Application of Liquid Smoke and Smoke Powder for Process Development Instant Seasoning of Indonesian Traditional Food

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ABSTRACT

This research was initiated to determine the right formula pasta and powder curry and chicken opor seasonings. Then, determine the lowest concentration of liquid smoke as a threshold and maximum concentration of liquid smoke on each type of seasoning. Furthermore, the research results were used to determine five different concentrations on sensory testing. Based on the assessment panel's favorite, the optimum concentration can be obtained so as to produce the traditional smoke flavor.

Threshold of liquid smoke to give flavor in curry pasta is 0.025% (v/v) while in the powder 0.04% (w/v) and for chicken opor pasta is 0.015% (v/v) while in powder 0.01% (w/v). The maximum concentration in the pasta curry and chicken opor seasoning are 0.4% and 0.8% (v/v) while the powder is 1.0% and 1,25% (w/v).

The result of ANOVA test shows that pasta curry and chicken opor seasoning at concentration 0.15% and 0.25% (v/v) and powder seasoning at concentration 0.12% and 0.20% (w/v) is the optimum concentration of traditional smoke flavors.

***Keyword** : Seasonings, Liquid Smoke, Traditional flavor, engineering*

INTRODUCTION

Along with the development of the modern era, the public demands practicality. Currently, the traditional way of processing food with wood as fuel has been abandoned and replaced with the use of gas stove. In fact, the burning of wood in the traditional food processing to produce foods have the distinctive taste because the cooking process is long, the smoke flavor absorb into the food. Specific smoke flavor is quite favored by consumers. Cooking by using wood, coconut husk and coconut shell as fuel has several advantages, namely the food produced durable, has a flavor that is more comfortable and enjoyable as well as having a high flavor and distinctive (Yefrida et al, 2008). This foods such as chicken opor, curry, brongkos, beef jerky and rendang. Based on research, typical flavors found in these foods derived from organic compounds (acid, carbonyl, and phenol) that found in the smoke of burning. However, an organic compounds that contribute to the formation of the smoke flavor is phenol (Girard, 1992). The weakness of traditional cooking, among others are less consistent product quality because the optimal time and temperature can not be maintained the same, can cause environmental pollution, and allow the fire hazard, as well as the possibility of polycyclic aromatic hydrocarbon compounds are formed (benzo (a) pyrene) that are carcinogenic (Gorbatov (1971) and Maga (1987)). These compounds can be formed and can be easily attached or absorbed on the surface of food during the traditional cooking (Tigner and Leaf, 1970 b; in Leaf, 1979).

On the other hand, food processing with gas stove is more practical and cleaner can not produce the typical flavor cuisine. Flavor that generated in food processing using a gas stove have less sharp. Therefore, the flavor of foods that are processed in traditional ways

have to be raised again. The solution of the problems above by engineering a traditional flavor through the addition of smoke flavor.

Engineering traditional cooking can be done using liquid smoke or liquid smoke powder as a source of smoke flavor. However, the proportion of liquid smoke and liquid smoke powder that too much can cause a bitter taste sensation at the base of the tongue. Conversely, the proportion of the addition that too little can not produce smoke flavor. Therefore, engineering the addition of liquid smoke and liquid smoke powder is required to obtain a unique flavor that can be preferred by consumers.

Engineering can be done by determining the proportion of the lowest and the proportion of its maximum. Then, the optimum proportion of the addition of liquid smoke and liquid smoke powder is determined by sensory testing with the proportion of variation between the lowest and the proportion of maximum proportions.

RESEARCH METHODOLOGY

Materials and Research Tools

Basic materials that used in the manufacture of curry seasoning and chicken opor pasta ready to eat are spices, coconut milk and cooking oil. While the seasoning powder used spices that have been dried. For the manufacture of liquid smoke is used coconut shell, and the manufacture of liquid smoke powder is used maltodextrin as a filler. For chemical analysis, materials used for the analysis of total phenol, total acid, and proximate analysis. As a prototype of packaging used aluminum foil and plastic PE for packaging materials.

The tools used for this research is a tool for the production of pyrolysis liquid smoke there are tool consisting of pyrolysis reactor tube equipped with a thermostat and time, streamer pipe smoke and the cooling tube for condensation of liquid smoke, and liquid smoke redestilation tool consisting of a stove electricity, thermostat, penangas oil, distillate pipe thermometer, cooling pipes for condensate, and also a tool for making pasta and powder seasonings.

How To Research

Research Introduction

Determination Formula Seasonings

Formulas of ready to eat pasta seasoning is obtained by performing weighting of each fresh herb in accordance with the orientation done, then mashed and sautened.

Formulas of ready to eat powder seasoning is obtained by drying each type of fresh herbs that are used, then crushed and sifted, and weighed according to their respective orientations.

Preparation and Purification of Liquid Smoke

Liquid smoke is made from 3 kg of coconut shell through a process of pyrolysis at a temperature of 400^0C for 2.5 hours. After passing through the stages of pyrolysis, liquid smoke condensate become to redestilation at a temperature of 105^0C. Liquid smoke redestilation results then placed in dark bottles and stored in a coolroom.

Making Liquid Smoke Powder

Liquid smoke powder is made by mixing the liquid smoke and maltodextrin with a ratio of 1:1 and then dried in cabinet dryer temperature 50^0C and then stirred until evenly mixed and poured in the pan and then dried using a cabinet dryer. Once dry, the clumps are formed and then crushed with a porcelain cup to be powder.

Determination of Threshold and Maximum Concentration

Threshold testing aims to find the lowest concentration of liquid smoke to the sauce that has begun to be perceived by the panelists. It also conducted tests to determine the highest concentration of liquid smoke that can make the panelists felt sick and did not want to feel the gravy is.

Main Research

Sensory Analysis

Testing preferences and product differentiation in the sensory ready to eat seasoning is done in two batches and were evaluated by 20 panelists in each batch. The variation of the concentration used in the organoleptic test was the result obtained from the orientation of the preliminary research.

This test uses scoring method which panelists were asked to rate each of the parameters provided in the form number/ score. Scores are provided to test and test distinction of joy is in the range 1-5.

