

EFFECT OF GENDER ON QUALITY TRAITS AND SENSORY EVALUATION OF HANWOO BEEF

D.Dashdorj^{1, 2+}, Z.Song¹⁺, G.Zuljargal¹, M.J.Kim¹, Suresh¹, J.S.Lee¹

D.Yoon³, and I.H.Hwang^{1*}

¹Department of Animal Science, Chonbuk National University, 567, Jeonju city, Republic of Korea

²Department of Livestock Production & Monitoring and Inspection, Mongolian University of Life Sciences, Mongolia

³Department of Animal Science, Kyungpook National University, Daegu, 41566, Republic of Korea

+ Both authors had equal contribution , * Corresponding author email: inho.hwang@jbnu.ac.kr

I. INTRODUCTION

Ruminants' gender effect (male, female, castrated and spayed) is mainly related to the quantity of fat deposition and growth rate (Guerrero et al., 2013). Castration or spaying of animals has been a common practice in livestock operations and it is one management tool to help ensure quality of meat products to consumers. The objective of the study was to compare sensory traits, intramuscular fat (IMF), fatty acid composition and TBARS of the *longissimus lumborum* muscles of Hanwoo steers, bull, cow and spayed heifer.

II. MATERIALS AND METHODS

Longissimus lumborum (LL) muscles (n=20) from Hanwoo steer, bull, cow and spayed heifer (30, 26, 46 and 30 mon of age, respectively; n=5, each) were obtained at commercial meat processing plant. All pre- and post-slaughter processes were carried out in accordance with the current meat industry regulations of Korea. Muscles were aged for 7 days at 4°C. IMF, oxidative stability (TBARS), fatty acid analysis, sensory were evaluated by previously developed methods [2]. Data were analyzed using the GLM procedure and Duncan's multiple range test of SAS Version 9.3 (SAS Institute, Cary, NC, USA).

III. RESULTS AND DISCUSSION

Back fat thickness in steer and spayed heifer carcasses was greater (P<0.001) than bull and cow. The samples from steer and cow had greater IMF content than in spayed heifer (P<0.001) and in bull (P<0.05). Rib-eye area of bull carcasses was lower (P<0.001) than others.

Table 1. Carcass and quality traits, and sensory evaluation of beef subjected to different gender

Traits	Bull	Steer	Cow	Spayed heifer	SEM	F value
Back fat, mm	6.6 ^c	14.6 ^a	11.4 ^b	17 ^a	1.9	8.7 ^{***}
Marbling score	1 ^c	5 ^a	4 ^b	5 ^a	0.6	13 ^{***}
Rib-eye area, cm ²	80.6 ^b	93.8 ^a	89 ^a	90.5 ^a	3.6	5.3 ^{**}
IMF, %	9.87 ^c	19.9 ^a	19.0 ^a	15.1 ^b	1.2	14.1 ^{***}
TBARS, mg MA/kg	0.21 ^{aY}	0.17 ^{aY}	0.13 ^{bY}	0.13 ^b	0.03	3.2 [*]
WBSF, kgf	4.81 ^a	3.67 ^b	4.0 ^a	3.74 ^b	0.52	0.9
Tenderness	26.4 ^b	58.4 ^a	50.4 ^a	58.0 ^a	5.03	5.3 [*]
Juiciness	32.6 ^b	47.8 ^a	54.4 ^a	54.5 ^a	4.12	5.5 [*]
Flavor	34.6 ^b	59.2 ^a	60.0 ^a	57.0 ^a	2.85	17.5 ^{***}
Overall acceptability	33.4 ^b	57.2 ^a	56.4 ^a	56.0 ^a	4.5	6.3 ^{**}
Overall rating	31.4 ^b	55.8 ^a	55.4 ^a	50.0 ^a	4.62	6.1 ^{**}

^{a-c}, means within row with different superscripts are significantly different;

^{X-Y}, means within column with different superscripts are significantly different;

*** P<0.001, ** P<0.01, * P<0.05;

Moreover, the samples from steer, spayed heifer and cow were more tender and juicy ($P<0.05$). It was received more desirable ($P<0.05$) flavor ratings compared with those from bull (Table 1).

TBARS value was significantly affected by the gender. Oxidative stability was lower in beef from the female group ($p<0.05$) than the beef from the male group. This can be attributed to the quantity of fatty acids that had undergone oxidation was higher.

Table 2. Fatty acid content of *longissimus lumborum* muscle subjected to different gender

Fatty acid	Bull	Steer	Cow	Spayed heifer	SEM	F value
C8:0	0.01 ^b	0.02 ^a	0.013 ^{ab}	0.01 ^b	0.002	7.2*
C10:0	0.08	0.13	0.11	0.08	0.02	2.0
C12:0	0.17	0.24	0.15	0.14	0.03	1.8
C14:0	4.41	5.36	5.4	4.85	0.39	1.4
C16:0	19.2	18.4	19.6	19.5	0.52	0.98
C16:1	5.91 ^b	9.75 ^a	10.9 ^a	8.7 ^a	0.68	9.6**
C18:0	19.1 ^a	14.9 ^a	16.6 ^b	18.3 ^a	0.77	5.1*
C18:1	37.9	42.8	38.9	39.4	1.81	1.4
C18:2	11.6 ^a	7.3 ^b	7.1 ^b	7.7 ^b	0.67	9.6**
C18:3	0.33 ^b	0.27 ^c	0.27 ^c	0.4 ^a	0.02	7.9**
C20:0	0.29	0.27	0.24	0.3	0.03	0.7
C20:0	0.49	0.29	0.3	0.29	0.06	2.4
C22:1	0.07	-	0.03	-	-	-
C22:4	0.52 ^a	0.16 ^b	0.38 ^{ab}	0.42 ^a	0.06	5.5*
SFA	44.2	39.9	42.9	43.8	1.4	1.8
MUFA	43.8 ^b	52.5 ^a	49.8 ^a	48.1 ^{ab}	1.5	6.3**
PUPA	11.9 ^a	7.6 ^b	7.3 ^b	8.1 ^b	0.7	9.8**

Total saturated (SFA) fatty acid content were almost equal in all samples of all the gender. Monounsaturated (MUFA) fatty acid content of bull samples were less than in other gender ($P<0.01$), while polyunsaturated (PUPA) fatty acid content was greater than others. According to Wood et al. [3] the muscle fatty acid composition affects its oxidative stability, and PUPA are more prone to oxidation than MUFA and SFA.

IV. CONCLUSION

It can be concluded that gender of the cattle had an effect on carcass traits and meat palatability. Steer and spayed heifer were significantly fatter compared to bulls and cow due to different growth. Beef from steer, and spayed heifer were more tender and palatable compared with those from bull.

ACKNOWLEDGEMENTS

This work was supported by Research Program for Agriculture Science and Technology Development (Project No PJ013169), Rural Development Administration, Republic of Korea.

REFERENCES

- Guerrero, A., Valero, M.V., Campo, M. & Sañudo, C. (2013). Some factors that affect ruminant meat quality: from the farm to the fork. *Acta Scientiarum. Animal Sciences* 35: 335-347.
- Dashdorj, D., Oliveros, M.C.R. & Hwang, I.H. (2012). Meat quality traits of *longissimus* muscle of Hanwoo steers as a function of interaction between slaughter endpoint and chiller ageing. *Korean Journal for Food Science of Animal Resources* 32:414-427.
- Wood, J.D., Richardson, R.I., Nute, G.R., Fisher, A.V., Campo, M.M., Kasapidou, E., Sheard, P.R. & Enser, M. (2004). Effects of fatty acids on meat quality: A review. *Meat Science* 66:21-32.