COMPARISON OF TEXTURE AND PROTEIN CONTENT OF CHICKEN NOODLE AND COMMERCIAL NOODLE

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ABSTRACT

Chicken noodle was produced by adding chicken meat and chicken flavouring into the formulation of Asian egg noodle (mi kuning). A number of analysis has been carried out to determine the protein content, the acceptance towards its texture and overall consumer acceptance. Based on the results of protein analysis using Kjeldahl Method, chicken noodle has higher protein content compared to the commercial Asian egg noodle due to the addition of 34% (w/w) chicken meat into the formulation. A sensory analysis was conducted to determine the acceptance of texture and overall acceptance by consumers. Based on the results, there is no significant difference observed in the analysis of texture. However, a significant difference was observed among the panels in terms of overall acceptance.

KEYWORDS: chicken, noodle, protein, sensory, texture

1. INTRODUCTION

Meat is animal flesh that is known to be one of the major food source for human-beings. Humans have been hunting for meat since prehistoric times. The development of civilization has allowed the domestication of animals such as chicken, sheep and cattle and eventually their use in meat production on an industrial scale. Meat is mostly composed of water, protein and fat. This is normally eaten together with other food. It is edible raw, but is commonly eaten after it has been cooked and seasoned or processed in various ways. Unprocessed meat will spoil or rot within hours or days as a result of infection with and decomposition by bacteria and fungi.

Oftentimes, meat refers to the skeletal muscle and associated fat and other tissues, but it may also describe other edible tissues such as offal. Meat is sometimes also used in a more specific sense, the flesh of mammalian species like pigs, cattle and lambs raised prepared for human consumption, to the exclusion of fish, other seafood, poultry or other animals. Generally, white meat refers to meats pale before cooked like poultry, fish and pork. Red meat often refers to meat that is red in colour before cooking such as lamb, beef and also pork. Birds with a high concentration of dark meat, such as ducks and geese, are now and the categorized as red meat, even if their meat is pale pre-cooking. Meats are sometimes divided into red or white due to their flavour: white meats tend to be blander (chicken, pork), and red meats have a more intense flavour.
Noodles are a staple food in many countries made from unleavened dough which is stretched, extruded, or rolled flat and cut into a variety of shapes (Fu, 2008). A single noodle can be made, eaten, or extracted from a serving of noodles, but it is far more common to serve and eat many at once, and thus more common to see the plural form of the word. While long, thin strips may be the most common, many varieties of noodles are cut into waves, helices, tubes, strings, shells or folded over, or cut into other shapes. Noodles are usually cooked in boiling water, sometimes with cooking oil or salt added (Foley, 2008). They are often pan-fried or deep-fried. Noodles are often served with an accompanying sauce or in a soup. Noodles can be refrigerated for short-term storage, or dried and stored for future use. The material composition or geocultural origin must be specified when discussing noodles. The word derives from the German word Nudel. The oldest evidence of noodle consumption, from 4,000 years ago, has been found in China (McDonnell, 2013).

In this study, chicken noodle was produced by adding chicken meat and chicken flavouring into the formulation of Asian egg noodle (mi kuning). The purpose of formulating chicken noodle is to offer another variety of noodle that is rich in protein to the consumers. The comparison of texture, overall acceptance and protein content were made between the produced chicken noodle and the commercial Asian egg noodle that are readily available in the market.

In this article, the comparison of texture, overall acceptance and protein content of the chicken noodle was analysed. The texture of the chicken noodle is attributed by its elasticity. The overall acceptance of the chicken noodle and commercial noodle were examined by using the sensory evaluation analysis. The crude protein content of both noodles were analysed by Kjeldahl Method protein analysis.

2. LITERATURE REVIEW AND HYPOTHESIS

2.1 Noodle

The words “pasta” and “noodles” are occasionally used as interchangeably due to the products are basically the same type and mainly produced from wheat semolina or fine flour and water, intermittently produced from other cereals like rice, corn; eggs and spices. Pasta and noodles are end products made during processing of wheat which are staple foods in several countries. These products differ in their place of origins, raw materials used for producing, composition of ingredients, industrial procedures and also eating patterns. According to Fu (2008), noodles in various contents, formulations, and shapes have been the staple food for many Asian countries since ancient time. They can be made from wheat, rice, buckwheat, and starches derived from potato, sweet potato, and pulses. Wheat noodles are prepared mainly from three ingredients; flour, water and salt (Fu, 2008).

