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Change of meat quality and bioactive compounds in Korean native black goat meat during cold storage (#418)

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Introduction

Korean native black goat (*Capra hircus coreanae*) is the indigenous goat breed in Korea. Goat meats are known as rich source consisting of lower cholesterol and fat contents and higher contents of calcium and iron. However, there are limitations in research for evaluating bioactive compounds of Korean native black goat (KNBG) meat and its quality change during storage. Therefore, the aim of this study was to evaluate the meat quality and bioactive compounds of KNBG loin, and change of these properties when stored at 4°C.

Methods

The loin meat (*Longissimus dorsi*) from five KNBG was obtained from local slaughterhouse in Korea after 24 h postmortem. The loin meat was cut at 1 cm of thickness, and each pieces were stored on the styrofroam tray wrapped with low-density polyethylene film for 15 days at 4°C. To evaluating the change of meat quality, the pH, meat color, aerobic plate counts (APC), *E.coli*/coliform, and volatile basic nitrogen (VBN) were measured on every experimental day (day 1, 5, 10, and 15). APC and E.coli/coliform were performed using 3M Petrifilm (St.Paul, MN, USA). The VBN content was analyzed by the microdiffusion method using a Conway unit. The contents of creatinine, creatine, carnosine and anserine were measured using high-performance liquid chromatography. All data were analyzed by one way ANOVA using SAS program (version 9.4). Statistical difference among samples were performed Tukey's test at $p < 0.05$. The results were expressed as mean value and standard error of means (SEM).

Results

The initial pH value of KNBG loin was 5.92 and the pH value of it had increased up to 6.27 at day 15 ($p < 0.05$) as shown in Table 1. When meat pH value reaches more than 6.20, meat begins to be spoiled. The initial CIE L* (lightness), CIE a* (redness), and CIE b* (yellowness) value of KNBG were decreased during storage ($p < 0.05$, Table 1).

Increased pH was highly related to the growth of the microorganism in meat. As shown in Table 2, APC of KNBG loin was increased from 2.17 Log CFU/g on day 1 to 7.16 Log CFU/g on day 15 ($p < 0.05$). Meat is considered as spoilage if the APC is 6.7 Log CFU/g. On day 15, KNBG loin was considered as spoilage. VBN is one of the indicators of freshness, with higher VBN value more than 20 mg/100 g is considered as spoiled. In this study, initial VBN content of KNBG loin was 7.25 mg/100 g and increased during storage ($p < 0.05$, Table 2), and reached at 18.80 mg/100 g on day 15.

Creatinine, creatine, carnosine, and anserine content of fresh KNBG loin was 2.71, 184.35, 54.12, and 55.00 mg/100 g, respectively (Table 3). In this study, creatinine content increased while creatine content decreased during storage ($p < 0.05$). Carnosine and anserine contents in KNBG loin were remained until day 10, however, they were dropped on day 15 at 43.28 and 44.32 mg/100 g, respectively ($p < 0.05$).

Conclusion

This is a novel study to evaluate the change of meat quality and bioactive compounds of KNBG loin. When KNBG loin was stored at 4°C in aerobic condition, it can be accepted as fresh and safe until day 10. Bioactive compounds in the KNBG loin remained until day 10, however, it was decreased on day 15. These results can be used as primary data for characteristics of KNBG loin.

Notes

Bioactive Compounds (mg/100 g)	Storage days				SEM
	1	5	10	15	
Creatinine	2.71[c]	2.97[c]	3.46[b]	3.96[a]	0.079
Creatine	184.35[a]	179.76[a]	178.43[a]	171.39[b]	1.727
Carnosine	54.12[a]	54.44[a]	55.41[a]	43.28[b]	2.367
Anserine	55.00[a]	54.09[a]	54.99[a]	44.32[b]	2.044

Table 3. Bioactive compound contents of Korean native black goat loin during storage

[a-c] Means within a row with different superscript differ significantly at $p < 0.05$.

Traits	Storage days				SEM
	1	5	10	15	
APC (Log CFU/g)	2.17[d]	2.93[c]	5.00[b]	7.16[a]	0.158
E.coli / coliform (Log CFU/g)	ND	ND	ND	ND/0.51	-
VBN (mg/100 g)	7.25[d]	9.38[c]	12.00[b]	18.80[a]	0.359

Table 2. Aerobic plate counts and E.coli/coliform of Korean native black goat loin during storage

[a-d] Means within a row with different superscript differ significantly at $p < 0.05$.,ND, not detected.

Notes

Traits		Storage days				SEM
		1	5	10	15	
pH		5.92[c]	6.10[b]	6.19[ab]	6.27[a]	0.027
Meat color	CIE L*	40.81[a]	38.79[b]	38.88[b]	38.07[b]	0.289
	CIE a*	25.01[a]	18.75[b]	16.53[c]	15.17[c]	0.478
	CIE b*	13.94[a]	10.88[b]	10.26[c]	10.09[c]	0.152

Table 1. Change in pH and meat color of Korean native black goat loin during storage

[a-c] Means within a row with different superscript differ significantly at $p < 0.05$.

Notes