

# Consumer preference and mechanical properties of Korean menu cooked with mineral water

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## Abstract

**Purpose:** The purpose of this study was to investigate the consumer preference characteristics and mechanical properties of Korean menu for different cooking water.

**Methods:** Mineral water (manufactured by Orion Jejuyongamsoo corp.) and commercial bottled water were used in the cooking water. For consumer preference, there were seven kinds of Korean food menu including sagol guk, patjuk, white rice, dongchimi, sujeonggwa, omija, doenjang stew. Samples used for sensory evaluation were presented to the panel in a white container, and the 9 point scale was used. Hardness, strength, cohesiveness, springiness, gumminess and brittleness were evaluated using potatoes and sweet potatoes to determine mechanical properties.

**Results:** Preference for overall taste, aftertaste, and degree of sticky of rice was significantly higher in mineral water than that of bottled water ( $p < 0.05$ ). In the case of sagol guk, the preference for thick and deep flavor ( $p < 0.05$ ) and the preference for richness ( $p < 0.1$ ) were significantly higher in mineral water. Preference for taste and flavor of omija was high ( $p < 0.01$ ), and the preference for flavor, texture, and aftertaste of patjuk ( $p < 0.1$ ) was higher in mineral water than in bottled water. There was no significant difference in the consumer preference for the sujeonggwa, dongchimi and doenjang stew. In the mechanical properties test, potatoes cooked with mineral water showed high strength against gumminess and brittleness. Also, sweet potatoes cooked with mineral water were significantly strong against cohesiveness and brittleness.

**Conclusion:** As a result, the quality of rice and sagol guk was improved in mineral water, and it was found that the strength of solid ingredient was increased during cooking.

## Objective

The purpose of this study was to investigate the consumer preference characteristics and mechanical properties of Korean menu for different cooking water.

## Material and Methods

### 1. Materials and sample preparation

- Yongamsoo (mineral water) and commercial bottled water were used in the cooking water.
- Yongamsoo was manufactured by Orion Jejuyongamsoo corp. and contained an 68mg of calcium and 10mg of magnesium in 1 liter ; hardness is 210.
- For consumer preference, there were seven kinds of Korean food menu including sagol guk, patjuk, white rice, dongchimi, sujeonggwa, omija, doenjang stew.
- The samples used for the sensory evaluation are prepared according to the recipe determined by the academic advisor and the food researcher.

### 2. Methods

- Samples used for sensory evaluation were presented to the panel ( $n=30$ ) in a white container (8.5×5 cm), and the 9 point scale was used.
- Hardness, strength, cohesiveness, springiness, gumminess and brittleness were evaluated for potatoes and sweet potatoes to determine mechanical properties using Gun Rheo Meter compac-100.

### 3. Statistical analysis

- All data were presented as means and standard deviations for continuous variables.
- SPSS 24 software was used for all statistical analysis.

## Results

### 1. Sensory characteristics

- There was no significant difference in the sensory characteristics of the bread by the cooking water. In the subjective evaluation, the elasticity of texture was evaluated to be stronger for Yongamsoo than that of control (Fig 1(a), Fig 1(b)).
- For ogok-bap, it was more chewy, more elastic, and glossy than control group when Yongamsoo is used. However, the seeds that were cooked together were hard like a rock (Fig 1(c), Fig 1(d)).
- The sensory characteristics of white rice were similar to those of ogok-bap (Fig 1(e), Fig 1(f)).
- When Yongamsoo was used as cooking water, sweetness and thickness were strong in patjuk (Fig 1(g), Fig 1(h)).
- In the case of noodles, the intensity of elasticity and texture is very high, soggy process was delayed (Fig 1(i), Fig 1(j)).

