CHANGES OF cAMP-DEPENDENT PROTEIN KINASE ACTIVITY IN MEAT OF DIFFERENT QUALITY

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I. INTRODUCTION

The cAMP-dependent protein kinase activity (PKA) is one of the most important protein kinases. It can promote protein phosphorylation by transferring phosphoric acid groups from ATP or GTP to specific amino acid residues of proteins, regulate muscle glycolysis, muscle contraction and protein degradation, and thus affect meat color, tenderness and water retention [1,2]. As a second messenger, cAMP can activate the intracellular PKA, enhance the activity of metabolic enzymes, and then affect meat quality [3]. Therefore, this study analysed the changes of cAMP-dependent protein kinase activity with postmortem time in meat of different quality, and provided theoretical basis for the development of meat quality regulation technology.

II. MATERIALS AND METHODS

The bilateral *longissimus dorsi* muscles of 64 small-tailed Han sheep , aged 6 to 7 months, weighing 38.94±2.11 Kg, were divided into frozen tubes and stored at 4℃. Meat samples were taken at 1 h, 12 h, 1 d, 3 d, and 5 d after postmortem, and the samples at each time point were divided into two parts: one part was used for meat quality analysis, and the other part was stored at -80℃ for biochemical index analysis. According to *a** value, shear force and cooking loss at 1 d postmortem, the samples were divided into high quality group and low quality group, with 9 sheep in each group.
Index of measurement: shearing stress, cooking loss, *a** value, cAMP content, and PKA activity.
Mean values for all parameters in the five dietary groups were compared using one-way Anova and Tukey test and with SPSS 25.0 (SPSS. Inc., IL, USA). P<0.05 was the threshold for significance.

III. RESULTS AND DISCUSSION

Table 1 shows that *a** value of the high quality group was significantly higher than that of the low quality group, and the shear force and cooking loss were significantly lower than those of the low quality group (P < 0.05).

Table 1 Analysis of meat *a** value, shear force and cooking loss in different quality groups

Groups	*a** value	Shear force, N	Cooking loss, %
High quality groups	13.7	62.6	7.7
Low quality groups	12.4	83.0	10.6
SEM	0.2	2.8	0.4
P-values	<0.05	<0.05	<0.05

Table 2 shows that the cAMP content of the high quality group was significantly higher than that of the low quality group (P < 0.05). The cAMP content of high quality group was significantly higher than that of low quality group (P < 0.05). The content of cAMP in the high quality group was significantly lower at 1 h and 12 h than that at 1, 3, and 5 d after postmortem (P < 0.05), but there was no significant difference in the content of cAMP in the low quality group (P > 0.05).

Table 2 Changes of cAMP content in meat samples of different quality groups with postmortem time

Groups	1 h	12 h	1 d	3 d	5 d	SEM	P-values
High quality groups (nmol/L)	11.0^{Aa}	10.0^{Aa}	8.4^{Ab}	6.6^{Ab}	5.7^{Ab}	0.7	0.22
Low quality groups (nmol/L)	4.0^{Ba}	3.8^{Ba}	3.3^{Ba}	3.6^{Ba}	3.7^{Ba}	0.1	0.14

A-B: Different capital letters indicate in the same postmortem time significant differences at 0.05 level between different. a-b: groups. Different lowercase letters indicate significant difference at 0.05 level between different postmortem time in the same treatment group.

As shown in Figure 1, the PKA activity of the low quality group was significantly higher than that of the high quality group at 1 h and 12 h after postmortem ($P < 0.05$), but there was no significant difference between the high quality group and the low quality group at 1, 3, and 5 d after postmortem ($P > 0.05$). The PKA activity of high quality group was significantly lower than that of 3 and 5 d after postmortem at 1 h, 12 h, and 1 d, and that of low quality group was significantly lower than that of 5 d after postmortem at 1 h, 12 h, 1 d, and 3 d ($P < 0.05$).

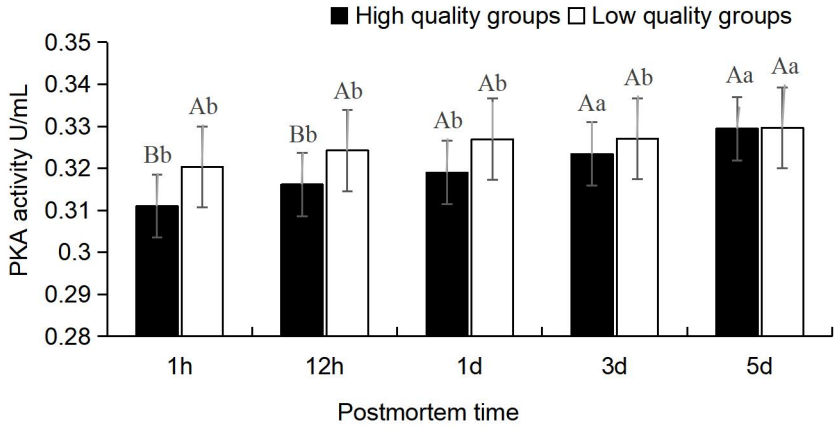

Figure 1. Changes of PKA activity in meat samples of different quality groups with postmortem time

A-B: Different capital letters indicate in the same postmortem time significant differences at 0.05 level between different. a-b: groups. Different lowercase letters indicate significant difference at 0.05 level between different postmortem time in the same treatment group.

IV. CONCLUSION

PKA activity in meat was affected by postmortem time and meat quality. With the extension of postmortem time, the formation of cAMP was inhibited and the activity of PKA was affected.

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