Oh et al (1983) stated that the standard of identity for noodles in the United States specifies that they be made from wheat dough containing eggs, and the source of wheat is usually durum. The dried noodles must contain ≥87% solids and ≥5.5% egg solids (Code of Federal Regulations 1981). Generally, noodles made in Asian countries do not contain eggs, although the use of eggs depends greatly on the type of noodle and the specific region of Asia (Oh et al 1983). Fu (2008) has stated that the basic process of producing noodles includes dough mixing, sheet forming, compounding, sheeting/reduction, and cutting. Different ingredients
and processing properties are highly related to the resulting texture of the noodle (Fu, 2008). Protein plays an important role of determining the texture of the noodle. According to Fu (2008), protein content is positively correlated with noodle firmness and sometimes negatively correlated with elasticity. Therefore, a correct range of protein content is important for textural characteristics. Adequate gluten strength and extensibility is required in all noodle flours (Fu, 2008).

2.2 Wheat Flour

Wheat flour quality appears to be the major influence on noodle eating attributes (Smatanova & Lacko-Bartosova, 2014). For each different type of noodle, flours meeting specific criteria are essential. Understanding the different wheat flour characteristics and how these impact on the prepared instant noodles, is therefore an important aspect of research. An appreciation of this subject will assist in screening and selecting the suitable flour type. Commercial instant noodles from various parts of the world are made from flours having a wide range of characteristics. These differences are partly due to the type of wheat available and consumer preferences in the particular region. Wheat for noodles should be sound, dry and clean as wheat that has sprouted or disease damaged kernels will affect the end product quality. In addition, wheat should be well-filled, of good appearance and not spoilt by weather (Fu, 2008).

Other researchers have highlighted bran color, kernel hardness, protein content, dough strength and starch pasting properties as major quality criteria for noodle wheat (Smatanova & Lacko-Bartosova, 2014). The execution of correct milling procedures is also critical to ensure the resulting noodle flour has a bright color, maintaining low ash content, a low level of damaged starch and fine particle size. Wheat flour affects end product eating quality and two areas are of significance: texture and appearance properties, which are now described.

3. RESEARCH METHODOLOGY

3.1 Noodle Preparation

Chicken noodle was prepared by mixing 200 g of ground chicken meat with 300 g of all purpose wheat flour, 60 g eggs, 6 g chicken stock, 6 g of salt, and 15 g of cooking oil. Then the mixture was kneaded into a dough. The dough was sheeted and cut. After that, the noodles were blanched in hot water at 100°C. It is then cooled and packed. The noodle was kept chilled at 1-2°C afterwards.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All purpose wheat flour</td>
<td>300</td>
</tr>
<tr>
<td>Ground chicken meat</td>
<td>200</td>
</tr>
<tr>
<td>Egg</td>
<td>60</td>
</tr>
<tr>
<td>Chicken flavouring</td>
<td>6</td>
</tr>
<tr>
<td>Salt</td>
<td>6</td>
</tr>
<tr>
<td>Cooking oil</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 1: Formulation of Chicken Noodle
3.2 Protein Analysis

Protein analysis of chicken noodle and commercial noodle were performed using the Kjeldahl Method, which involves digestion, distillation and titration process. 1 g sample were digested with 8 g protein catalyst and 20 ml of concentrated H$_2$SO$_4$. After that, the samples were distilled with 60 ml of 40% NaOH. The distillate collection flask was filled with 50ml of 2% boric acid and a few drops of protein indicator. After 5 minutes of distillation, the distillate was titrated with 0.5 N H$_2$SO$_4$ until it turned pinkish in colour. The same process was carried out for blank sample. The protein content was calculated using the equation below:

$$Eq. 1: \% \text{ Nitrogen} = \frac{(\text{volume of sample, ml} - \text{volume of blank, ml}) \times \text{N of acid} \times 1.4007}{\text{Weight of sample (g)}}$$

$$Eq. 2: \% \text{ Protein} = \% \text{ of Nitrogen} \times \text{protein factor}$$

3.3 Sensory Evaluation Analysis

Sensory evaluation was conducted at a laboratory level using five points of hedonic scales with 20 panelists. There are two samples involved, which are the chicken noodle and the commercial noodle. The samples were coded with three digit numbers and assessed for their aroma, texture, taste and overall acceptance. The five point hedonic scales which was used in this study was 5 = Excellent, 4 = Very good, 3 = Good, 2 = Satisfactory and 1 = Unsatisfactory. The data was then processed by using the SPSS analysis.

4. RESULT AND DISCUSSION

4.1 Sensory Evaluation Analysis

The paired samples T-Test procedure compares the means of two variables for a single group. It computes the differences between values of the two variables for each cases and test whether the mean differs significantly. For instance, to determine the best formulation for a food product prepared using two different formulations which are chicken noodle and commercial noodle, the same panelists (one group) were asked to carry out a sensory evaluation for attributes such as aroma, texture, taste and overall acceptance. Each panelist has to evaluate for every attributes for both chicken noodle and commercial noodle.