Chemical Analysis

Chemical analysis performed on this product are:

a) Analysis of water content with thermogravimetri method (Anonymous, 1990),
b) Analysis of protein content with mikrokjeldahl method (Anonymous, 1990),
c) Analysis of lipid content with soxhlet method (Anonymous, 1990),
d) Analysis of total sugar and reducing sugar with Nelson-Somogyi method (Anonymous, 1990),
e) Analysis of phenol concentration method with Senter et al., 1989; modifications to the method Plumer, 1971),
f) Analysis of total acid with titration method (Anonymous, 1990).

Making Prototype Packaging

Pasta and poeder ready to eat opor and curry seasoning that has been carried out chemical analysis then packed with plastic polyethilen use as primary packaging and aluminum foil as a secondary packaging. Furthermore, packaging is labeled to product identity.

Experimental Design

The experimental design used was Randomized Perfect Design with influential factor is the addition of various concentration of liquid smoke and liquid smoke powder and response factors to be measured is the organoleptic properties of curry sauce and chicken opor generated, which includes smoke flavor, aroma / odor of smoke, and preference as a whole. Furthermore, the data obtained statistically tested using analysis of Variance (ANOVA) to determine whether there is a difference between the panelists and assessment followed by a test DMRT (Duncan Multiple Range Test) if there is a real difference. Statistical analysis using SPSS 16. Results of sensory testing is then followed by chemical analysis.

RESULT AND DISCUSSION

Research Introduction

Determination Formula Seasonings

a. Curry Seasoning

Determination of the ready to eat pasta curry seasoning is done in two orientations to finally obtain the exact formula of spices to produce a curry sauce with a optimal taste. Spice formula is based on recipes from Ernawati, 1996. From prescription weight was obtained from each type of herbs and spices made into a paste, are solely due to the addition of chilli and turmeric recipe obtained from the color of the soup yet reddish yellow.

Table 1. Determination of formula ready to eat pasta curry seasoning

types of seasoning	recipe	weight (gram)
red onion	6 pieces	23,75
garlic	2 pieces	13,89
hazelnut	3 pieces	10,88
ginger	1 cm	1,70
turmeric	1 cm	6,28
coriander	1 tablespoon	2,59
cumin	1/4 teaspoon	0,78
klabet	1/4 teaspoon	1,08
nutmeg	1/4 teaspoon	0,70
fennel	1/4 teaspoon	0,76
tamarind	1 teaspoon	7,68
salt	1 teaspoon	7,67
chili	3 pieces	21,72
cardamom	4 pieces	0,43
galangal	1 cm	3,60
lemongrass leaves	1 sheet	9,07
bay	1 sheet	1,95
lime leaves	2 sheet	1,22
Total		115,75

In determining formulation of ready to eat curry powder seasoning is done by three times orientation until finally obtained the proper formulation of ingredients to produce curry sauce with a optimal taste. From each formula is then cooked with coconut milk as much as 1000 ml and tested to the limited panelists.

Table 2. Determination of curry powder seasoning Formula Ready to Eat

types of seasoning	I (gram)	II (gram)	III (gram)
red onion	2,61	5,22	5,23
garlic	4,18	8,36	8,36
hazelnut	10,04	20,08	20,08
ginger	0,45	0,90	0,90
turmeric	0,87	1,74	1,74
coriander	0,78	1,56	1,56
cumin	0,25	0,50	0,50
klabet	0,33	0,66	0,68
nutmeg	0,21	0,42	0,42
fennel	0,23	0,46	0,48
tamarind	1,10	2,20	3,30
salt	4,27	8,54	8,54
chili	0,13	0,26	0,28
cardamom	0,53	1,06	1,06

galangal	1,41	2,82	2,82
lemongrass leaves	0,69	1,38	1,38
bay	0,55	1,10	1,10
lime leaves	28,63	57,26	58,43

From the results of evaluation of the selected fast food seasoning curry powder on to a third orientation that could result in curry sauce with a flavor that fits.

b. Chicken Opor Seasoning

Proper formulation in the process of making smoke flavor seasoning chicken opor function to produce the most preferred flavor. Weighing in a formulation that is important to know the type and amount of ingredients needed opor. Determination of formula through several stages of orientation.

Table 3. Determination Formula Ready to Eat Pasta Seasonings opor

Types of Spices	**Orientation (grams)**			
	I	**II**	**III**	**IV**
Shallots	57.77	57.77	57.77	58
Garlic	16:59	6:59	6:59	6:59
Hazelnut	16:50	6:50	6:50	6:50
Ginger			1.84	8
Turmeric			2.77	5
Pepper	0.91	0.91	0.91	1
Coriander	0.87	0.87	0.87	0.87
Cumin	00:37	00:37	00:37	0.4
Galangal	5.60	5.60	5.60	5.60
Lemongrass leaves	1 stalk	8:16	8:16	11
Bay	2 LBR	2:01	2:01	2:01
Lime leaves			1:31	1:50
Brown sugar	17.72	20	20	26
Salt	12.63	11	11	16

The process of determining the right formula at the top through sensory testing is limited to determining flavor fast pasta seasoning opor most preferred by panelists.

In determining the formula paste opor seasoning, initially obtained orientation using a recipe from the internet. In order to taste the same formula on each test will be weighing the amount of each spice. Then, in orientation I taste sweet and salty in one liter of soup opor less appropriate. Furthermore, in orientation II, added salt and more sugar and spice leaves.

Idea appears to reverse the addition of seasoning leaf by taking the extract. The way the spices with a smooth leaf and then added water 50 ml. Then, extract the flavor leaves squeezed and filtered. The result is added at the time of extraction pemblenderan along with other spices.

At orientation III plus ginger, turmeric and lime leaves. Based on limited sensory test results showed that the flavor and aroma of spice pastes opor not fit so we need more orientation.

In the fourth orientation, the addition of some spices such as ginger, turmeric, pepper, lemon grass leaf, brown sugar and salt. Furthermore, limited sensory test carried out and obtained pasta with opor spice flavor and aroma that is appropriate. The comparison between the flavor with a sauce that is 1:8 (w / v).

