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Characteristics of Chicken Sausage Treated with Using Tofu Dregs Waste

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***Abstract*— Tofu dregs flour serve the purpose of addition-agent in sausage making, as a whole sausage yielded to accept SNI 01-3820-1995. Usage of tofu dregs flour which more and more causing protein rate to increase, so do usage of sago flour will increase carbohydrate rate. Acceptable and best composition of panelist is treatment D = chicken flesh 75% : sago flour 15% : tofu dregs flour 10%. Best sausage characteristic and panelist is with water content 66,71%, fat rate 3,54%, ash content 1,74%, protein rate 13,91%, carbohydrate rate 14,10%, cooking yield 76,24%, juiciness 22,78%, reduction diameter -1,85%, reduction thickness 3,63%, folding test 4,67%.**

***Keywords*— Chicken Sausage; Tofu Dregs Waste; Tofu Waste.**

I. INTRODUCTION

Tofu dregs still contains 27g protein, 41.3 g carbohydrates, it is possible to be reused into ketchup, tauco, flour can be used in the manufacture of a variety of foods (cookies, cakes, side dishes, crackers, etc.). In making cakes and a variety of food, the use of tofu gregs fluor can be substituted into the grain. Use flour as an ingredient substitute tofu dregs has benefits such as wheat produces a product that still has nutritional value and economic value and to avoid pollution of the environment (Ministry of Environment, 2006).

Potential high tofu dregs, soy beans in Indonesia was recorded in 1999 as 1,306,253 tons, while West Java as much as 85,988 tons. When 50% of soybeans are used to make tofu and soy conversion into pulp out of 100-112%, then the amount of tofu 731,501.5 tonnes recorded nationally and 48,153 tons in West Java (Ministry of the environment, 2003).

Tofu dregs also contains mineral elements namely micro and macro to micro; 200-500 ppm Fe, Mn 30-100 ppm, 5-15 ppm Cu, Co less than 1 ppm, more than 50 ppm Zn (Sumardi and Patuan, 1983). In addition to having a good nutritional content, tofu dregs also has antinutrisi form of phytic acid that would interfere with the absorption of minerals valency 2 is mainly mineral Ca, Zn, Co, Mg, and Cu, so need to be careful (Cullison, 1978).

Tofu dregs flour can be used as an ingredient in the manufacture of sausage, because it still contains enough good nutritional value. Sausage is a processed meat products are now gaining popularity in the community, especially children. Sausage processing was originally developed by the four seasons, which aims to preserve, so they do not lack meat for the winter.

The purpose of this study is 1). Knowing whether tofu dregs flour can be used as an additive in the manufacture of sausage, 2). Knowing the composition of the optimal tofu dregs flour in the manufacture of sausage, 3). Knowing the characteristics of the resulting sausages, 4). Knowing the composition of the sausages were acceptable to consumers and meet ISO standards. While the benefits of this research are 1). Prevent environmental pollution caused by sewage pollution processing know, 2). Utilizing food waste into a source of protein, 3). Produces sausages that high nutritional value and more economical.

II. MATERIALS AND METHODS

The research was conducted in July through October 2012 housed in the laboratory of Agricultural Chemistry and Biochemistry of Agricultural Technology Studies Program, Faculty of Agriculture, University of Andalas Padang. The design of this study is to use a completely randomized design with treatments chicken mixture composition: sago starch tofu dregs flour with three replications. The details of treatment are:

A = Meat Chicken 75% :Sago starch 8% : tofu dregs flour 17%
B = Meat Chicken 75%: Sago starch 10 % : tofu dregs flour 15%

C = Meat Chicken 75% : Sago starch 12.5% : tofu dregs flour 12.5%
D = Meat Chicken 75%: Sago starch 15% : tofu dregs flour 10%
E = Meat Chicken 75% : Sago starch 17% : tofu dregs flour 8%

A. Observation

1. Moisture content (AOAC, 1995)
2. Fat content (AOAC, 1995)
3. Ash content (AOAC, 1995)
4. Micro-Kjeldahl method of protein content (AOAC, 1995)
5. Carbohydrate content (total)
6. Cooking yield

