INVESTING IN FOOD QUALITY, SAFETY & NUTRITION

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SEAFAST CENTER
Southeast Asian Food & Agricultural Science & Technology (SEAFAST) Center
Bogor Agricultural University
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Study On Noodle Making From Corn and Sago Flours

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Abstract

Non-rice commodity has been increasingly discussed as food alternative commodity. Type of processing food applied on this research is noodle making from mixed sago and corn flours.

The aim of this research was to investigate the quality of noodle made from sago and corn flours, as well as to observe the impact of the addition of preservative materials towards the noodle's shelf life. Treatments implemented in the research are the mixture of sago and corn flours with the proportion of 50%-50%; 60%-40%; 40%-60%. The noodles were then treated with and without potassium sorbat (0.005%), and stored for four days. Parameters observed were the water contents, protein contents, ash contents, fiber contents, total microbe, organoleptic tests towards its texture, color, flavor and taste.

The best technique to prepare noodle from sago and corn flours was to steam the mixture after homogenization followed by molding. Salts 1.3%, 30% fresh egg, 0.3% sodium carbonate and 60% water were added to the formula. The most acceptable treatment was mixture of 60% sago and 40% flours for desirable physical characteristic, nutrition value and added by potassium sorbat (0.005%) for 2 days storage.

Introduction

Rice has become the food staple in Indonesia. The changes of global climate have affected the plant session and the variability of plant crop cultivated in Indonesia included rice. However, several communities on certain region of Indonesia are not significantly affected with that because they had local plant crops such as corn, sweet potatoes, sago and others as their alternative food staple.

The efforts have been pursued by the Indonesian government to not depend on rice or imported products (wheat products) as the source of food staple. The anticipation must be found to solve this food supplies problem by
educate people to learn how to make others food staples prepared from their local crops.

The changing trend food in Asian countries is driven by number of factors i.e. the increasing of population, GDP and the evolution in trade practices which lead the manufactures to create more kind of trend food such as noodle. The noodle manufacturing for some people stay in far from the city was not easy to find, so they can prepare their food by them self at home or on scale home industry (Owen, 2001).

The commercial standard noodles currently are prepared using wheat flours and mixed it with water to form dough. The dough requires 30 – 35 percent of the mixing time which is restricted less than 20 minutes (Owen, 2001). This paper will present the preparation of alkaline noodle using corn and sago flour as base materials on home industry. The wheat flour is rich on gluten (viscoelastic protein) which will affect the noodle texture and elasticity. It also affects the sufficient noodle dough strength to cope with multiple sheeting processes without tearing it thus the excessive shrinkage after rolling could be avoided. In contrast on the noodle made from corn and sago flours, it structure and texture associated with high swelling and sticky properties of two flours because of the high amyllose and amylpectin contents and the addition of water on the dough during steaming. The noodle preparation was characterized in alkaline noodle (Owen, 2001).

**Material and Methods**

**Materials**

The yellow corn flour was prepared from rice corn obtained from local market. First, the corn was cleaned by eliminating husk and bran and then soaked on warm water for 1 hour. After draining, the rice corn was dried by sun drying until the weight of corn rice become constant. The dry corn rice was milled (80 mesh) and the flour obtained was dried again to be very dry and the weight became constant. The sago (original extract stem of sago plant) also obtained from local marked, washed many time with water to get clean and white flour. After draining, the extract sago then sun-dried until dry and the weight was constant.
Other materials were Sodium carbonate (Na$_2$CO$_3$), e.g. potassium sulfite (K$_2$SO$_3$), sodium hydroxide (NaOH), chloride acid (HCl), sulfuric acid (H$_2$SO$_4$), salt (NaCl), egg (Khouryieh et al. 2006) and yellow coloring (Food grade)

**Noodle Preparation**

Each noodle sample was prepared by the combination of three variable treatments arranged on Randomized Complete Design and Factorial model as described below.