Table 4. Determination Formula Powder Chicken Opor Seasoning

Types of Spices	**Recipe (Grams)**	**I (Grams)**	**II (Grams)**
Shallots	2.4	5:22	10:42
Garlic	2.4	4:13	8:26
Hazelnut	3 eggs	15:31	15:31
Ginger	-	1:35	1:35
Turmeric	-	0.62	1:24
Coriander	2.4	0.87	1.74
Cumin	0.8	0.4	0.80
Salt	10	16	16
Brown sugar	5	26	26
Galangal	1.6	1:22	2:44
Lemongrass leaves	1 stalk	1.95	1.95
Bay	2 sheets	0.80	0.80
Lime leaves	-	0.69	1:39
Pepper	-	1:00	2:00

Chicken opor seasoning flavor with formulation I are less tasty, just taste sweet and slightly salty. Orientation II done with some seasoning powder amount multiplied twice as onion, garlic, pepper, lime leaves, turmeric, coriander, cumin and galangal. Comparison of the amount of seasoning powder with a sauce that is 1:10 (w / v). Based on sensory evaluation test results obtained by flavor and aroma that is appropriate.

Liquid Smoke and Liquid Smoke Powder

3 kg of coconut shell was pyrolisated to produce liquid smoke as much as 1400 ml and 600 ml redistilled redestilat liquid smoke. While the manufacture of liquid smoke powder in this study by using liquid smoke as much as 300 ml then mixed with maltodextrin as much as 300 grams. Results of drying liquid smoke is liquid smoke powder as much as 264.8 grams so that the yield obtained from the crystallization is as much as ±44.13%. These results are similar to previous research conducted by Handayani (2004) which states that the yield resulting from the crystallization liquid smoke and maltodextrin as much as 50%.

Composition of Liquid Smoke and Liquid Smoke Powder

Table 5. The chemical composition and physical properties of liquid smoke and liquid smoke powder

Chemical composition	**Prosentase (%)**	
	Liquid Smoke	**Liquid Smoke Powder**
Fenol Acid Total Moisture Content	2,53 20,74 -	2,24 10,46 6,72
Physical Properties (odor)	Smoke specifique	Smoke specifique

The table above shows that the fraction of liquid smoke and the results redestilat liquid smoke powder, acid has a greater percentage compared with phenol. The percentage of such compounds in liquid smoke different amounts depending on the type of wood or raw material liquid smoke, component fiber base material, and pyrolysis temperature. Meanwhile, according Pszczola (1995), differences in chemical composition of liquid smoke is based on plant species, age and condition of the crop growth. Acid content of liquid smoke powder in this study were 10.46% and the liquid smoke at 20.74%. According Tranggono et.al., (1989) acid levels are several types of wood are made at 350-400^{0}C pyrolysis temperature ranged from 4.27-11.39%.

The average of phenol concentration in liquid smoke powder obtained from the analysis of 2.24% while 2.53% liquid smoke. Tranggono et.al., (2002) reported that levels of phenol in liquid smoke ranged from 2.10-5.13%. This results shows that the phenol content in liquid smoke powder and liquid smoke have very low levels.

This phenomenon can occur is possible because, although coconut shell is a hardwood that has a higher lignin content compared to other components, but the pyrolysis temperature affects the amount of decomposition of lignin compounds, namely phenol, which will be shipped in liquid smoke. Lignin will be decomposed into phenol at 350-450^{0}C, while the pyrolysis temperature in this study was 400^{0}C. Additionally redestilation temperature, ie 105^{0}C, is the temperature below the boiling point of phenol, phenol compounds which decompose during the distillation is not maximized, so not many who participated in redestilat phenol.

Moisture content in this study was conducted to liquid smoke powder using thermogravimetri. From the table shows that water content was 6.72% (wb). This shows that the moisture content is low.

Determination of Threshold Value

Threshold test used to determine the threshold value of the smoke flavor began to be perceived by the panelists. While the maximum test serves to determine the maximum proportion of liquid smoke and liquid smoke powder that can still be accepted by the panelists. According Draudt (1963), the threshold value of phenols from smoke condensate is 0.147 ppm to 0.023 ppm stimuli for taste and odor stimuli. This threshold value of phenos is used as the basis for determining the proportion of the addition of liquid smoke and liquid smoke powder in the threshold test.

a. Pasta Seasoning

Five kinds of variations in the concentration of liquid smoke added to ready to eat pasta curry and chicken opor seasoning.

Table 6. Scoring Threshold Panelists to pasta curry and chicken opor seasoning

Concentrations of Liquid Smoke (v/v)	Curry Spices		Chicken Opor	
	Smoke Smell	Smoke Flavor	Smoke Smell	Smoke Flavor
0%	2.00^{a}	2.83^{ab}	2.67^{ab}	2.67^{a}
0.015%	2.67^{ab}	3.33^{ab}	2.00^{a}	2.33^{a}
0.025%	2.33^{a}	2.50^{a}	2.33^{a}	2.67^{a}
0.035%	3.00^{ab}	3.17^{ab}	3.83^{a}	3.83^{a}
0.045%	3.67^{b}	4.17^{b}	3.33^{ab}	3.83^{a}

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Description:
(1) There is no smell / flavor of smoke
(2) Smell / flavor of smoke is very weak
(3) Smell / flavor of smoke is weak
(4) Smell / flavor of smoke is strong
(5) Smell / flavor of smoke is very strong

From the test results, indicating that the curry sauce, liquid smoke added at a concentration of 0.025% (v/v) and 0.015% (v/v) in opor sauce already can feel the flavor and aroma of the smoke by the panelists.

Furthermore, in addition to the threshold value also sought the maximum concentration values for the addition of liquid smoke in the ready to eat pasta seasoning. Initially tried 2 kinds of variations, namely the concentration of 0.5% and 1.0% (v/v). For 0.5% concentration, odor and taste of smoke from the curry sauce is thick and feels more concentrated again to 1% concentration, so that at this concentration sauce was more bitter and panelists felt sick and did not want to eat it. For the concentration chosen was 0.5% and two below the concentration, ie 0.4% and 0.3% for the panelists and get tested to the maximum concentration of liquid smoke to produce curry sauce that taste and smell of smoke was not liked by the panelists was 0.4% (v/v).

Table 7. Scoring panelists dislike of curry spice

Concentrations of Liquid Smoke (v/v)	Attributes	
	Smoke Smell	Smoke Flavor
0.3%	1.00[a]	1.33[a]
0.4%	2.33[b]	3.00[b]
0.5%	2.67[b]	3.00[b]

Description:
(1) Like
(2) Somewhat like
(3) Not Like

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Table 8. Scoring Panelist Dislike of Chicken Pasta Opor Seasoning

The proportion of Liquid Smoke	Smoke Flavor	The smell of smoke
0.5%	1.67 [a]	1.67 [a]
0.8%	**3:33 [a]**	**3:33 [a]**
0.9%	1.67 [a]	2.67 [ab]
1%	2.67 [a]	2.67 [ab]

Description:
1= Like
2 = Somewhat dislike
3 = Dislike
4 = dislike

Note: The superscript sign with letters that are not the same in one column, showed significantly different results (α = 5%).

