# COMPARISON OF TASTE COMPOUNDS OF CHICKEN BROTH MADE OF KOREAN NATIVE CHICENS AND BROILER

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## I. INTRODUCTION

In order to conserve biodiversity and protect countries' rights over their genetic resources, many countries worldwide have supported the development of new varieties of genetic sources. The National Institute of Animal Science in Korea also conducted projects to obtain novel Korean native chicken (KNC) with improved growth rate and meat quality. *Woorimatdag* 1 (WRMD1) is one of its products with a faster growth rate than ordinary KNCs and with unique taste. To encourage the consumption of the new breed, it is necessary to develop various products using WRMD1. Chicken broth is one of the chicken products that has been widely used in diverse cuisines. Taking the advantage of the WRMD1 in chicken broth, it was expected that using WRMD1 would enhance the taste of chicken broth. However, there is limited study on the taste compounds of chicken broth made using the newly developed breed along with a lack of reports on that made using KNC. Therefore, this study aimed to investigate the taste compounds of chicken broth made using WRMD1 and *Hanhyup* 3 (HH3), a well-known commercial KNC, and compare them to those of commercial broiler chicken broth.

## II. MATERIALS AND METHODS

Frozen broiler (1.2 kg), HH3 (1.4~1.6 kg), and WRMD1 (1.4 kg) carcasses were purchased from domestic butchers in Korea (n=5, for each breed). The carcass was thawed at 4°C for 16 hours. The chicken feet and neck were removed and inside and outside body were rinsed with tap water. The chicken was boiled in a stainless-steel pot with twice its weight of water at 95°C for 3 hours. After boiling, the broth was filtered through a cheese cloth and cooled to 4°C. The lipid and water-soluble phase were separated by centrifugation (1,000 ×g, 10 min). The composition of fatty acids was analysed on lipid phase though gas-chromatograph and nucleotide-related compounds using a high-performance liquid chromatography according to Barido *et al.* [1].

## III. RESULTS AND DISCUSSION

The content of guanosine monophosphate, which has umami taste, was significantly higher in broiler broth compared to that of WRMD1 broth (Table 1). There were no significant differences in the contents of guanosine monophosphate and inosine monophosphate which also had an umami taste [2]. While WRMD1 broth had the lowest inosine and hypoxanthine contents which are known to have a bitter taste with significantly lower value compared to those for broiler broth.

Among fatty acids of the chicken broths, oleic acid composed the highest portion of all the treatments followed by palmitic and linoleic acids (Table 2). As oleic acid is highly correlated with the flavour of meat, its significantly higher contents in HH3 compared to that in broiler would positively affect the flavour of HH3 meat. Arachidonic and docosahexaenoic acids are known as sources of umami flavour of meat [3]. The composition of arachidonic acid was twice higher on HH3 and WRMD1 broths compared to broiler broth. However, no difference resulted in docosahexaenoic acid contents.

Table 1. Nucleotide-related compounds contents of chicken broth made using Korean native chickens and broiler (mg/100 g).

| Treatments | Broiler | HH3 | WRMD1 | SEM | P-value |
|---|---|---|---|---|---|
| Adenosine triphosphate | 23.2[a] | 20.4[ab] | 18.9[b] | 0.74 | <0.05 |
| Adenosine diphosphate | 1.8 | 1.52 | 1.4 | 0.09 | >0.05 |
| Adenosine monophosphate | 13.4 | 12.8 | 11.9 | 0.29 | >0.05 |
| Inosine monophosphate | 42.9 | 44.4 | 40.5 | 2.76 | >0.05 |
| Guanosine monophosphate | 0.9[a] | 0.63[ab] | 0.45[b] | 0.07 | <0.001 |
| Inosine | 47.0[a] | 36.5[b] | 31.5[c] | 1.85 | <0.001 |
| Hypoxanthine | 14.2[a] | 10.3[b] | 09.1[b] | 0.71 | <0.005 |

HH3, *Hanhyup* 3; WRMD1, *Woorimatdag* 1; SEM, Standard error of mean;
[a-c]Means within the same row with different letters are significantly different (P<0.05).

Table 2. Fatty acid composition of chicken broth made using Korean native chickens and broiler (%).

| Treatments | Broiler | HH3 | WRDM1 | SEM | P-value |
|---|---|---|---|---|---|
| C14:0 (myristic acid) | 1.0±0.10[b] | 1.3±0.17[a] | 1.4±0.14[a] | 0.06 | <0.01 |
| C16:0 (palmitic acid) | 29.6±1.80 | 27.0±1.49 | 27.9±1.49 | 0.48 | >0.05 |
| C16:1n7 (palmitoleic acid) | 08.0±0.46[a] | 05.9±0.65[b] | 5.7±0.53[b] | 0.31 | <0.001 |
| C18:0 (stearic acid) | 5.04±0.19[b] | 05.7±0.64[ab] | 6.1±0.27[a] | 0.15 | <0.01 |
| C18:1n9 (oleic acid) | 37.2±0.79[b] | 40.2±2.48[a] | 37.6±1.54[ab] | 0.55 | <0.05 |
| C18:2n6 (linoleic acid) 7 | 16.7±1.65 | 16.9±0.99 | 18.8±1.82 | 0.44 | <0.01 |
| C20:1n9 (eicosenoic acid)10 | 0.13±0.02[b] | 0.2±0.02[a] | 0.2±0.07[a] | 0.02 | <0.05 |
| C20:4n6 (arachidonic acid)11 | 0.13±0.04[b] | 0.3±0.03[a] | 0.3±0.04[a] | 0.02 | <0.01 |
| C20:5n3 (eicosapentaenoic acid)2 | 0.03±0.02 | 0.0±0.01 | 0.0±0.00 | 0.00 | >0.05 |
| C22:6n3 (docosahexaenoic acid)4 | 0.07±0.02 | 0.0±0.03 | 0.0±0.00 | 0.01 | >0.05 |
| SFA | 35.7±1.94 | 34.0±2.15 | 35.4±1.54 | 0.50 | >0.05 |
| UFA | 64.3±1.94 | 66.1±2.15 | 64.6±1.54 | 0.50 | >0.05 |
| MUFA | 46.4±0.72 | 47.9±2.88 | 44.5±2.12 | 0.62 | >0.05 |
| PUFA | 18.0±1.86 | 18.1±1.00 | 20.1±1.93 | 0.47 | >0.05 |

HH3, *Hanhyup* 3; WRMD1, *Woorimatdag* 1; SEM, Standard error of mean;
[a,b]Means within the same row with different letters are significantly different (P<0.05);
SFA: saturated fatty acid, UFA: unsaturated fatty acid, MUFA: monounsaturated fatty acid, PUFA: polyunsaturated fatty acid.

## IV. CONCLUSION

Overall, the results suggested that the broths made using broiler and Korean native chickens had different compositions on important taste compounds. It implies distinctive flavours of chicken broth made using Korean native chickens. However, further investigation to estimate the sensory characteristics of the broth should be done to confirm the distinctive flavour of the chicken broth.

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