The combination of two flours described above as the first variable (A1, A2, A3 variables). The ratio of the corn flours and sago flour were 5:5 (A1), 4:6 (A2) and 6:4 (A3) respectively. The second variable was adding the preservative (potassium sorbate) as B variable; Addition of 0.005% potassium sorbate (B0) without or non preservative (B1) respectively and third variable was storage: 2 days of storage (C1), 3 days of storage (C2) and without storage (C0). From the combination of three variables implied on noodle preparation above, it was obtained 18 variations of noodle; each noodle treatment was repeated twice. The parameter of noodles measured were water content (AOAC, 2000); crude fiber (AOAC, 2000); total microbial count (AOAC, Method 991.14.), and sensory (texture, taste, color and aroma) by hedonic scale test (Meilgaard et al. 1999).

The combination of two flours (1000 Gram), salt 3% (w/w), egg 30% (w/w) to improve dough texture and color, as well as to stabilize and enhance the nutritional value of food products (Bringe and Cheng, 1995). Sodium bicarbonate 0.3% (w/w), Sodium tripolyphosphate 0.25% (w/w), Potassium sorbate 0.005% (w/w), zero (without) Potassium sorbate and water 60% (w/w) mixed on mixer apparatus (2000 gram capacity). The dough obtained was conditioned or the dough covered with cloth and lied for 1 hour to become homogen and the water well absorbed. After conditioning, the dough were placed on the plate surface, which was dropped with some vegetable oil before, and then continued to forming the sheet on 2 mm thick, 30 Cm wide and 40 Cm long. The sheets were steamed on aluminium tray 15 minutes and then cooled. After cooling the sheets were cut using the manual pasta making in 3 mm wide. The evaluation of sensory (organoleptic) test of noodles was released by the hedonic scale adopted from Meilgaard, et al. (1999).
### Result and Discussion

The water content of fresh noodle obtained after preparation and storage varied between 45.77% - 49.48% dry basis before storage and 46.95%-47% after 2 days storage and 47%-49.48% after 4th day storage. (Table. 1)

**Table 1. Analyses noodles composition from of sago flour and corn flours**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Water Content (%)</th>
<th>Protein (%)</th>
<th>Ash (%)</th>
<th>Mirobial Count</th>
<th>Texture</th>
<th>Color</th>
<th>Aroma</th>
<th>Taste</th>
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</thead>
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<td>A1B0C0</td>
<td>46.91</td>
<td>3.37</td>
<td>1.16</td>
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<td>A1B0C1</td>
<td>47.17</td>
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<td>1.12</td>
<td>1.03.10^5</td>
<td>2.9</td>
<td>3.0</td>
<td>3.0</td>
<td>2.9</td>
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<tr>
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<td>49.19</td>
<td>2.75</td>
<td>0.89</td>
<td>Undetermined</td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>3.38</td>
<td>1.04</td>
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<td>2.9</td>
<td>2.9</td>
<td>2.8</td>
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<td>2.69</td>
<td>0.88</td>
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<td>2.45</td>
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<tr>
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<td>47.75</td>
<td>2.98</td>
<td>0.96</td>
<td>1.265.10^6</td>
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<td>2.9</td>
<td>3.18</td>
<td>2.6</td>
</tr>
<tr>
<td>A2B0C2</td>
<td>49.48</td>
<td>2.75</td>
<td>0.89</td>
<td>Undetermined</td>
<td></td>
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<td></td>
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<td>A2B1C0</td>
<td>45.56</td>
<td>3.63</td>
<td>1.38</td>
<td>1.03</td>
<td>3.18</td>
<td>2.36</td>
<td>3.27</td>
<td>2.9</td>
</tr>
<tr>
<td>A2B1C1</td>
<td>46.45</td>
<td>2.98</td>
<td>1.10</td>
<td>2.18.10^5</td>
<td>2.9</td>
<td>2.9</td>
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<td>2.6</td>
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<td>3.95</td>
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<td>3.73</td>
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<td>3.38</td>
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<td>3.84</td>
<td>1.08</td>
<td>1.03</td>
<td>3.27</td>
<td>3.73</td>
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</tr>
<tr>
<td>A3B1C1</td>
<td>37.73</td>
<td>3.64</td>
<td>1.03</td>
<td>5.68.10^5</td>
<td>2.8</td>
<td>3.1</td>
<td>2.9</td>
<td>3.1</td>
</tr>
<tr>
<td>A3B1C2</td>
<td>47.77</td>
<td>3.63</td>
<td>0.75</td>
<td>Undetermined</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A1= Combine of corn flour 50% and sago flour 50%
A2= Combine of corn flour 40% and sago flour 60%
A3= Combine of corn flour 60% and sago flour 40%
B0= Non addition preservative
B1= Addition preservative (Potassium sorbate 0.005%)
C0= Storage 0 days (Control)
C1= Storage 2 days
C2= Storage 4 days
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The addition of preservative in this case was significant (Ps0.5) for noodle water content, but interaction of the combine of flours and storage, interaction between addition of preservative and storage treatments was not significant. The interaction of tree variable treatments (The combination of 2 different flours, addition of preservative and storage) were also not significant. The addition of preservative (potassium sorbate) caused the water evaporation from the dough, during and after steaming dough sheet resulted the noodle water content especially on noodle prepared from 60% sago flour and corn flour 40% (A2B2) (Figure 1). The water content will correspond lately to total microbial count on noodle storage especially molds, yeast, and bacteria (Branen et al., 1990).