In the table above, note that the test results of maximum smoke flavor seasoning paste opor found on the proportion of 0.8% (v / v). On the proportion of 0.8% (v / v) panelists can feel a sense of smoke, but the flavor that appears not smoke the expected sensation. Taste sensation that arises is saturated at the base of the tongue, tend to taste bitter, so this treatment is not received by panelis.Berdasarkan results can be concluded that the optimum proportion of smoke became unpopular taste panelists on the proportion of 0.8% (v / v).

The aroma is not liked by the panelists was the smell of smoke with the proportion of liquid smoke **0.8% (v / v).** The result of the assessment panel is due to the proportion of liquid smoke used is high enough so that the smell of smoke is very strong.

b. Powders Seasoning

Five kinds variations of concentration of the liquid smoke powder added to the ready to eat curry and chicken opor powder seasoning.

Tabel 9. Scoring Threshold Panelists against Curry & Chicken Opor Powder Seasoning

Concentration of Liquid Smoke Powder (b/v)	Curry Spices		Chicken Opor	
	Smoke Smell	Smoke Flavor	Smoke Smell	Smoke Flavor
0%	1.67[a]	2.50[a]	2.83[ab]	2.50[ab]
0.01%	2.83[ab]	2.83[a]	1.67[a]	1.67[a]
0.02%	2.67[ab]	2.67[a]	1.67[a]	1.83[ab]
0.03%	3.33[ab]	2.83[a]	3.33[b]	2.83[b]
0.04%	2.67[ab]	2.17[a]	2.50[ab]	2.50[ab]

Description:
(1) There is no smell / flavor of smoke
(2) Smell / flavor of smoke is very weak
(3) Smell / flavor of smoke is weak
(4) Smell / flavor of smoke is strong
(5) Smell / flavor of smoke is very strong

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

From the test results, indicating that the curry sauce, liquid smoke powder added at a concentration of 0.03% (w/v) have the smoke smell that can be perceived by the panelists, while for the smoke flavor can begin to be felt in the concentration of smoke powder 0.04% (w/v). As for the taste of chicken opor spice powder began to feel taste of smoke on the proportion of 0.01%. It is known that the lowest threshold smell of smoke began to be felt on the proportion of 0.01% (w / v).

Furthermore, to find the maximum concentration tested 2 kinds of variations, namely the concentration of 0.5% and 1.0% (w/v). For 0.5% concentration, odor and taste of smoke from the curry sauce is still acceptable by panelists at a concentration of 1% while the panelists have felt disgusted and did not want to eat it. For that the selected concentration is 0.1% and two below of the concentration, ie 0.9% and 0.8% for the panelists and get tested to the maximum concentration of liquid smoke to produce the smoke-flavored curry sauce, preferably no panelist was 1.0% (w/v) and to the smell of smoke at a concentration of 0.9% (w/v).

Table 10. Scoring Panelists Dislike of Powder Curry Seasoning

Concentration of Liquid Smoke Powder (w/v)	Atribute	
	Smoke Smell	Smoke Flavor
0.8%	1.75[a]	2.00[a]
0.9%	2.00[a]	1.75[a]
1.0%	2.00[a]	2.75[a]

Description:
(1) Like
(2) Somewhat like
(3) Not Like

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Table 11. Scoring Dislike of Panelist for Powder Chicken Opor Seasoning

Flour Concentration Liquid Smoke (w / v)	Atribute	
	Smoke Odor	Smoke Flavor
0.5%	1.75 [a]	2:00 [a]
1%	3:25 [a]	2.75 [a]
1.25%	**4:00 [a]**	**4:25 [a]**

In the spice powder chicken opor indicates that the test results for the proportion of maximum smoke flavor **1.25% (w/ v).** On the proportion of 1.25% (w / v) showed the highest value is **4:00,** which means not liked **[a]** panelist. On the proportion of 1% (w / v)

several panelists disliked the taste sensation of smoke that emerged but some panelists still able to receive it. Therefore, limit the maximum proportion can be increased until the proportion of 1.25% (w / v).

While the chicken opor spice powder showed displeasure at the smell of smoke panelist for the proportion of **1.25% (w / v).** On the proportion of 1.25% (w / v) showed the highest value is **4:25,** which means not liked [a] panelist. At this proportion is less like some panelists taste sensation that arise because of the smell of smoke generated smoke is very strong. Therefore, the limit on the maximum proportions opor chicken seasoning powder that is the proportion of 1.25% (w / v).

Sensory Analysis

- Curry Spices

Table 12. Preferrence Scoring Panelists to Curry Flavored Traditional Smoke

Sample	Smoke Smell	Smoke Flavor	Overall
Pasta			
0.10%	3.60[b]	3.28[ab]	3.30[ab]
0.15%	3.53[b]	3.40[b]	3.40[b]
0.20%	3.03[a]	2.95[ab]	3.05[ab]
0.25%	3.00[a]	3.08[ab]	3.00[ab]
0.30%	2.73[a]	2.83[a]	2.90[a]
Powder			
0.12%	3.38[c]	3.08[c]	3.08[b]
0.32%	3.30[c]	2.95[bc]	3.13[b]
0.52%	2.73[b]	2.65[abc]	2.83[ab]
0.72%	2.25[a]	2.50[ab]	2.45[a]
0.92%	2.43[ab]	2.30[a]	2.475[a]

Description:
(1) Very Dislike
(2) Dislike
(3) Neutral
(4) Like
(5) Very Like

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Table 13. Scoring Difference Testing of Traditional Curry Flavored Smoke

Sample	Smoke Smell	Smoke Flavor
Pasta		
0.10%	2.33[a]	2.13[a]
0.15%	2.18[a]	2.35[a]
0.20%	3.20[b]	2.98[b]
0.25%	3.73[c]	3.93[c]
0.30%	4.00[c]	3.93[c]
Powder		
0.12%	2.25[a]	2.18[a]
0.32%	2.75[b]	2.80[b]
0.52%	3.38[c]	3.38[c]
0.72%	3.90[d]	3.88[cd]
0.92%	4.33[d]	4.13[d]

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Description:(
1) The smell and taste of smoke is very weak
(2) The smell and taste of smoke is weak
(3) The smell and taste of smoke is a bit stronger
(4) The smell and taste of smoke is strong
(5) The smell and taste of smoke is very strong

Smoke Smell

From this table, average the second batch can be seen that the highest value favorite panelist of smoke smell/ aroma from ready to eat curry paste seasoning that added with the liquid smoke at a concentration of 0.10% (v/v), so that from the five samples of the scent of curry sauce panelists most preferred smoke at a concentration of 0.10% (v/v). However, panelists at a concentration level of delight the addition of liquid smoke 0.10% and 0.15% (v/v) did not significantly different.

