QUALITY AND SENSORY CHARACTERISTICS
FOR EXTRUDING RECONSTITUTED RICE WITH BEEF POWDER

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Abstract – In this study, various concentration of 1%, 3%, and 5% of beef powder was added in extruding reconstituted rice. Quality and sensory characteristics of extruding reconstituted rice which is used for instant *Nuroong-gi* (Korean type of scorched rice), snack and porridge are analyzed. As a result, ER 2 sample which was mixed with 3% beef powder, showed the best score in the all acceptability.

Key Words – Beef powder, *Nuroong-gi*, Rice flour

I.   INTRODUCTION

One of the biggest changes in the diet of South Korea last 20 years is an increase in consumption of meat (Figure 1). The consumption of beef per a person is changed from approximately 2.0 kg in 1970s to approximately 7.5 kg in 2008 indicating the annual average growth rate reached about 5.8%. Beef is well known as perfect source of protein which contains all essential amino acids, it is not only excellent source of protein for the body but also it is recommended food to young and elder people because it has various vitamins and minerals, especially high amount of iron [1]. Extruding reconstituted rice is made of rice flour, it helps to intake all nutrition of rice and could be stored longer time without preservatives [2, 3]. And extruding reconstituted rice is environmental friendly food because it can be used as a ingredients for various processed food [4]. Therefore we made sample treatment for extruding reconstituted rice with 0%, 1%, 3%, 5% beef powder (Table 1, Figure 2). Quality and sensory characteristics of extruding reconstituted rice which are analyzed .

II.   MATERIALS AND METHODS

Moisture content of extruding reconstituted rice was measured after drying process at 105   with high pressure and heat (AOAC method) for three times. Extruding reconstituted rice was put into a cell with a diameter of 4 cm and height of 1 cm to measure color using a color difference meter CR-300 Minolta, Japan. L values (lightness), a values (+redness and -greenness) and b values (+yellowness and -blueness) were measured five times repeatedly. White standard plate was L: 96.86, a: -0.07, b:2.02. It was also measured five times repeatedly. Specific gravity was measured by the bottle method [5]. Sensory evaluation was conducted for each experimental sample in terms of color, flavor, taste, texture and overall acceptability by 30 well-trained panels.

III.   RESULTS AND DISCUSSION

Moisture content of extruding reconstituted rice containing beef powder was in the range of 2.62~2.72%, and Color difference measurement results did not show a significant difference in value from 50.30 to 52.33 for L value, -1.26 to 1.56 for a value, 16.07 to 16.86 for b value.. In addition, specific gravity showed in the range of 0.38~0.43, and it was deceased as the amount of powder increased (Table 2). Lee *et al* in Korea made *Nuroong-gi* with cooked rice different us [6]. As a result, it is considered that the ability of puffing depends on the addition of amount on beef powder. In the sensory test, ER 2 sample which was mixed with 3% beef powder, showed the best score in the all acceptability (Table 3).
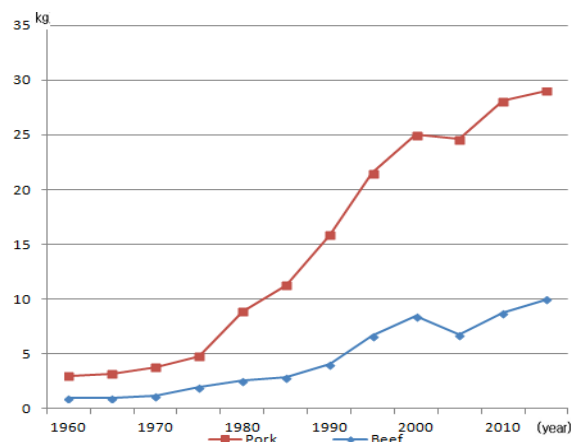
Figure 1. Annual meat consumption per person in Korea
Source: Statistical comprehensive survey of livestock products, Korea National Agricultural Cooperative Federation.

Table 1 Sample treatment for extruding reconstituted rice with beef powder

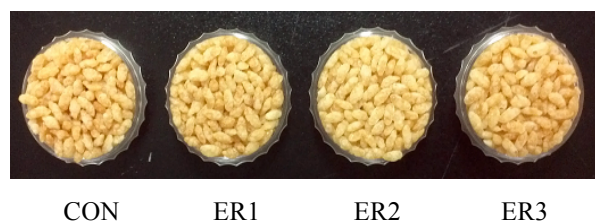| Sample	Contents (%, w/w)		Sum
	Rice flour	Beef powder	
CON	100	-	100
ER1	99	1	100
ER2	97	3	100
ER3	95	5	100

| CON | ER1 | ER2 | ER3 |

Figure 2. Extruding reconstituted rice with beef powder 0%(CON), 1%(ER1), 3%(ER2), 5%(ER3)

Table 2 Quality characteristics for extruding reconstituted rice with beef powder

Sample	Moisture (%)	Specific gravity	Color value		
			L	a	b
CON[1]	2.70±0.05[a2]	0.43±0.01[a]	51.06±0.75[a]	1.56±0.48[a]	16.86±0.15[a]
ER1	2.72±0.08[a]	0.41±0.01[b]	52.33±0.27[a]	1.26±0.40[a]	16.80±0.13[a]
ER2	2.81±0.04[a]	0.40±0.01[b]	50.30±0.42[a]	1.37±0.51[a]	16.07±0.35[a]
ER3	2.62±0.04[a]	0.38±0.01[c]	51.23±0.52[a]	1.39±0.47[a]	16.10±0.20[a]

[1] The abbreviations refer to Table 1.
[2] Values with different superscript in the same column are significantly different at $p<0.05$.

Table 3 Sensory characteristics for extruding reconstituted rice with beef powder

Sample	Sensory evaluation				
	Color	Taste	Flavor	Texture	Acceptability
CON[1]	5.20±1.52[2)b]	5.80±1.22[b]	5.40±1.26[b]	5.60±0.82[a]	5.60±0.26[a]
ER1	5.90±1.17[ab]	6.00±1.63[a]	5.80±1.26[ab]	6.00±0.94[a]	5.80±0.47[a]
ER2	6.20±1.38[a]	6.26±1.38[a]	6.00±0.98[a]	6.00±1.14[a]	6.20±1.01[a]
ER3	5.80±1.14[ab]	5.80±1.37[b]	5.80±1.10[ab]	5.60±1.83[a]	5.60±0.51[a]

[1] The abbreviations refer to Table 1.
[2] Values with different superscript in the same column are significantly different at $p<0.05$.

IV. CONCLUSION

In consequence, the sample containing beef powder showed lower specific gravity than no addition of beef in extruding reconstituted rice. And it was confirmed that beef in the sample helped increase for puffing ability, also the sample containing 3% beef powder showed the best score in texture and overall acceptability.

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