EVALUATION OF BASIL SEED GUM ON PHYSICAL AND STRUCTURAL CHANGES OF LOW-FAT SAUSAGES AT DIFFERENT SALT LEVELS

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I. INTRODUCTION

Basil seed gum (BSG) is a hydrocolloid extracted from the outer pericarp of basil seed. It is a heteropolysaccharide, which has high molecular weight (2,320 kDa), consisted of two fractions as glucomannan (43%), xylan (24.29%) and glucan (2.31%) [1],[2]. It has currently been used as hydrocolloids due to its high functionality such as emulsifying and stabilizing ability. Thus, the objective of this study was performed to evaluate the physicochemical and textural properties of low-fat sausages with BSG at different salt levels (1.0 and 1.5%).

II. MATERIALS AND METHODS

Pork ham (Landrace x Yorkshire, grade A) was bought from the local market (Samho Co., Gwangju, South Korea) to manufacture the sausages. After basil seed was purchased from Nutricare Co. (Seoul, South Korea), it was swollen with distilled water. Extracted BSG gum was dried at 50°C dry-oven. The sausages were manufactured with or without 0.5% dried BSG powder at two different salt levels (1.0 and 1.5%). pH, color, expressible moisture (EM, %), cooking loss (CL, %), textural profile analyses, fourier transform infrared spectroscopy (FTIR, %T), sulfhydryl group (SH, A_{415}), and protein surface hydrophobicity (μg) were measured. The experimental design was one-way analysis of variance at the significant level of 0.05%.

III. RESULTS AND DISCUSSION

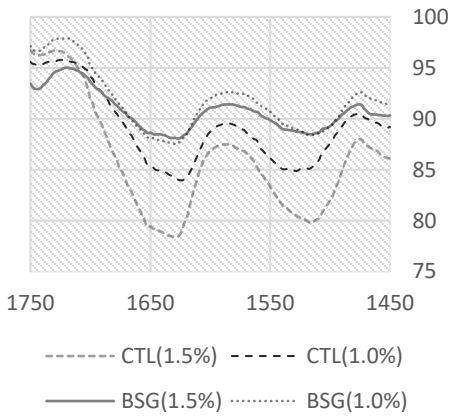
Table 1 shows the CL, hardness, and springiness of the low-fat sausages with/without BSG at different salt concentrations. The increased salt level decreased CL, but increased hardness of the sausage, however, the addition of BSG into the sausage reduced the CL and springiness. These results indicated that the addition of BSG might be functioned as a water-binding agent in the sausage. No differences in pH, color, EM, gumminess, chewiness, cohesiveness were observed among the treatments (data not shown).

Table 1 Quality characteristics of low-fat sausages with or without BSG as affected by salt concentrations

		CTL		BSG	
		1.0%	1.5%	1.0%	1.5%
Cooking loss (%)	Mean	13.0[a]	3.33[b]	13.8[a]	2.15[b]
	S.D.	1.41	0.60	0.04	0.64
Hardness (gf)	Mean	2955[a]	2606[b]	3066[a]	2924[a]
	S.D.	71.1	159	75.6	43.9
Springiness (mm)	Mean	6.89[a]	7.26[a]	6.09[b]	5.16[c]
	S.D.	0.42	0.13	0.13	0.25

[a-b] Means (n=3) having same superscripts in a same row are not different (p>0.05).

The quantitative analysis of the changes in band at 1650 cm^{-1}, 1624 cm^{-1}, and 1680 cm^{-1} (α-helix/unordered structures and β-sheet) were decreased with increased salt concentrations. The changes of band were not much different at different salt concentrations between the BSG treatments.



Area amid I	1624^{cm-1}	1650^{cm-1}	1680^{cm-1}
CTL(1.0%)	84.0	85.5	90.8
CTL(1.5%)	79.0	79.4	86.5
BSG(1.0%)	87.9	88.2	92.1
BSG(1.5%)	88.2	88.6	91.5

Figure 1. FTIR of low-fat sausages with or without BSG by different salt concentrations

Increasing salt concentration showed low content of sulfhydryl groups and high protein surface hydrophobicity, indicating that there were more interactions among them (Table 2). However, protein surface hydrophobicity and sulfhydryl contents of sausages were increased with BSG, resulting in more hardness and less springiness than those without BSG. Therefore, the interaction among the protein molecules in the sausage were highly associated with BSG and salt concentration.

Table 2 Hydrophobicity and SH contents of low-fat sausages with or without BSG by different salt concentrations

	CTL		BSG	
	1.0%	1.5%	1.0%	1.5%
Protein surface hydrophobicity (μg)	12.5^{d}	13.6^{c}	16.3^{b}	18.5^{a}
SH content (μmol/g proteins)	26.3^{bc}	22.8^{c}	31.3^{a}	27.7^{ab}

$^{a-c}$ Means (n=3) having same superscripts in a same row are not different ($p>0.05$).

IV. CONCLUSION

When BSG was added to the low-fat sausage mixture at higher salt level (1.5%), it was more effective as a water-binding agent as compared to the lower salt level. The interaction among the protein molecules in the sausage was highly associated with BSG and salt concentration

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