The apparent difference between curry sauce with concentration of liquid smoke 0.10%, and 0.15% (v/v) with 0.20%, 0.25%, and 0.30% (v/v). From the results of preference test indicated that panelists prefer a curry sauce with a low concentration of liquid smoke that is below 0.20% (v/v). The higher concentration of liquid smoke, the panelist's favorite level goes down, this proved to panelists gave a lower value. This is also supported by the results of the test scoring differences that the higher concentration of added liquid smoke, flavor/ odor of smoke generated stronger. The smell of smoke generated from the addition of liquid smoke 0.10% (v/v) did not significantly different with the concentration of 0.15% (v/v) but significantly different with three concentration on it. The stronger the smell of smoke is detected by the panelists, the level of preference of panelists decreases.

For the ready to eat powder seasoning, the highest score of panelists to smoke smell in a curry sauce that whit added the liquid smoke powder at a concentration of 0.12% (w/v), so that from the five samples of curry sauce is the most preferred smoke flavor panelists at a concentration of 0:12 % (w/v). However, the level of flavor panelists favorite in curry sauce at a concentration of 0.12% was not significantly different with the concentration of 0:32%, but significantly different with the concentration of 0.52%, 0.72% and 0.92% (w /).

From the results of preference test indicated that panelists prefer a curry sauce with concentration of liquid smoke powder is low, under 0.32% (w/v). The higher concentration of liquid smoke powder then progressively decreasing level of panelist's favorite, this proved to panelists gave a lower value. This is because the smell of smoke is produced will get stronger and sharper. This is also supported by the results of the test scoring differences that the higher of the concentration of added liquid smoke, flavor/ odor of smoke generated stronger. The smell of smoke generated from the addition of liquid smoke 0.12% (w/v) significantly different with other concentrations. The stronger the smell of smoke is detected by the panelists, the level of preference of panelists decreases.

Smoke Flavor

From the table it can be seen that the highest value of the panelist's favorite smoke flavor from the paste seasoning in curry sauce with a concentration of 0.15% (v/v), so that from the five samples of curry sauce is the most preferred smoke flavor panelists at a concentration of 0.15% (v/v). However, the smoke flavor panelist’s favorite level of curry sauce at this concentration did not differ significantly with the concentration of the other four.

From the results of preference test indicated that panelists prefer a curry sauce with a low concentration of liquid smoke was the concentration below 0.25% (v/v). The higher concentration of liquid smoke, the panelist's favorite level goes down, this proved to panelists gave a lower value. This is also supported by the results of the difference test’s scoring that the higher concentration of added liquid smoke, flavor/ odor of smoke generated stronger. The smell of smoke generated from the addition of liquid smoke 0.10% (v/v) did not differ significantly with the concentration of 0.15% (v/v) but significantly different with three concentration on it. The stronger smell of smoke is detected by the panelists, the level of preference of panelists decreases.

For ready to eat curry powder, the highest value preferences of panelists for smoke flavor is in a curry sauce that added liquid smoke powder at concentration 0.12% (w/v), so that from the fifth sample was panelists most preferred of the smell of smoke with concentration of 0.12% (w/v). However, the level of smoke flavor favorite panelist of curry sauce at this concentration did not differ significantly with the concentration of 0:32% (w/v), and significantly different with the three other concentrations.

From the results of preference test indicated that panelists prefer a curry sauce with concentration of liquid smoke powder is low at concentrations below the 0.32% (w/v). The higher concentration of liquid smoke powder then progressively decreasing level of panelist's favorite, this proved to panelists gave a lower value because the resulting smoke flavor will get stronger and sharper, causing a bitter aftertaste. Thus it can be seen that the panelists preferred the low smoke flavor. This is also supported by the results of the difference test's scoring that the higher of the concentration of added liquid smoke powder, the flavor/ odor of smoke generated stronger. The smell of smoke generated from the addition of liquid smoke powder 0.12% (w/v) differ significantly with other concentrations. The stronger of the smell of smoke's detected by the panelists, the level of panelist's preference decreases.

Overall Liking

From the table it can be seen that the highest score overall liking from panelist of the ready to eat curry pasta, which added to the liquid smoke at a concentration of 0.15% (v/v), so that the overall liking from panelists from the fifth sample was at the concentration of 0.15% (v/v). However, the overall level of panelist's favorite from curry sauce at this concentration did not differ significantly with the concentration of the other four.

From the results of preference test indicated that panelists prefer a curry sauce with a low concentration of liquid smoke was the concentration below 0.25% (v/v). The higher concentration of liquid smoke, the panelist's favorite level goes down, this proved to panelists gave a lower value.

For ready to eat curry powder, the highest value of overall liking from panelists was for smoke flavor in a curry sauce that added liquid smoke powder at concentration 0.32% (w/v), so that from the fifth sample, panelists liked the overall flavor of smoke at a concentration 0.32% (w/v). However, the overall level of panelist's favorite smoke curry sauce at this concentration did not differ significantly with the concentration of the other four.