4.1.1 Texture

| Table 2: Paired Samples Statistics of Texture of Chicken Noodle and Commercial Noodle |
|---------------------------------|--------|--------|------------------|------------------|
|                                 | Mean   | N      | Std. Deviation   | Std. Error Mean  |
| Chicken noodle                  | 4.45   | 20     | 0.999            | 0.223            |
| Commercial noodle               | 4.15   | 20     | 1.089            | 0.224            |

Based on the results above, the mean for the attribute of texture of chicken noodle is 4.45±0.999 while the mean of texture of commercial noodle is 4.15±1.089.
Table 3: Paired Samples Test of Texture of Chicken Noodle and Commercial Noodle

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair of Chicken Noodle and Commercial Noodle</td>
<td>0.300</td>
<td>1.455</td>
<td>0.325</td>
<td>-0.381 - 0.981</td>
<td>0.922</td>
<td>19</td>
<td>0.368</td>
</tr>
</tbody>
</table>

The panelists did not prefer any of the texture of either chicken noodle or commercial noodle (Mean: 4.45 and 4.15 equivalent to dislike slightly). So from the table above, the paired samples T-Test showed no significant difference of texture between the chicken noodle and commercial noodle (p>0.05, t=0.922).

Based on the analysis, it is proved that the addition of chicken meat does not contribute much to the texture of the chicken noodle. This can be observed by the panelists did not prefer any of the texture of both chicken noodle and commercial noodle.

4.1.2 Overall Acceptance

Table 4: Paired Samples Statistics of Overall Acceptance of Chicken Noodle and Commercial Noodle

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken noodle</td>
<td>5.10</td>
<td>20</td>
<td>1.119</td>
<td>0.250</td>
</tr>
<tr>
<td>Commercial noodle</td>
<td>4.35</td>
<td>20</td>
<td>1.137</td>
<td>0.254</td>
</tr>
</tbody>
</table>

Based on the results above, the mean for the attribute of overall acceptance of chicken noodle is 5.10±1.119 while the mean of overall acceptance of commercial noodle is 4.35±1.137.

Table 5: Paired Samples Test of Overall Acceptance of Chicken Noodle and Commercial Noodle

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair of Chicken Noodle and Commercial Noodle</td>
<td>0.750</td>
<td>1.446</td>
<td>0.323</td>
<td>0.073 - 1.427</td>
<td>2.319</td>
<td>19</td>
<td>0.032</td>
</tr>
</tbody>
</table>

Based on the analysis of the overall acceptance, the panelists prefer chicken noodle (Mean: 5.10 equivalent to neither like nor dislike) over commercial noodle (Mean: 4.35 equivalent to dislike slightly). From the table above, the paired samples T-Test showed that a significant difference was observed among the panels in terms of overall acceptance (p<0.05, t=2.319). Based on the samples statistics, the panelists gave higher scores for the chicken noodle compared to the commercial noodle.

The result of sensory evaluation of chicken noodle and commercial noodle shows that there is no significant difference observed in the analysis of texture of the chicken noodle.
Based on the results of SPSS analysis for texture, the panelists did not prefer either chicken noodle or commercial noodle because they possess similar characteristics. However, a significant difference was observed in the analysis of overall acceptance of the chicken noodle. This shows that the consumers prefer chicken noodle over the commercial noodle. It might be due to the flavoursome taste that is resulted from the addition of chicken meat and chicken flavouring into the chicken noodle formulation.

4.2 Protein Content Analysis

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample Weight (g)</th>
<th>Volume of H₂SO₄ (ml)</th>
<th>% Nitrogen</th>
<th>% Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Noodle</td>
<td>1.055</td>
<td>1.177</td>
<td>1.432</td>
<td>8.948</td>
</tr>
<tr>
<td>Commercial Noodle</td>
<td>1.036</td>
<td>6.987</td>
<td>0.916</td>
<td>5.725</td>
</tr>
</tbody>
</table>

Based on the table above, the percentage of protein of chicken noodle and commercial noodle are 8.948 % and 5.725% respectively. This shows that chicken noodle has 3.2 % more protein content than the commercial noodle. Chicken noodle has higher protein content due to the addition of 34% ground chicken meat into the formulation. Other ingredients such as all-purpose wheat flour and egg also contributed to the percentage of protein content in both samples.

5. CONCLUSION

As a conclusion, there is no significant difference observed for the analysis of texture of the chicken noodle. However, a significant difference is observed in the analysis of the overall acceptance of chicken noodle, demonstrating that the panelists prefer chicken noodle over the commercial noodle. The addition of chicken meat does not contribute much to the texture of the chicken noodle. Chicken noodle has 3.2 % more protein content compared to the commercial noodle due to the addition of ground chicken meat into the formulation. Chicken noodle is suitable for consumption to those who need to get more protein in their diet.

REFERENCES


**AUTHORS’ BIBLIOGRAPHY**

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