NUTRITIONAL, CHEMICAL, AND SENSORY TRAITS OF SAUSAGE MADE BY CHICKEN BREAST MEAT AND LIQUID EGG WHITE

Hyun Jung Lee[1], Cheorun Jo[1], Ki-Chang Nam[2], Kyung-Haeng Lee[3]

[1] Department of Agricultural Biotechnology, Seoul National University, Seoul 151-921, Korea

[2] Department of Animal Science and Technology, Sunchon National University, Suncheon 500-742, Korea

[3]Deptartment of Food and Nutrition, Korea National University of Transportation, Jeungpyeong 368-701, Korea

Abstract – A sausage was developed using chicken breast meat and liquid egg white aiming at high protein-, low fat-, and low salt-product. Two kinds of the sausages were prepared: chicken breast meat was (A) mixed with liquid egg white stuffed in the same casing and (B) stuffed in a sheep natural casing and put into a center of the PVDC casing stuffed with liquid egg white. Compared to market product, the sausage was comparable in taste, color, texture, and overall acceptance, except for odor. The content of sausage composed of 84.17% water, 13.42% protein, and 0.12% fat. Its calorific value was 61.50 kcal. Free amino acids, nucleotide-related compounds, and fatty acids composition of the sausage did not show significant changes during storage. The sausage was comparable in sensory quality. Further work to improve odor using other additives or sauces will be more helpful.

Key Words – chicken breast, egg white, sausage, nutrition evaluation

I. INTRODUCTION

In market, the consumption of chicken breast meat has been increased due to the increasing interest for health and diet. Chicken breast meat is a good source for protein to the consumers, including the body-builders who consume diet on the purpose of weight-control, as it contains high protein and low fat [1] as well as various amino acids and nucleotide-related compounds.

A lot of products have been developed using chicken breast meat, however, most of them were not succeeded in Korean market due to its low acceptance to the consumers. There are ongoing studies to process chicken breast meat as a better protein source, and also, as one of the consumer-palatable products in the market. Liquid egg white has a higher biological value compared to chicken breast meat. And also, it softens texture of food so that used as a food additive.

In present work, the sausages were developed using chicken breast meat and liquid egg white aiming at high protein-, low fat-, and low salt-product. Their nutritional, chemical and sensory traits during storage were evaluated to prove the possibilities of the new product in market.

II. MATERIALS AND METHODS

Chicken breast meat was purchased from a market (Jeungpyeong, Korea) and used as raw material for sausage processing (81.73%). Other ingredients for the sausage were liquid egg white, ice water, phosphate, ascorbic acid, spices mix, and vegetables (Table 1). Two kinds of the sausages were prepared using a different method in the addition of liquid egg white. One was mixing of chicken breast meat and liquid egg white stuffed in the same casing (A). Another one was made as follows: Chicken breast meat was stuffed in a sheep natural casing (an inner casing, 22 mm diameter) and the stuffed casing was put into a center of the PVDC casing (an outer casing, 50 mm diameter), stuffed with liquid egg white (B). No salt was used in order to develop low salt meat products. The sausages were cooked until their internal temperature reaches 85°C, cooled, and stored in refrigerated conditions. The sensorial quality was evaluated by the panelist, general consumers (20) and body-builders (14). Different meat products A, B, and C (market product, meatball composed of 87.43% chicken meat breast) were compared using a 7-point hedonic scale to evaluate the likeness of the products according with the following criteria: like extremely (7), neither like nor dislike (4), and dislike extremely (1). The other sensorial parameters used were: taste, odor, color, texture, and overall acceptance. Chemical composition and calorific value were analyzed according to their

specific method [2]. Free amino acid composition [3], nucleotide-related compounds [4], and fatty acid composition [5] were evaluated during storage.

Table 1. The ingredient composition (%) of the sausages A and B made by chicken breast meat and liquid egg white.

Ingredient	A	B
Chicken breast meat	81.73	81.73
Liquid egg white	197.72[1)]	-[2)]
Ice water	9.08	9.08
Salt	-	-
Phosphate	0.27	0.27
Ascorbic acid	0.02	0.02
Spice mix	0.91	0.91
Cheongyang red pepper	1.48	1.48
Garlic	2.80	2.80
Carrot	0.95	0.95
Onion	2.76	2.76

[1)]chicken breast and liquid egg white stuffed in the same casing.
[2)]liquid egg white stuffed in the outer casing.