- Chicken Opor Seasoning

Tabel 14. Scoring Preferent Test of Traditional Chicken Opor with Smoke Flavored

Sampel	Smoke taste	Smoke odor	Overall
Pasta			
0.1%	3.32^{c}	$\mathbf{3.72^{d}}$	$\mathbf{3.60^{c}}$
0.25%	$\mathbf{3.35^{c}}$	3.45^{cd}	3.42^{bc}
0.4%	2.77^{b}	2.90^{b}	3.02^{b}
0.55%	3.10^{bc}	3.12^{bc}	3.02^{b}
0.7%	2.05^{a}	2.20^{a}	2.30^{a}
Bubuk			
0.2%	$\mathbf{3.80^{b}}$	$\mathbf{3.67^{c}}$	$\mathbf{3.80^{b}}$
0.4%	3.62^{bc}	3.35^{bc}	3.70^{b}
0.6%	3.52^{b}	3.37^{bc}	3.62^{b}
0.8%	2.90^{a}	3.07^{b}	2.92^{a}
1 %	2.55^{a}	2.57^{a}	2.65^{a}

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different (α = 5%)

Description:
Testing Interests:
(1) It's Not Like (4) Like
(2) Not Like (5) It's Like
(3) Neutral

Table 15. Scoring Different Test of Traditional Chicken Opor with Smoke Flavored

Sampel	Smoke odor	Smoke taste
Pasta		
0.1%	1.75^{a}	1.75^{a}
0.25%	**3.22^{b}**	**2.92^{b}**
0.4%	3.92^{c}	3.95^{c}
0.55%	3.70^{bc}	3.95^{c}
0.7%	4.55^{d}	4.55^{d}
Bubuk		
0.2%	**2.15^{a}**	**2.02^{a}**
0.4%	2.67^{a}	2.70^{b}
0.6%	3.32^{b}	3.52^{c}
0.8%	4.05^{c}	3.97^{cd}
1%	4.42^{c}	4.32^{d}

Note: The superscript sign with letters that are not the same in the same column indicate results significantly different ($\alpha = 5\%$)

Description:
Differentiation Test:
(1) The smell and taste of smoke is very weak
(2) The smell and taste of smoke weak
(3) The smell and taste a bit stronger smoke
(4) strong smoke smell and taste
(5) The smell and taste of smoke is very strong

Smoke Flavor

Taste panelists most preferred is a variation of chicken opor spice paste flavors with smoke and liquid smoke proportion of **0.25% (v/ v).** There is no real difference with the proportion of 0.1% (v / v), but for effectiveness we used the proportion of 0.25% (v / v) as a proportion of the optimum. Selection of a higher proportion in order to have antioxidant and antimicrobial higher as well. Compounds in liquid smoke that act as antimicrobial namely phenol. The proportion of 0.25% (v / v) have a higher durability and can cope with loss of smoke flavor to flavor chicken opor if prolonged storage.

Mechanism of phenolic compounds in killing microbes is the reaction between acid fenoleat with protein (in this case, microbes. In enzymatic conditions in the presence of enzymes that work naturally fenolase at neutral pH, acid fenoleat oxidized to quinones that can react with the lysine of the protein that causes these proteins can not be used in biological (Hurrell, 1984).

According Wastono (2006), liquid smoke *(liquid smoke)* may be used as a preservative because of the acid compounds, phenolic and carbonyl who have the ability to preserve food such as meat, fish, noodles, food seasonings and meatballs.

A higher proportion of liquid smoke contains higher as well. Liquid smoke contains components that are bakteristatis and bactericidal which can act as a preservative. This can happen if the smoke settles on the surface or seep into the material of smoked (Winarno, 1981). Compounds that very act as antimicrobials are compounds of phenol and acetic acid, and its role is increasing when there are two compounds together (Darmadji, 1996). Besides phenol, aldehyde compounds, acetone and ketones also has bacteriostatic and bakteriosidal power on smoke products. Girrard (1992) states that the smoke in the form of liquid affect the overall amount of smoke in smoke condensate, which reached 40% with 35 types of acid.

Volatile acid content in the smoke will decreased the pH, thus slowing the growth of microorganisms (Buckle *et al.*, 1985).

There are real differences in the proportion of 0.4%, 0.55% and 0.7% (v/v). Chicken opor seasoning with the proportion of 0.4% liquid smoke shows tend neutral rating, while the proportion of 0.55% preferred near neutral to the panelists so that is still acceptable by the panelists. Then, on the proportion of 0.70% (v / v) showed an unwelcome rating panelists. Therefore, concluded the optimum taste of smoke on the proportion of variation 0.25% (v/v). From the results of the most *high-scoring* flavor obtained a mean value of **3.35** ^{c} panelists liked sample chicken opor seasoning with proportion of liquid smoke 0.25% (v/v).

For powder fast food seasoning, the highest value preferences of panelists to smell smoke powder chicken opor seasoning with liquid smoke proportion of 0.2% (w/v) have a sense of smoke with the highest score of **3.80** ^{b} which means that panelists liked. It is known that panelists tend to like spice powder opor smoke flavor with a range of proportions of 0.2% -0.6% (w/v) with panelists on the product's favourite powder chicken opor seasoning not significantly different. While the proportion of 0.8% and 1%, which is significantly different panelists prefer less preferred. The proportion of 0.2% (w/v) was chosen as the optimum proportion because it is more efficient and economical.

The correlation between preference test results and different test results to the taste of smoke indicates that panelists prefer the taste of smoke with a low intensity. Based the result of different test above, it can be seen the proportion of the addition of liquid smoke to taste panelists affect the assessment of smoke. The greater proportion of the addition of liquid smoke and liquid smoke, the taste of flour produced stronger smoke too. On the table shows that chicken opor paste seasoning with the addition of liquid smoke proportion of 0.25% and 0.2% for the proportion of powder is the preferred product, but with low smoke flavor intensity.

The smell of smoke

Variations chicken opor pasta seasoning which showed the highest value of smoke odor and flavor of liquid smoke is the proportion of 0.1% with a value of **3.72**^{d}. However, the value is not significantly different with variations in the proportion of 0.25% (v / v) whose value is **3.45**$^{cd.}$ In consideration of antioxidant properties and durability of products like the taste of smoke, the chosen variation of the proportion of 0.25% (v / v) as a optimum proportion.

In the panelist's favourite scoring for powder chicken opor seasoning seen the highest score for the proportion of 0.2% (w/v) with a value of **3.67**^{c} which indicates neutral rather liked. On the proportion of 0.4% (w/v) with value 3.35^{bc} and 0.6% (w/v) with value 3.37$^{bc.}$ These results are not significantly different from the proportion of 0.2% (w/v). While the proportion of 0.8% (w/v) 3.07^{c} is not significantly different from the proportion of 0.4% and 0.6% (w/v). Then, the proportion of 1% (w/v) tend to be neutral is not favored with 2.57^{a} score.