TABLE I
PROXIMATE ANALYSIS SAUSAGE

Treatment	Water Content (%)	Fat Content (%)	Protein Content (%)	Ash Content (%)	Carbohydrate Content (%)
A	71,18	4,81	15,03	1,41	7,57 a
B	66,39	3,52	14,15	1,99	13,95 b
C	67,60	3,35	13,81	1,59	13,65 b
D	64,54	3,02	13,85	1,83	16,76 c
E	63,82	3,01	12,70	1,88	18,59 c
Average	66,71	3,54	13,91	1,74	14,10

Numeral at the same columns followed by the same lower case different not real at level 5% according to DMNRT

III. Results And Discussion

Average water content of 66.71% National Standard Indonesia 01-3820-1995 meet the maximum water content of 67.0%, only treatments that exceed the requirements of ISO A is 71.18% and further decreased to treatment E is 63.82%. This is influenced by the number or percentage of use tofu dregs flour, the higher the percentage the higher tofu dregs flour sausages produced water content. In line with tofu dregs flour protein content is relatively high so that is hygroscopic or ability to bind water. According Tamtarini and Yuwanti (2005) cit Alkhaufa (2008) contains a lot of protein and fiber hydrophilic groups capable of binding water.

According to National Standard Indonesia 01-3820-1995 sausage fat content up to 25%. Table 1 illustrates that the fat content of sausages produced to meet these standards, as is required under the fat content. Where the highest fat content found in treatment A with tofu dregs flour highest percentage is 4.81% and the lowest percentage of flour lowest tofu. This means that the higher the percentage of tofu dregs flour was added the higher the fat content of the output, fat content sausages affected by the fat content of tofu dregs flour, although not statistically significantly different.

The average protein content of National Standard Indonesia 01-3820-1995 Sausage meet the minimum of 13.0%. Only the treatment of E that do not meet the National Standard Indonesia 01-3820-1995 which is only 12.70%. The more the composition of tofu dregs flour then the higher protein content. This is due to the contribution of protein from tofu dregs flour were varied. Proteins in this aktomiosin a primary emulsifier in emulsion sausages. According Kramlich (1973) phase of water in the dough sausages protein will form a matrix surrounding the fat and form a stable emulsion. Because it is the sausage mixture in water-oil emulsions formed in the colloidal phase, and a protein that acts as an emulsifier.

Ash content interpret for the amount of minerals contained in the sausage. These include salt added or additional materials in the manufacture of sausages than the main ingredient. Mineral content contained in tofu dregs flour is low resulting in low levels of ash produced sausages, although tofu dregs flour is not the only source of minerals in the manufacture of sausages. The minerals that may be present in the sausages are metallic minerals, such as calcium, phosphorus, and iron.

Carbohydrate content (by different) is calculated by subtracting 100 with water content, fat content, protein content and ash content. High levels of carbohydrate derived from sago starch carbohydrate is used, because the higher the percentage the higher levels of sago starch carbohydrate derived. While the treatment of tofu dregs flour no significant impact because the levels of carbohydrates in the tofu dregs flour is relatively low. According to (Suherman, 2009) sago flour is rich in carbohydrates (starch), but poor in other nutrients, which in a 100 g contained 94 g carbohydrate. However, treatment A still meet the National Standard Indonesia 01-3820-1995 ie a maximum of 8%, which the carbohydrate levels gained 7.57%.

B. Cooking yield

Cooking is one of the parameters Yields reception quality of cooking in which the absorption of water absorbed is expressed in g H2O/g sausage. Value Cooking Yields increased along with the increase in the number of sago starch. Cooking yield shows the results after the cooked sausage manufacture. Cooking the results, the average yield ranged from 74.25 to 77.62%. Of variance test was found that the effect of the treatment effect is not significant to the total yield cooking sausages. The results are presented in Table 2 below.

TABLE II
EFFECT OF MIXTURE COMPOSITION CHICKEN: SAGO FLOUR: WHEAT PULP COOKING KNOW THE YIELD SAUSAGE

Treatment	Cooking Yield (%)
A	74,25
B	75,29
C	76,56
D	77,49
E	77,62
Average	76,24

Numeral at the same columns followed by the same lower case different not real at level 5% according to DMNRT

Table 2 shows that the larger the cooking yield by increasing the amount of sago starch composition. This could be due to water absorption greater in treatment E compared with other treatments. In accordance with the

opinion of Charles et al (2008) and Inglet et al (2007) in Jeni (2012) increased the amount of hydrocolloid or polysaccharides will improve cooking yields. But because the protein also have water holding capacity at the different results are not significant, with the addition of the percentage of sago starch followed by a reduction in the percentage of tofu dregs flour and vice versa. Both materials are rich in different components, namely carbohydrates for sago starch and wheat protein to tofu dregs.

