



CHARACTERISTICS OF CARCASS COMPOSITION FOR HANWOO (COW, BULL, STEER) AND HOLSTAIN STEER

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Background

According to the Korean animal products grading service, the frequency of carcass weight slaughtered from 1998 to 2002 decreased 2.9%, 14.7% and 12.2% for lighter than 200 kg, 200~250 kg and 250~300 kg, respectively. On the other hand, that increased 8.1% and 14.8% for 300~350 kg and 350~400 kg, respectively. Dairy cattle also showed the similar trend over the period. The tendency was understood as a consequence of improvement of feeding technique and long feeding period in response to consumer's demand of high quality beef. The rate of castration increased from 8.6% in 1998 to 38.2% in 2002. As a result, frequency of carcass heavier than 350kg increased from 16.3% in 1998 to 42.5% in 2002 which was the result of farmer's effort for producing high quality Hanwoo beef. According to the US National Beef Quality Audit in 2002, the most important task for beef producer included consistent product, yieldness, over-fattening. In the case of the US, carcass weight increased from 344kg in 1991, 339 kg in 1995 to 357 kg in 2000. However, backfat thickness was 1.5cm in 1991, 1.2 cm in 1995 and 1.24 cm in 2000. In addition, average carcass weight for each quality grade was 370 kg for prime, 359 kg for choice and 355 kg for select grade.

Objectives

The current study was conducted to investigate characteristics of carcass quality and yieldness for Hanwoo cow, bull and steers within the range of market weight for each breed.

Materials and methods

The current analysis used industrial data collected from July 2003 to November 2003 across Korean best six slaughter houses. Seventy three carcasses of total 631 carcass were excluded for which a sum of deboned meat, bone and fat was higher than carcass weight, or which had higher than 15 kg of processing loss. Finally 558 carcasses were used for the analysis. Seven Hanwoo cows with carcass weight range of 350~400 kg, 77 Hanwoo bulls, 50 Hanwoo steers, 71 castrated daily cattle and thus total 212 cattle were used for analyzing carcass weight, cutability (10 primal cuts), body fat, bone weight. Carcass separation was performed according to the methods described by Ministry of Agriculture and Forest Act 1- 69. Subcutaneous fat was determined according to the beef regulation which requires remaining rate of 0 mm. Yieldness was calculated carcass weight against carcass weight without kidney and kidney fat. Back fat thickness and ribeye area were determined according to the method described by Animal products grading service.

Results and discussion

Table 1 shows characteristics of carcass traits. Average carcass weight of Hanwoo cow, bull and steer, and Holstein steer were 326.7 kg, 372.6, 378.6 and 396.7 kg, respectively. Holstein steer had the highest carcass weight, and that for bull and steer was similar. On the other hand, Hanwoo cow had a significantly lower carcass weight ($p < 0.05$). Hanwoo cow had the most thicker back fat with 11.34 mm, followed by Hanwoo steer with 10.54 mm, Holstein steer with 7.69 mm, and Hanwoo bull with 6.16 mm ($p < 0.05$). Ribeye area was largest for Hanwoo bull with 85.7, followed by Hanwoo cow with 76.01 and Hanwoo steer with 74.20 ($p < 0.05$). Yieldness was highest for Hanwoo bull with 67.8%, followed by Holstein steer with 64.0%, Hanwoo steer with 61.5%, and Hanwoo cow with 61.1% ($p < 0.05$). Bone percentage was highest for Holstein steer with 15.0%, followed by Hanwoo bull 13.4%, Hanwoo steer with 12.0%, and Hanwoo cow with 11.8%. Difference in bone percentage between Hanwoo bull and Holstein steer was approximately 1.6%, while that between Hanwoo steer and Holstein steer was approximately 3.0% with higher percentage for Holstein steer. Body fat percentage was lowest for Hanwoo bull with 17.4%, followed by Holstein steer with 19.4%, Hanwoo steer with 24.6%, and Hanwoo cow with 25.0% ($p < 0.05$).



With regard to carcass characteristics, Hamlin et al. (1995), Reiling et al. (1995) and Barber et al. (1981) reported that yieldness was linearly increased with carcass weight, but cutability against yieldness was decreased. Johnson et al. (1991) reported that high carcass quality with increased carcass weight resulted in reduction in cutability and increase in body fat percentage. In this regard, the current result of Holstein steer and Hanwoo steers supported the previous result. In addition, Abraham et al. (1980) and Talamantes et al. (1986) reported that body fat varied between breeds, sex, slaughter weight and between carcasses. Thus the percentage of body fat was a significant factor determining slaughter age for the best economic value of carcass.

Table 2 shows difference in carcass characteristics. Carcass weight did not differ with the selected range ($p>0.05$). However, retail cut percentage was highest for Hanwoo bull with 254.0 kg, followed by Holstein steer with 242.8 kg, Hanwoo steer with 229.6 kg, and Hanwoo cow with 221.2 kg ($p<0.05$). Yieldness which reflects cutability was highest in Hanwoo bull with 67.8%, followed by Holstein steer with 64.5%, Hanwoo steer with 61.3%, and Hanwoo cow with 59.2% ($p<0.05$). Difference in cutability between Hanwoo and Holstein steers were 3.2% with higher percentage for Hanwoo steer. Bone percentage was highest for Holstein steer with 15.4%, while Hanwoo cow was lowest with 11.1% ($p<0.05$). Difference in Holstein steer and Hanwoo bull were 2.13%, and that between Holstein and Hanwoo steers were 3.45%. In body fat content, Hanwoo bull and Holstein steer had 17.6% and 18.5%, respectively. Hanwoo steer and Hanwoo cow were 24.8% and 27.1%, respectively ($p<0.05$).