Figure 1. Water conten of noodle prepared from combine of sago and corn flours.

The protein control of noodle increased when adding the proportion of corn flour 60% and the Sago flour 40% (by weight) (Figure 2). In this case, the majority of protein on noodle come from corn flour (protein content of corn was 7.9%) (Munarso at al. 1992., Van Drop. et al., 1989), whereas the protein of sago flour only 0.7% (Djafar et al. 2000 ; Haryanto et al. 1992., Cecil et al. 1982)). Thus, the protein of noodle was clearly came from the corn flour. During storage, the protein showed decreasing value for all noodle samples. The Anova result showed the combination the flours and storage was significant to noodles, but other combination treatments also the three combination treatments implied in the noodle preparation were not significant.
Figure 2. Protein content of noodles from combine of sago and corn flours during storage.

The ash content tends to decrease during storage (1.38 - 0.75%). The relation of the ash content, water content and protein of noodle seemed to correlate in development of total microbial count during storage whereas the ash, water and protein consumed by microbial during storage and also preservative (Potassium sorbate 0.05%) added on the noodle was not effective (Figure 3)

Figure 3. The ash content of noodles prepared from combine of sago and corn flours

The self life of all noodles was 2 days. The microbial count during 2 days storage was average $0 - 6 \times 10^5$. After three days storage, the noodle was not acceptable due to high intensity of mold myceliums and other microbes growth on noodles surface.
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The crude fiber of noodles was 0.82%, this value below the standard value of SNI (Standar Nasional Indonesia) therefore the noodles were save for consumption of infants.

The sensory test of noodle becomes important, due to evaluate the panels assumption the acceptable of noodles for consumption. The best sensory value (color, texture, aroma and taste) of noodle contributed by the panels that was expressed in “like” to: Color was fresh noodle (without storage) from 60% sago flour combined with 40% corn flour without preservative; Texture was fresh noodle from 40% sago flour and 60% corn flour and also prepared from 40% sago flour combine with 60% corn flour with preservative; Aroma was noodle prepared from 40% sago flour combine with 60% corn flour without preservative; taste was noodle prepared from combine 40% sago flour and 60% corn flour and also noodle prepared from combine of 50% sago flour and 50% corn flour with preservative, (Figures 4, 5 and 6).

Figure 4. Noodles prepared from combination of 50% sago flour and 50% corn flour without preservative.

Figure 5. Noodles prepared from combination of 60% sago flour and 40% corn flour without preservative.
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Figure 6. Noodles prepared from combination of 40% sago flour and 60% corn flour without preservative.

Conclusion

The conditioning the dough of noodle has to be done in noodle preparation from sago and corn flours in order to homogenate the dough before sheeting and steam. The steaming was also important to find the elasticity of noodle dough before cutting. The best noodle obtained indicated by properties of physic, nutrition value and storage life the noodle prepared from combine of 60% sago flour and 40% corn flour with addition preservative.

References