III. RESULTS AND DISCUSSION

Different meat products A, B, and C were served to the panelists for sensorial quality (Table 2). For general consumers, the sausage A resulted in the lowest taste, color, texture, and overall acceptance. In specific, taste and texture of the sausage A showed significant variation compared to those of the sausage B and the meatball (C). This phenomenon can be explained through undesirable texture due to the addition of chicken breast meat and liquid egg white. In order to improve texture, liquid egg white was separated in the outer casing, and as the result, the sausage B was more superior with respect to its taste, color, texture, and overall acceptance. The meatball C had good results in overall acceptance for the groups of general consumers and body-builders. However, there was no significance between the sausage B and the meatball C, meaning that the sausage is capable of being accepted in market. Further work to improve odor using other additives or sauces will be more helpful for body-builders because most of them are expected as the consumers for the sausage made by chicken breast meat and liquid egg white.

Table 2. The sensorial quality of different meat products with the panelists composed of general consumers and body-builders.

Parameters	General consumers			Body-builders		
	A	B	C	A	B	C
Taste	3.27± 1.22^{b}	5.73± 1.28^{a}	5.60± 0.99^{a}	4.62± 1.41^{b}	5.38± 1.30^{a}	5.56± 0.93^{a}
Odor	4.80± 0.68^{a}	5.00± 0.85^{a}	5.07± 1.10^{a}	4.53± 1.26^{b}	4.79± 1.45^{ab}	5.18± 1.06^{a}
Color	4.73± 0.88^{b}	5.53± 1.06^{a}	5.40± 0.99^{ab}	4.59± 1.21^{b}	5.26± 1.26^{a}	5.15± 1.16^{ab}
Texture	3.33± 1.05^{b}	5.47± 0.99^{a}	5.20± 1.01^{a}	4.06± 1.25^{a}	5.00± 1.37^{a}	5.26± 1.21^{a}
Overall acceptance	4.07± 0.80^{b}	5.60± 1.06^{a}	5.47± 0.99^{a}	4.66± 1.19^{b}	5.28± 1.18^{a}	5.36± 1.24^{a}

[1)]Values with different superscripts within the same row (a, b) was significantly different ($p<0.05$).

The chemical composition of the sausage B is shown in Table 3. The content of sausages composed of 84.17% moisture, 13.42% protein, and 0.12% fat. Its calorific value was 61.50 kcal. So if moisture is excluded, protein is approximately 85%, meaning that the sausage is high protein-, low fat-, and low calorie-product. Based on 'Standard of Meat and Meat Products' of Ministry of Food and Drug Safety, the sausage is also applied to the category in low salt product as well as no salt was added during processing.

In addition, the meatball C contains 4.2 g carbohydrate, 32.7 g protein, 1.6 g fat, 0.42 g saturated fat, 0.01 g trans-fat, 44.11 mg cholesterol, 190.39 mg salt, and 162 kcal. As compared to C, the sausage B was found to have higher protein and lower fat contents.

Table 3. The chemical composition (%) of the sausage B containing chicken breast meat and liquid egg white.

Items	%
Moisture	84.17
Protein	13.42
Fat	0.12
Ash	0.84
Carbohydrate	1.42
Cellulose	0.05
Calorie (kcal)	61.50

Free amino acids, nucleotide-related compounds, and fatty acids profile were determined during storage (data not shown). For free amino acid

composition, threonine was found the highest amount followed by arginine, lysine, and glutamic acid. Arginine amount was expected to be the highest as it is known to be abundant in chicken breast meat, however, due to the addition of liquid egg white, threonine was found to be the highest amount. Nucleotide-related compounds [adenosine monophosphate (AMP), inosine monophosphate (IMP), inosine, and hypoxanthine] have a certain relationship with taste, and inosine content was highest (76.78 mg%) followed by IMP, hypoxanthine, and AMP. Fatty acid profile reveals that 4 saturated fatty acids and 10 unsaturated fatty acids were detected in the sausage. Oleic acid (C18:1), palmitic acid (C16:0), and linoleic acid (C18:2) share the maximum proportion of fatty acids. However, free amino acids, nucleotide-related compounds, and fatty acids did not show significant changes during storage.

IV. CONCLUSION

The sausage made by chicken breast meat and liquid egg white seems to have strong competitiveness as high protein-, low fat-, and low calorie-product in the market. The adverse effect on taste, color, texture, and overall acceptance could be improved as liquid egg white is separated in the outer casing, except for odor. Further work to improve odor using other additives or sauces will be more helpful for the sausage.

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