Based on the correlation of preferrence test results and the different test results of the favourite shows that panelists prefer the smell of smoke with a low intensity of 0.25% on the spice paste and 0.2% for powder seasoning. Meanwhile, the strong scent of smoke less preferred panelists.

Overall

Overall, the panelists showed the highest rating in the sample that is **3.60** chicken opor pasta seasoning flavored with smoke and liquid smoke variation 0.1% (v/v) with neutral rather liked scoring. There is no real difference with the proportion of 0.25% (v/v), which the value is **3.42** ^{bc} or neutral rather liked. With consideration of the higher addition of liquid

smoke can produce high antioxidant, so the chosen proportion of 0.25% (v/v) as a optimum proportion. For the proportion of 0.4% and 0.55% (v/v) 3.02^{b} which means the scent is still accepted by the panelist. While the proportion of 0.7% (v/v), the panelists gave score 2.30^{a}, which means taste and smell strong smoke flavor is less preferred.

Panelists showed the highest rating in the sample that is **3.80^{b}** powder chicken opor seasoning with liquid smoke variation of 0.2% (w /v) with scoring tends to prefer. There is no real difference to the proportion of value 0.40% and 0.60% ^{b} 3.70 (w/v) 3.62 ^{b} with a neutral score rather liked. While the proportion of 0.8% with value 2.92^{a} and 1% (w/v) the value 2.65^{a} significant difference that is less favored by panelists. With the addition of liquid smoke economical considerations, the chosen proportion of 0.2% (w / v) as a optimum proportion. Making powder chicken opor seasoning used drying so that has higher operating costs.

Chemical Composition

Determination of Phenol and Total Acid

Determination of phenol content and total acid was to determine the components of liquid smoke flavor in the form of components phenolytic and acid compounds were absorbed into the product and its influence on the panelist's favorite.

- Curry Spices

Table 16. Results Analysis of Phenol and Total Acid Curry Spices

Sample	Concentration	Prosentage (%)	
		Phenol Content	Total Acid
pasta	0% (v/v)	1.65	2.63
	0.15% (v/v)	2.69	3.09
	0.30% (v/v)	3.13	4.77
powder	0% (b/v)	3.40	1.44
	0.12% (b/v)	4.20	2.04
	0.92% (b/v)	5.24	3.29

Phenol content in the paste seasoning without the addition of liquid smoke is 1.65%. While the phenol content in the spice paste with liquid smoke's concentration 0.15% (v/v) and 0.30% (v/v) respectively 2.69% and 3.13%, higher than the levels of phenol in smoke liquid itself, ie 2.53%. Similarly, the phenol content in the seasoning powder, powder seasoning without the addition of liquid smoke powder amounted to 3.40%. While the phenol content in the seasoning powder with liquid smoke powder's concentration 0.12% (w/v) and 0.92% (w/v) respectively for 4.20% and 5.24%, higher than the levels of phenol in liquid smoke powder itself, which is equal to 2.24%. This suggests that the seasoning paste and powder itself already contains phenolic compounds.

From the results table is also known that the higher of the concentration's use of liquid smoke to ready to eat paste seasoning or use of liquid smoke powder on ready to eat seasoning powder, then the phenol content and total acid will increase as well. Total phenol content of this acid effects on the flavor of spices produced, where Girard (1992) mentions that the phenol compounds known as the major constituents that play a role in the formation of flavor in the product and according Darmadji (1996) acid plays an important role in the organoleptic assessment on the product as a whole. More phenol and total acids contained in the material then the smoke flavor will be felt increasingly. When connected with the results of sensory analysis, the greater of uses the concentration of liquid smoke and liquid smoke powder, panelists favorite value decreases. It means that the higher phenol content and total

acid contained in the material, the value of the panelist favourites goes down because the smoke flavor is very pronounced and can give a bitter after taste.

- Chicken Opor Seasoning

Tabel 17. Results Analysis of Phenol and Total Acid Chicken Opor Seasoning

Sample	Concentration (%)	Percentage (%)	
		Phenol	Acid Total
Pasta Seasoning (v/v)	0	2.56	1.62
	0.25	2.63	2.00
	0.70	3.14	2.78
Powder seasoning (b/v)	0	1.86	1.99
	0.20	1.91	2.19
	1	2.77	2.59

From Table 17, we know that there is an increase of phenol content control pasta and powders seasoning without smoke into pasta and powder seasoning smoke flavor. The increase in phenol content was related to the use of liquid smoke 0.25% (v / v) on addition of flour paste and smoke 0.2% (w / v) of spice powder. This proves that the engineering process, adding smoke flavor can raise the level of phenol in the product but can still be accepted by consumers.

Phenolic compounds is very important in determining the quality of liquid smoke and material treated with liquid smoke. This is because phenol role in contributing to produce specific smoke flavor (Dugan, 1976). Based the table 4.13 seen that the more addition of liquid smoke and liquid smoke powder causing the higher of phenol content. The increase in phenol content was contribute the decrease of panelists preferrence in opor seasoning products for either in the form of powder or paste.

Acids derived from liquid smoke and powder liquid smoke products shipped to chicken opor seasoning. This was a favorite cause panelist to be reduced. Overall seen that the more total acid content in the product ingredients opor then decline favorite panelists.

Proximate Analysis

Table 18. Proximate Analysis Results of Ready to Eat Curry Spice

Sample	Component	Content (%wb)	Content (%db)
Pasta 0.15%	Moisture	58.12	129.01
	Fat	12.06	28.78
	Protein	5.65	13.49
	Total Sugar	6.36	15.19
	Reduction Sugar	2.33	5.57
Powder 0.12%	Moisture	8.75	9.61
	Fat	9.73	10.64
	Protein	25.17	27.58
	Total Sugar	7.91	8.67
	Reduction Sugar	4.94	5.42

Tabel 19. The Proximate Analysis Ready to Eat Chicken Opor Seasoning

Sample	Component	Content (%wb)	Content (%db)
Pasta Seasoning 0,15%	Water	37.11	59.00
	Fat	10.59	16.84
	Protein	5.71	9.08
	Total sugar	9.77	15.54
	Sugar Reduction	2.61	4.15
Powder Seasoning 0,12%	Water Levels	7.80	8.46
	Fat	5.20	5.63
	Protein	12.98	14.08
	Total sugar	19.57	21.23
	Sugar Reduction	2.65	2.87

Moisture Content

From the above table is known that the moisture content in curry paste amounted to 58.12% (wb) or 129.01% (db) and the curry powder s of 8.75% (wb) or 9.61% (db). While for the chicken opor pasta seasoning 37.11% (wb) or 59% (db) and powder of 7.8% (wb) or 8.46% (db). According to Hambali (2009) the water content of dried herbs is less than 8%.