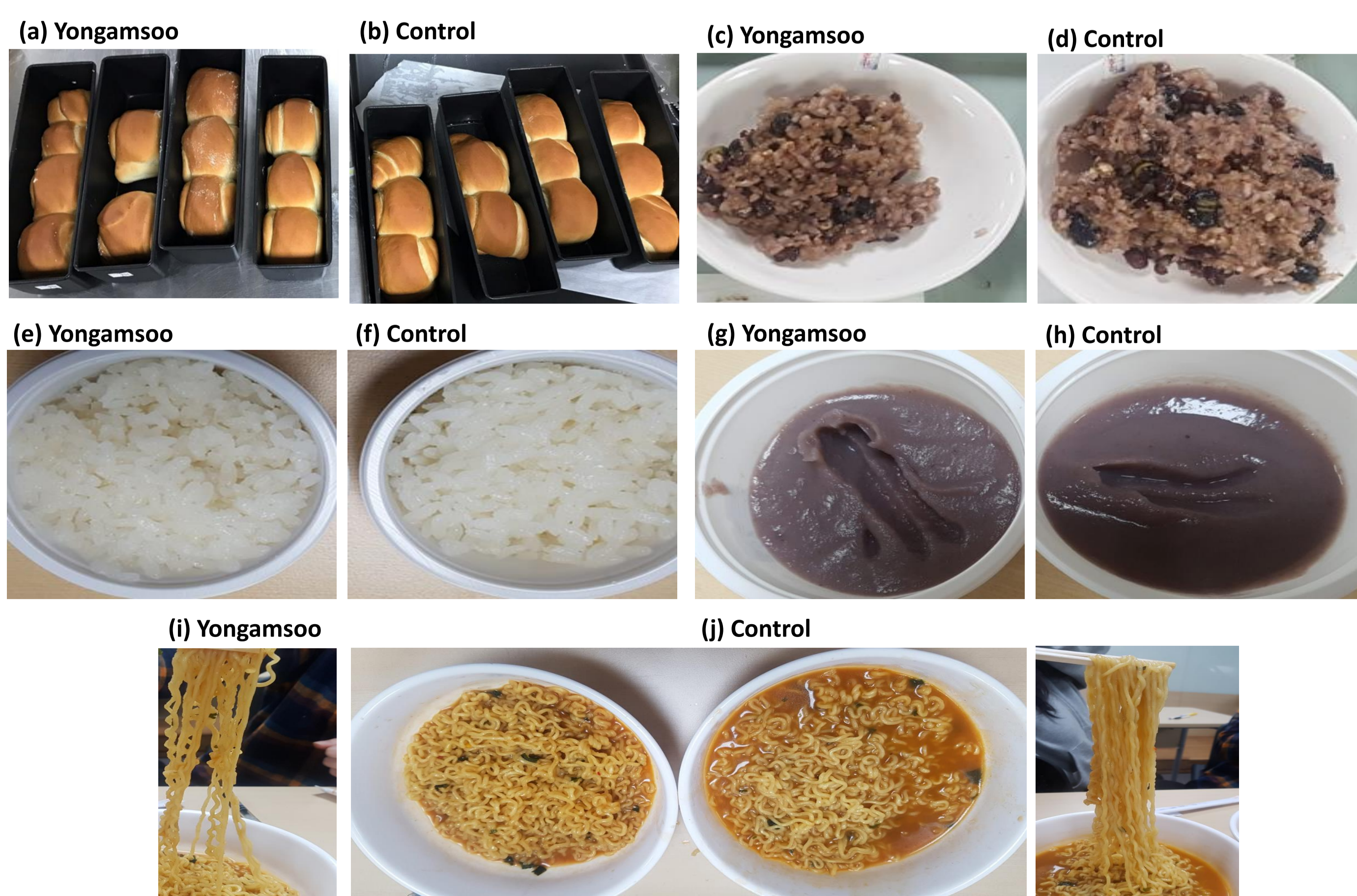


Fig 1. Sensory characteristics

## Results

### 2. Sensory attributes of 12 samples using Yongamsoo

Menu	Yongamsoo	Menu	Yongamsoo	Menu	Yongamsoo
Samgye-tang	Greasy Light Color Tough	Omija	Sweet Dark (color)	Sujeonggwa	Cinnamon flavor strong Bitter Spicy Sweet flavor
Bread	Sweet flavor Chewy Elastic Salty	Danpatjuk	Sweet strong Salty Tough Poor flow ability	Galbi-tang	Flow Good Softness Greasy Tough (meat) Watery (broth)
Ogok-bap	Elastic Hardness(seed) Glossy	Doenjang-jjigae	Hardness (texture) Rear sweetness sagging	Gyeran-jjim	Too salty Softness
Kong-guk(su)	Taste strong Strong Thickness	Kimchi-jjigae	Dark red Sour Salty Hard texture (tofu) Taste strong	Muk	Salty Sesame oil flavor Astringent It is good to eat without a sauce Hardness

### 3. Consumer liking test

- The degree of preference for appearance, overall taste, aftertaste, and stickiness of rice was significantly higher in Yongamsoo ( $p < 0.05$ ). The preference for taste and flavor and the preference for texture were significantly higher at the  $p < 0.001$  and  $p < 0.01$  level, respectively.
- The preference for rich flavor of sagol-guk was significantly higher in Yongamsoo ( $p < 0.05$ ).

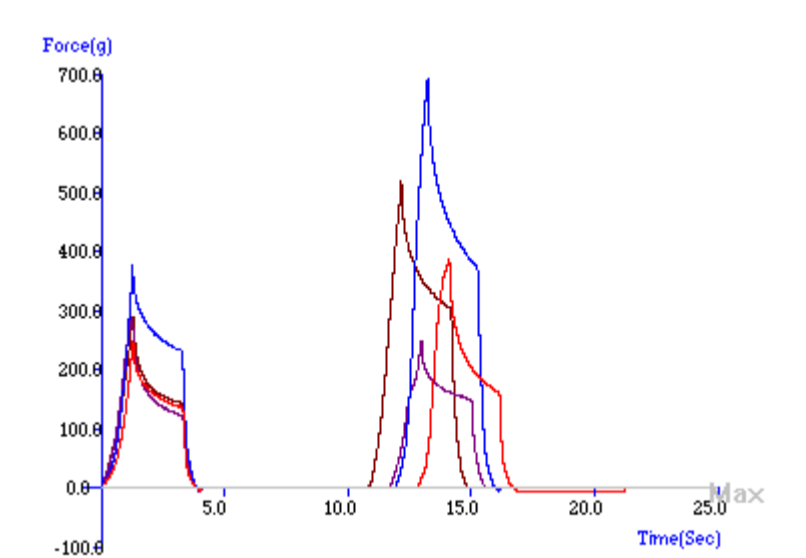
Table 1. Consumer preference for white rice and Sagol-gook

