Comparison of meat quality traits and fatty acid profiles of *M. longissimus* from different Korean native cattle (striped cattle and yellow cattle)

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Abstract

The objective of this research was to compare meat quality traits and fatty acid profiles of *M. longissimus* from different Korean native cattle. Animals were 7 heads of striped bulls (SB) and 24 heads of yellow bulls (YB). SB significantly had more fat and myoglobin, lower cooking loss and darker, redder, yellower and harder muscle than YB ($P < 0.05$). In fatty acid profiles, SB contained lower proportion of myristic acid (C14:0) compared with YB ($P < 0.05$), but no differences were detected in the other profiles.

Introduction

The breed is one of many factors affecting beef quality (Renerre, 1990). In Korea, there are some native Hanwoo breeds such as striped cattle and yellow cattle (Bos taurus×Bos zebu). So far, many studies about beef quality of yellow cattle were reported (Kim & Lee, 2003; Lee *et al*., 2005). However, there is no report about beef quality of striped cattle. There are reports concerning only genetic characteristics (Lee *et al*., 2002; Sohn *et al*., 2000). Therefore, the objective of this research was to compare meat quality traits and fatty acid profiles of M. longissimus from Korean stripe cattle and yellow cattle.

Materials and Methods

Seven heads striped bulls (44±6 months of age, SB) and twenty-four heads of yellow bulls (21±1 months of age, YB) were used in this research. At 48 h post-slaughter, *M. longissimus* from carcass were utilized as experimental materials. Intramuscular fat (IMF) content and water-holding capacity (WHC) of beef were analyzed as described by AOAC (1995) and Hofmann *et al*. (1982), respectively. Total myoglobin content was analyzed by Sammel *et al*. (2003) method and calculated using 16,110 (MW of myoglobin; Drabkin, 1978) and 7.6 (molar extinction coefficient; Bowen, 1949). Drip loss and cooking loss were analyzed by Honikel (1998) method. pH, Waner-Bratzler shear force (WBSF) and meat color were determined using a pH meter (SevenEasy pH, Mettler-Toledo GmbH, Switzerland), a texture analyzer (TA-XT2*i* version 6.06, Stable Micro Systems, Ltd, UK) and a chroma meter (CR-400, Konica Minolta Sensing, Inc., Japan), respectively. Total color indicating sensory attribute of meat color, oxidation-reduction potential (ORP) and total reducing ability (TRA) were determined as described by Eagerman *et al*. (1977), Nam & Ahn (2003) and Lee *et al*. (1981). Fatty acid methyl esters were analyzed by GC (6890N, Agilent Technologies, USA) equipped with a CP-Sil 88 capillary column (100 m length×0.25 mm i.d.×0.20 μm film thickness, Varian Inc., USA) and a FID. Data was analyzed using the General Linear Model procedure of SAS (1999) program. Differences among means at the 5% level were determined by the Least Significant Differences test.

Results and Discussion

Meat quality traits of *M. longissimus* are displayed in Table 1. SB had higher IMF and total myoglobin contents and WBSF than YB ($P < 0.05$). In addition, cooking loss of SB was lower than that of YB ($P < 0.05$). In color parameters, SB showed lower value of L^* and higher values of a^*, b^* and total color compared with YB ($P < 0.05$). However, pH, WHC, drip loss, ORP and TRA were not significantly different between two cattle. In Table 2, fatty acid profiles of *M. longissimus* are reported. A lower proportion of myristic acid (C14:0) was noticed for SB compared with YB ($P < 0.05$). However, there were no significant differences in proportions of C14:1-C20:4, SFA, MUFA, PUFA, trans-fatty acids and n-6/ n-3 ratio could be detected. In the present study, the n-6/n-3 ratio of SB and YB exceeded 4-5 recommended as the maximum healthy range (Department of Health, 1994).

Table 1. Comparison of meat quality traits of *M. longissimus* from different Korean native cattle

Trait	Striped cattle	Yellow cattle	SEM[1]
IMF (%)	4.80[a]	2.53[b]	0.181
Myoglobin (mg/g)	9.32[a]	6.29[b]	0.260
pH	5.57	5.85	0.067
WHC (%)	46.24	43.94	0.828
Drip loss (%)	2.67	3.08	0.160
Cooking loss (%)	32.25[b]	34.76[a]	0.529
WBSF (N)	46.88[a]	34.56[b]	0.819
L^*	37.49[b]	39.17[a]	0.076
a^*	18.01[a]	15.82[b]	0.054
b^*	8.29[a]	7.24[b]	0.016
Total color ($L^* \times a^{*2} / b^*$)	1471.44[a]	1360.17[b]	0.049
ORP (mV)	84.7	70.8	3.295
TRA	0.68	0.69	0.005

[a-b] Means in same row with different superscripts are significantly different at $P < 0.05$.

[1] Standard error of means.

Table 2. Comparison of fatty acid profiles of M. longissimus from different Korean native cattle

Fatty acid (%)	Striped cattle	Yellow cattle	SEM[1]
C14:0	2.72[b]	4.24[a]	0.295
C14:1trans	0.13	0.15	0.011
C14:1cis	0.23	0.27	0.026
C16:0	25.37	24.56	0.763
C16:1	5.95	5.86	0.222
C18:0	16.60	17.00	0.494
C18:1trans	0.96	0.87	0.054
C18:1cis-9	37.78	36.59	0.951
C18:1cis-11	2.36	1.80	0.171
C18:2trans-9, trans-12	0.18	0.19	0.016
C18:2n-6	5.31	6.14	0.659
C18:3n-6	0.13	0.11	0.007
C18:3n-3	0.43	0.45	0.050
C20:1	0.21	0.23	0.012
C20:4n-6	1.64	1.54	0.133
ΣSFA[2]	44.69	45.81	0.607
ΣMUFA[3]	47.61	45.76	0.766
ΣPUFA[4]	7.70	8.43	0.785
Σn-6/Σn-3	16.79	17.80	0.727
ΣTrans	1.26	1.21	0.058

[a-b] Means in same row with different superscripts are significantly different at $P < 0.05$.

[1] Standard error of means.

[2] Saturated fatty acids. [3] Monounsaturated fatty acids. [4] Polyunsaturated fatty acids.

Conclusions

The beef from striped bulls were fatter, harder, darker and redder than those from yellow bulls.

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