In the spice paste, the frying process during processing can cause a decrease in water content and the spice powder, a decrease of water content occurs during the drying process of each type of seasoning. Drying is a process of removal of water from a dried material. This omission includes two stages, namely transfer of material to the surface and the stage of water evaporation from the surface to the atmosphere (Van Arsdel, 1963).

This low water content can extend shelf life because water can help prevent the destruction of food such as the microbiological, chemical, and enzymatic material by the presence of insect activity.

Fat Content

It is known from the calculation that the fat content in the curry spice paste is quite high ie 12.06% (wb) or 28.78% (db). The high fat content found in the curry spice paste is highly influenced by the oil absorption process during frying. Fat contained in the material, eg ginger rhizome only by 1.0%, 0.3% fresh red chilli, red onion 0.3%, 0.2% garlic, tamarind 0.6% (Anonim[1], 1981) and turmeric rhizome 2.7% (Thomas, 1995) so that the high content of fat in curry spice pastes due to the absorption of oil during frying. During the frying process occurs transfer cooking oil from the frying pan into the products and become a component of the product (Heid and Joslyn, 1967).

While the calculation of fat content in the curry spice powder which is 9.73% (wb) or 10.64% (db). Fat content of chicken opor seasoning paste of 10.59% (wb) or 16.84% (db). While the calculation of fat content in chicken opor seasoning powder that is 5.20% (wb) or 5.63% (db). The presence of fat in the powder tends to be a barrier against water absorption process and will reduce the tendency of granules to swell. When high levels of fat in the powder can affect the quality of ingredients during the storage process because of the high fat content in the material causes the material will be more easily damaged and rancid.

Protein Content

Protein content in the curry spice paste was 5.65% (wb) or 13.49% (db). Protein content in these products is the result of contributions from ginger rhizome with a protein content of 2.0%, 1.0% fresh red chilli, red onion 1.5%, 4.5% garlic, tamarind 2.8% (Anonim2 , 1972), and turmeric 2% (Thomas, 1995) contained in the product. While the protein content from curry spice powder is about 25.17% (wb) or 27.58% (db). In the chicken opor spice paste, protein content is 5.71% (wb) and the powder as much as 12.98% (wb).

The existence of heat treatment, such as frying and drying during processing make quality of protein in the product decreases. Heating resulted in a decrease of total amino acids, especially lysine, tryptophan, cysteine, and histidine. The higher temperatures are used, then the total amino acids will further go down (Badenhop and Hackler, 1971). Heating process carried out during the making of spice paste is frying, while in the manufacture of spice powder is drying with a cabinet dryer. Frying temperature is higher than the temperature of drying with the cabinet dryer, so the decrease in total amino acids greater.

The amount of protein content in the powder will have much effect on the functional properties of powders, especially the absorption of water. According to Kinsella (1976), high protein content will increase the ability of the material to absorb water because in general the protein has a hydrophilic group capable of binding water. So spice powder is easier to be clouding when stored in conditions that are not good.

Total Sugar and Reduction Sugar

Total sugar content found in curry spice paste is 6.36% (wb) or 15.19% (wb) and reducing sugar content of 2.33% (wb) or 5.57% (db). While the total sugar content in currry spice powder is about 7.91% (wb) or 8.67% (db) and reducing sugar content of 4.94% (wb) or 5.42% (db).

Total sugar content in the seasoning pasta chicken opor is 9.77% (wb) or 15.54% (wb) and reducing sugar content of 2.61% (wb) or 4.15% (db). In the spice powder chicken opor, total sugar content is about 19.57% (wb) or 21.23% (db) and sugar reduction content 2.65% (wb) or 2.87% (db).

From the results it is known that both the ready to eat paste and powder seasoning contain more sugar reduction when compared with non-reducing sugar.

Prototype Packaging

The uses of aluminum foil as a packaging material because of the aluminum foil is airtight packaging materials and light-tight so that the packaging is expected to spice powder that not easy clouding and spice pastes did not experience oxidation. Another function is to protect the existing one component of the spice that are phenol components which influence the flavor. Phenol is an important component that can provide the smoke flavor in the seasoning and phenol are sensitive to light and temperature, the presence of aluminum foil packaging was then phenol present in condiments can be protected.

Prototype packaging for spices powder and pasta measuring 13 cm x 12 cm (length x width) with the front containing the brand, net, and halal label while the back contains a list of compositions, serving suggestions, nutritional information, production code, barcode, and the names and addresses of companies that produce.

Conclusion

1. Precise formulation curry spice is obtained on the orientation I in spice pastes and in orientation III in spice powder. While the chicken opor seasoning paste is obtained on the orientation IV and powder in orientation II.

2. Threshold of smell and smoke flavor of liquid smoke obtained by the curry seasoning paste are 0.025% (v/v) and 0.04% (w/v). While the threshold chicken opor seasoning pasta on the proportion of 0015% (v/v) and chicken opor spice powder with the proportion of 0.01% (w/v). Maximum proportion of curry spice paste in 0.4% (v/v), and for powder 1.0% (w/v). While the maximum proportion of the less favored panelist on seasoning pasta chicken opor ie 0.8% (v/v) and then to spice powder chicken opor with the proportion of 1.25% (w/v).

3. Optimum addition of liquid smoke at a concentration of 0.15% (v/v) in the ready to eat curry paste seasoning and 0.25% (v/v) for opor chicken paste seasoning, while the addition of liquid smoke on ready to eat curry powder seasoning at a concentration of 0.12% (w/v) and 0.2% (w/v) forchicken opor powder seasoning.

Suggestion

1. Not knowing the influence of cooking time to the addition of liquid smoke and liquid smoke powder in spice curry powder and pasta ready meals, so we need further research.

2. Engineering addition of liquid smoke and liquid smoke powder on the ready to eat seasnoning produced by different water content, so the shelf life was different, it is necessary to conduct further research to determine the shelf life of products.

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