Kim, J. H., and Lee, J. M. 2004. Meat quality of highly marbled imported beef with reference to Hanwoo beef. *J. Anim. Sci. & Technol (Kor.),* 46, 659-666.

Lorenzen, C. L., Neely, T. R., Miller, R. K., Tatum, J. D., Wise, J. W., Taylor, J. F., Buyck, M. J., Reagan, J. O., and Savell, J. W. 1999. Beef Customer Satisfaction: Cooking method and degree of doneness effects on the top loin steak. *J. Anim. Sci.* 77, 637-644.

SAS. SAS/STAT. 1998. SAS/STAT User's Guide: Statistics. SAS inst., Cary, NC.