White rice	Control (n=30)	Yongamsoo (n=30)	p	Sagol-gook	Control (n=30)	Yongamsoo (n=30)	p
Appearance	6.20 ± 2.31	6.93 ± 1.20	0.013	Color	5.24 ± 3.97	5.24 ± 2.97	1.000
Overall liking	5.96 ± 2.17	6.79 ± 1.52	0.018	Overall liking	4.89 ± 3.38	5.13 ± 1.83	0.467
Odor and smell	6.31 ± 1.72	6.51 ± 1.54	0.363	Odor and smell	5.17 ± 2.36	5.72 ± 2.27	0.107
Preference for taste and flavor	6.00 ± 1.57	6.96 ± 1.53	0.0002	Preference for taste and flavor	4.72 ± 3.56	5.34 ± 2.37	0.107
Preference for texture	5.65 ± 3.51	6.68 ± 1.65	0.007	Preference for aftertaste	4.65 ± 2.37	4.82 ± 2.21	0.524
Preference for aftertaste	6.03 ± 1.89	6.75 ± 1.18	0.011	Preference for the rich flavor	3.72 ± 1.77	4.62 ± 1.31	0.038
Preference for stickiness	5.48 ± 2.68	6.37 ± 2.45	0.03	Preference for umami	4.13 ± 3.76	4.75 ± 2.61	0.092

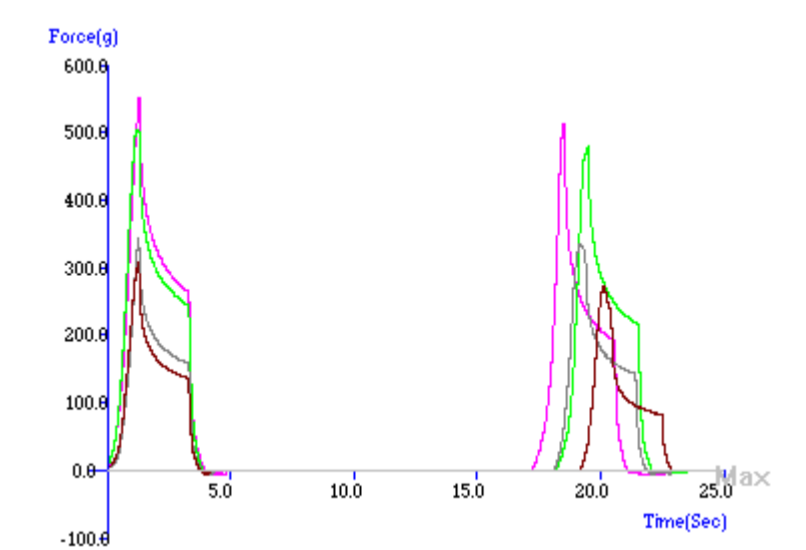
### 4. Rheology testing

- In the analysis of strength, hardness, cohesiveness, springiness, gumminess, and brittleness, potatoes cooked with Yongamsoo showed that the intensity of chewing and crushing is strong.
- In the sweet potatoes, the intensity of cohesion and cracking is weaker in the case of control compared to Yongamsoo.

Patato	Strength (g/cm <sup>2</sup> )	Hardness (g/cm <sup>2</sup> )	Cohsivness (%)	Springness (%)	Gumminess (g)	Brittleness (g)
Yongamsoo -TOP	164.672	1614.435	191.31	100.471	556.713	559.332
Control-TOP	162.409	1646.48	95.454	101.217	273.954	277.286
Yongamsoo -BOTTOM	213.904	2097.101	246.698	99.765	932.518	930.323
Control-BOTTOM	140.339	1359.877	237.046	98.372	587.874	578.304



Sweet Patato	Strength (g/cm <sup>2</sup> )	Hardness (g/cm <sup>2</sup> )	Cohsivness (%)	Springness (%)	Gumminess (g)	Brittleness (g)
Yongamsoo -TOP	312.368	3040.967	78.943	95.794	435.763	417.437
Control-TOP	286.903	2880.556	92.23	100	467.608	467.608
Yongamsoo -BOTTOM	195.796	1947.056	109.364	80.668	378.401	305.249
Control-BOTTOM	175.424	1732.071	73.475	71.09	227.772	161.924



## Conclusions

In the case of Yongamsoo containing a large amount of calcium and magnesium, it reacts with pectin and protein in food to cure foodstuffs. In this study, in general, the texture of the solid ingredient during cooking is shown to be hardened. In the sensory evaluation, hardening of the tissues occurred, in the case of potatoes and sweet potatoes, it was confirmed by a rheological test.