EFFECT OF MEAT AND NON-MEAT PROTEIN MIXING RATIO ON QUALITY CHARACTERISTIC OF EMULSION-TYPE SAUSAGE

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Abstract – This study was conducted to assess the effect of meat/non-meat protein mixing ratio the on quality characteristic of emulsion-type sausage. The sausages were formulated with various mixing ratios of meat and non-meat ingredients. The results showed that hardness was significantly ($p<0.05$) lower in sausage with pork (C) and sausage with more soybean (T4) in comparison to the other treatments. Springiness was significantly higher in sausage with more corn starch (T3) but lower in T4 sample in comparison to the other treatments. The TBARS values were significantly ($p<0.05$) lower in the C and sausage with chicken (T2) in comparison to the other treatments throughout the cold storage time. Also, the T4 samples showed significantly ($p<0.05$) lower TBARS value than other samples until 4 weeks of cold storage. These results indicate that the texture and lipid oxidation of emulsion-type sausage were affected by meat/non-meat protein ratio.

Key Words – sausage, meat, non-meat protein

I. INTRODUCTION

There has been an increase interested in healthier processed food products by consumers. Therefore, reduction of saturated fat content has been an emphasis since it is not beneficial to human health [1-2]. Recently, research trends in meat products relates to replacing pork fat or reducing sodium content [3-5]. In Korea, there are several different types of sausages such as non-emulsion type, called 'press ham' or 'mixed press ham', and emulsion-type sausage. The materials used for the emulsion-type sausage manufacture are often pork, chicken, fish etc, and non-meat contents such as starch, corn, soybean etc. Depending on the meat/ non-meat materials mixing ratio the quality and price of final products are also different. Kang et al. [6] recently reported that moisture content and texture attributes of sausage were affected by pork/duck meat mixing ratio. However, it is still unknown whether the meat/non-meat ingredients mixing ratio affects the quality characteristics of emulsion-type sausage. Therefore, the objective of this study was to investigate the effect of meat/non-meat protein mixing ratio on quality characteristic in emulsion type sausage.

II. MATERIALS AND METHODS

Treatments of sausages were subjected to 82% pork meat + 18% additives (C), 72% pork meat + 10% corn starch + 18% additives (T1), 72% pork meat + 10% chicken meat + 18% additives (T2), 62% pork meat + 10% corn starch + 10% chicken meat (T3), 80% pork meat + 2% concentrated soybean protein + 18% additives (T4), and 60% pork meat + 10% corn starch + 10% chicken meat + 2% concentrated soybean protein + 18% additives (T5). Three batches of emulsion-type sausages (20 kg each) were manufactured for each treatment. The meat was prepared with a meat grinder. All materials were treated with mixing, curing/ripening, emulsion, stuffing, and cooking. After cooking, the sausage samples were used for the chemical composition, texture and quality characteristics analyses. Chemical composition was performed according to the method of Anderson et al. [7]. Texture of sausages was analyzed by texture instrument (5543, Instron, USA). TBARS of all samples determined according to the method of Buege and Aust [8].

III. RESULTS AND DISCUSSION

Table 1 shows the effect of different meat/non-meat protein mixing ratios on texture of emulsion-type sausage. Hardness was significantly ($p<0.05$) lower in C and T4 samples compared to the other treatments, whereas no differences in cohesiveness

among the treatments were observed. Springiness was significantly higher in T3 but significantly lower in T4 compared to the other treatments. These results indicate that hardness and springiness of emulsion-type sausage were affected by the mixing ratio.

Table 1 Formulation (%) for manufacture of sausage used in the experiment

Ingredients	C	T1	T2	T3	T4	T5
Pork meat	82	72	72	62	80	60
Corn starch	0	10	0	10	0	10
Chicken meat	0	0	10	10	0	10
Concentrated soybean protein	0	0	0	0	2	2
Pork fat	15	15	15	15	15	15
Phosphate	0.3	0.3	0.3	0.3	0.3	0.3
Salt	1.25	1.25	1.25	1.25	1.25	1.25
Sugar	0.75	0.75	0.75	0.75	0.75	0.75
Black pepper	0.2	0.2	0.2	0.2	0.2	0.2
L-ascorbic acid	0.05	0.05	0.05	0.05	0.05	0.05
Garlic powder	0.2	0.2	0.2	0.2	0.2	0.2
L-Glutamate	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100

Table 2 Effect of different meat and non-meat protein mixing ratios on texture of emulsion-type sausage

Treatments*	Hardness (kg)	Cohesiveness (%)	Springiness (mm)
C	0.47^{D}	1.20	14.21^{AB}
T1	0.63^{B}	1.32	14.15^{AB}
T2	0.54^{C}	1.19	14.69^{AB}
T3	0.67^{A}	1.18	15.12^{A}
T4	0.47^{D}	1.30	13.83^{B}
T5	0.65^{AB}	1.47	14.69^{AB}
SEM	0.01	0.07	0.15

[A-D]Means with different letters within the same column differ ($p<0.05$).

Table 2 shows changes in TBARS value of emulsion-type sausage manufactured with different mixing ratio of meat and non-meat protein ingredients during cold storage. The TBARS value was significantly ($p<0.05$) lower in C and T2 samples compared to the other samples throughout the cold storage time. Also, T4 sample showed significantly ($p<0.05$) lower TBARS value than other samples until 4 weeks of cold storage. Therefore, these results suggest that the TBARS value of emulsion-type sausage was affected by the meat/non-meat protein types mixing ratio.

Table 3 Changes in TBARS of emulsion-type sausage manufactured with different meat/non-meat protein mixing ratio during cold storage

Treat-ments*	Storage time (weeks)				
	1	2	3	4	5
C	0.92^{Cc}	1.1^{Bb}	1.27^{Ca}	1.14^{Cb}	0.65^{Cd}
T1	2.43^{Bb}	3.02^{Aa}	2.77^{Bab}	2.85^{Bab}	3.1^{Aa}
T2	0.81^{Cb}	0.88^{Bab}	0.99^{Ca}	1.02^{Ca}	0.76^{BCb}
T3	3.07^{AB}	3.08^{A}	3.11^{AB}	3^{AB}	2.99^{A}
T4	1.52^{C}	1.2^{B}	1.12^{C}	1.09^{C}	1.01^{B}
T5	3.55^{Aa}	3.3^{Aab}	3.31^{Aab}	3.35^{Aab}	3.02^{Ab}
SEM	0.22	0.2	0.19	0.19	0.21

[A-C]Means with different letters within the same column differ ($p<0.05$).
[a-d]Means with different letters within the same row differ ($p<0.05$).

IV. CONCLUSION

Our study results indicate that texture (hardness and springiness) and lipid oxidation (TBARS) of emulsion-type sausage were considerably affected by the meat/non-meat protein types mixing ratio. Our study results indicate that sausages with meat protein were lower lipid oxidation compared to the sausages with non-meat protein during cold storage. Therefore, this data suggest that sausage manufactured with only meat protein is well beneficial to the health of consumers.

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