MEAT QUALITY OF HANWOO STEERS FED WITH TOTAL MIXED RATIONS(TMR) BASED ON WHOLE CROP BARLEY SILAGE(WBS) IN KOREA

W. H. Kim[1*], S. Seo[1], K. C. Choi[1], K. Y. Kim[1], M. W. Jung[1], Y. C. lim[1], B. Y. Park[2] and S. H. Cho[2*]

[1]Grassland and Forages Research Division, National Institute of Animal Science, RDA, Seonghwan, Cheonan, Chungnam, 331-801, Republic of Korea

[2]Animal Products Research and Development Division, National Institute of Animal Science, RDA, Omogcheon-dong, Suwon, Gyeonggi, 441-706, Republic of Korea

[*]Corresponding author (phone: +82-41-580-6747; fax: +82-41-580-6779; e-mail: kimwh@korea.kr)

Abstract— To investigate the effects of total mixed ration based on) on growth performance and carcass characteristics of Hanwoo steers, sixty steers were randomly assigned to one of four treatment groups; separate feeding of concentrate and rice straw(control), wet TMR based on whole crop barley silage from 6 to 30 month of age. Meat quality with TMR feed were higher than that of control. Frequency rate(%) of 1 and/or 1^+ quality grade, and marbling score of feeding with whole crop barley were 100% and 4.83, while those of control were 75% and 4.58, respectively. The results of the sensory evaluation showed that Hanwoo beef fed with TMR feed were better than that of control. In conclusion, feeding of TMR based on domestic forage was desirable to improve the beef quality and palatability of Hanwoo steers.

Index Terms—Total mixed rations, whole crop barley, sensory evaluation, whole crop silage

I. INTRODUCTION

Recently, however, the production and utilization of whole crop barley and Italian ryegrass (IRG) for cattle increase rapidly, and research on whole crop barley and IRG as domestic forages is carrying actively out since 1998 (Seo & Yook, 2002 ; MIFAFF, 2009 ; Seo, 2009). MIFAFF steadily tries to make the policies about the plans and supports for cattle research and extension of forages such as barley, IRG, corn, and so on. High quality and high safety Hanwoo beef is greatly required to consumers, nowadays. Therefore, this study was carried out to investigate the effect of feeding whole crop barley silage produced in domestic area on the carcass grade, beef quality and sensory evaluation of Korean native Hanwoo steers.

II. MATERIALS AND METHODS

This study was carried out to investigate the effect of feeding TMR based on whole crop barley silage as the beef carcass grade and meat quality of Korean native Hanwoo steers in Jeongub, Jeonbuk, 2003. sixty steers one steers were allocated and divided into two treatment groups which fed rice straw only, TMR based on whole crop barley silage. Hanwoo beef was analyzed quality-grade factor (marbling score, meat color, fat color, texture, maturity), and quantity-grade factor (carcass weight, back fat thickness, *longissimus* muscle loin area). The contents of moisture, crude protein, crude fat, and crude ash were analyzed by AOAC (1990) with *longissimus lumborum* muscles (striploin), and water holding capacity was measured by Laakkonen, Wellington & Skerbon (1970). 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 ºC and then cooled in running water (ca. 18ºC) for 30 min to reach a core temperature below 30ºC. 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 (Wheeler, Shackelford & Koohmaraie, 2000). Cooking loss was calculated as percent of weight changes during cooking for WB-shear force measurement. Non-trained eight panelists evaluated sensory characteristics of tenderness, juiciness and flavor intensity on a 6-point scale from very unacceptable to very acceptable.

III. RESULTS AND DISCUSSION

The most important factor is beef quality grade in Hanwoo steers (Table 1). The marbling score of Hanwoo beef fed with TMR based on whole crop barley (4.83) was higher than rice straw (4.33). The appearance percentage of over first and/or first+ grade quality was high in whole crop barley silage as a 100% than those of rice straw (75%). But *longissimus* muscle area tends to high in TMR based on whole crop barley silage. The content of moisture, crude protein, and crude ash were similar among treatments (Table 3). However, the content of crude fat was significantly

high in feeding with TMR based on forage barley silage as 13.12%. Juiciness, tenderness, and flavor of sensory evaluation of Hanwoo beef also good in whole crop barley silage than those of rice straw, and TMR based on whole crop barley silage feeding treatment (Table 5).

Table 1. Effect of feeding TMR on carcass yield and quality traits of Hanwoo beef

Treatment	Beef marbling score	Meat color score	Fat color score	Texture	Quality grade*(%)			
					1+	1+	1	2
Control	4.33	4.83	3.0	1.33	42	25	2 5	25
TMR	4.83	4.58	3.0	1.33	50	17	34	0

* Beef marbling score: 1 = devoid, 7 = very abundant ; Meat color: 1 = bright red, 7 = dark red ; Fat color: 1 = creamy white, 7 = yellowish ; Texture(firmness): 1 = firm, 3 = soft)

Table 2. Characteristics of beef yield grade factors of Hanwoo beef

Treatment	Back fat thickness (mm)	*Longissimus* muscle area (㎠)	Carcass weight (kg)	Yield index	% of yield grade		
					A	B	C
Control	15.08	83.75	394.0	66.05	16	42	42
TMR	12.83	85.25	392.0	67.16	42	25	33

* A: score 1, B: score 2, C: score 3

Table 3. Chemical composition of Hanwoo beef

Treatment	Moisture (%)	Protein (%)	Fat (%)	Ash (%)
Control	64.91	19.23	13.63	0.97
TMR	65.19	19.45	13.12	0.91

Table 4. Physical characteristics of Hanwoo beef

Treatment	Cooking loss (%)	WB-shear force (kg/㎠)	Water holding capacity (%)
Control	38.37	3.93	47.81
TMR	37.79	3.83	48.33

Table 5. Sensory evaluation of Hanwoo steer beef

Treatment	Juiciness (1 ~ 6)	Tenderness (1 ~ 6)	Flavor (1 ~ 6)
Control	4.13	3.98	4.31
TMR	4.63	4.31	4.61

* 6-point scale from 1(very unacceptable) to 6(very acceptable)

IV. CONCLUSION

Beef quality factors are very important to consumers and farmers. Feeding of TMR based on forage barley silage as domestic high quality forage was very desirable for improving beef quality and palatability of Hanwoo steers. Feeding with good quality should be applicable greatly to beef cattle farmers during growing and early-middle stage of Hanwoo steers.

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