Similar results with the current study were reported by Amer et al. (1994) and Jacobs et al. (1977) who reported in the study of comparing carcass characteristics between breeds and sex, steer had a higher back fat thickness and lower yieldness than those for bull at the same carcass weight. Hopkinson et al. (1985) buff had higher carcass weight, cutability, and dressing percentage than steer when these were slaughtered at the same live weight. On the other hand, body fat was higher for steer than bull. Miller et al. (1988) and Karima et al. (1986) studied the effect of sex on carcass traits for similar live weight and found that dressing percentage was higher for steer than bull and cow, while cutability was higher for bull than cow and steer.

Conclusions

Hanwoo bulls showed the highest yieldness with 67.8% between carcass weight 350~400 kg, followed by Holstein steer with 64.5%, Hanwoo steer with 61.3% and Hanwoo cow with 59.2% ($p<0.05$). In comparing yieldness between Hanwoo and Holstein steers, Hanwoo steer showed lower percentage by 3.2% than Holstein. In bone weight, Holstein showed the highest percentage with 15.4%, while Hanwoo cow was the lowest 11.1% ($p<0.05$). Difference in bone percentage between Holstein and Hanwoo bull were 2.13%, and that between Holstein and Hanwoo steers was 3.45%. Body fat was low in Hanwoo bull and Holstein with 17.6% and 18.5%, respectively, while that for Hanwoo steer and Hanwoo cow were 24.8% and 27.1%, respectively ($p<0.05$).

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Table 1. Comparison of carcass properties

Item	Hanow			Holstein	Overall
	cow	bull	steer	steer	mean
Numbers of animals	73	207	106	172	558
Carcass wt. (kg)	326.71 ^c ±4.89	372.61 ^b ±3.11	378.61 ^b ±3.88	396.73 ^a ±2.70	375.18 ±1.94
Retailcut wt. (kg)	199.48 ^c ±2.79	252.50 ^a ±1.99	232.35 ^b ±2.18	253.86 ^a ±1.60	242.16 ±1.30
inedible fat (kg)	82.40 ^b ±2.27	65.85 ^c ±1.33	94.14 ^a ±2.21	77.64 ^b ±1.12	77.02 ±0.90
Bone (kg)	38.49 ^d ±0.49	49.89 ^b ±0.34	45.33 ^c ±0.43	59.62 ^a ±0.35	50.53 ±0.36
By-products (kg)	120.89 ^b ±2.60	115.74 ^b ±1.48	139.47 ^a ±2.45	137.26 ^a ±1.28	127.55 ±0.99
% of bone	11.86 ^c ±0.13	13.46 ^b ±0.07	12.01 ^c ±0.08	15.07 ^a ±0.08	13.47 ±0.07
% of body fat	25.00 ^a ±0.44	17.47 ^c ±0.26	24.63 ^a ±0.42	19.47 ^b ±0.19	20.43 ±0.20
% of retail cut	61.19 ^c ±0.34	67.88 ^a ±0.20	61.52 ^c ±0.32	64.05 ^b ±0.15	64.61 ±0.16
Backfat thickness (mm)	11.34 ^a ±0.47	6.03 ^d ±0.21	10.54 ^b ±0.34	7.28 ^c ±0.17	7.97 ±0.16
Loin area ()	76.01 ^c ±1.05	85.70 ^a ±0.70	81.68 ^b ±0.77	74.20 ^c ±0.56	80.12 ±0.43

※ Mean ± standard error of mean.



Table 2. Comparison of carcass properties for animals having carcass weight ranges from 350~400 kg

Item	Hanwoo			Holstein	Overall mean
	cow	bull	steer	steer	
Numbers of animal	14	77	50	71	212
Carcass wt. (kg)	373.43 ±3.80	374.23 ±1.65	374.58 ±2.04	376.01 ±1.67	374.86 ±0.98
Retail cut wt. (kg)	221.22 ^d ±2.26	254.03 ^a ±1.60	229.66 ^c ±1.83	242.82 ^b ±1.27	242.36 ±1.13
inedible fat (kg)	101.31 ^a ±4.20	66.05 ^c ±1.40	93.25 ^b ±2.49	69.84 ^c ±1.04	76.06 ±1.25
Bone (kg)	41.64 ^d ±0.98	49.79 ^b ±0.40	44.90 ^c ±0.41	58.03 ^a ±0.42	50.86 ±0.45
By-products (kg)	142.95 ^a ±4.91	115.83 ^c ±1.39	138.15 ^a ±2.48	127.87 ^b ±1.03	126.92 ±1.11
% of bone	11.15 ^d ±0.24	13.31 ^b ±0.09	11.99 ^c ±0.10	15.44 ^a ±0.10	13.57 ±0.12
% of body fat	27.13 ^a ±1.07	17.65 ^c ±0.36	24.84 ^b ±0.60	18.56 ^c ±0.25	20.28 ±0.32
% of retail cut	59.28 ^d ±0.63	67.88 ^a ±0.31	61.35 ^c ±0.48	64.58 ^b ±0.20	64.67 ±0.27