C. Juissness

Juiciness of the meat-based products are affected by the water content remains in the material after it is cooked. Observations juiciness of the sausage obtained ranged from 20.87 to 23.86%. Based on the analysis of variance test is known that the effect of the treatment effect is not significant to the total juiciness of sausages. The results are presented in Table 3.

TABLE III
EFFECT OF MIXTURE COMPOSITION CHICKEN : SAGO FLOUR: TOFU DREGS FLOUR AGAINST THE JUICINESS SAUSAG

Treatment	Juiciness (%)
A	20,87
B	22,09
C	23,53
D	23,55
E	23,86
Average	22,78

Numeral at the same columns followed by the same lower case different not real at level 5% according to DMNRT

Table 3 shows that increasing the percentage of sago starch is added, juiciness sausages produced greater, meaning sausage contains a lot of water caused hygroscopic properties of sago. Besides proteins also play a role in the binding of water, in this case the variation of the contribution given by the flour protein tofu, resulting in juiciness was not significantly different from each treatment. This is in line with the cooking yield similar results, because both are influenced by the ability to bind water.

D. Reduction in Diameter and Reduction in Thickness

Observation of the Reduction in Diameter and Reduction in Thickness ranges from (-1.47) - (-3.04)% and 2.93 to 4.72%. Of variance test was found that the effect of the treatment effect is not noticeable to the Reduction in Diameter and Thickness Reduction in total sausage. The results are presented in Table 4 below.

TABLE IV
EFFECT OF MIXTURE COMPOSITION CHICKEN: SAGO FLOUR: FLOUR TOFU DREGS OF THE REDUCTION IN DIAMETER AND REDUCTION IN THICKNESS SAUSAGE

Treatment	Reduction in Diameter (%)	Reduction in Thickness (%)
A	-3,04	2,93
B	-1,59	3,17
C	-1,52	4,72
D	-1,47	2,89
E	-1,63	4,45
Rata-Rata	-1,85	3,63

Numeral at the same columns followed by the same lower case different not real at level 5% according to DMNRT

From Table 4 shows that the more the addition of tofu powder the greater reduction (reduction) in diameter and the thickness of the resulting sausage, meaning a size reduction after the sausages cooked. This is due to the proteins that are still quite a lot of tofu in the flour, making too much protein in the sausage. Besides the addition of the percentage of sago starch polysaccharide content in sausages has also increased. The more protein contained in the sausage, the more also damaged because of errors during cooking and or polysaccharide to gelatinous lead to reduced water holding capacity and affect development. Error during cooking can be caused by frying medium temperature is too hot and or long cooking time. In accordance with the opinion of Jeni (1993) water holding capacity greatly affect the nature of the ability to form a gel during processing, viscosity and product development resources

E. Folding test

The results obtained Folding test average ranges from 1.33 - 4.6%. Of variance test was found that the effect of treatment significantly affect the total test Folding sausage. The results are presented in Table 5 below.

TABLE V
EFFECT OF MIXTURE COMPOSITION CHICKEN: SAGO FLOUR: TOFU DREGS FLOUR TO FOLDING TEST THE SAUSAGE

Treatment	Folding Test (%)
A	1,33 a
B	2,33 b
C	2,67 b
D	3,67 c
E	4,67 c

Numeral at the same columns followed by the same lower case different not real at level 5% according to DMNRTa

From Table 5 looks Folding Test results greater with the high percentage of sago starch. Sago starch polysaccharides which led to the formation of plasticity contributing to sausage making sausages to be flexible is not easily broken.

F. SensoryTest

From the results of sensory tests on randomly panelist, panelists like (value 4) and very like (grade 5) are presented in Table 6 below. Panelists who love and love is the sausage of treatment D, which is to color as much as 85%, 90% texture, taste and aroma as much as 90% to 80%.

TABLE VI
SENSORY TEST RESULTS SAUSAGES BY PANELIST

Treatment	Acceptance panelists expressed Like and Very Like (%)			
	Color	Texture	Taste	Aroma
A	65	45	50	30
B	65	75	55	40
C	75	60	70	65
D	85	90	90	80
E	65	70	65	70

IV. CONCLUSIONS

1. Tofu dregs Flour can be used as an additive in the manufacture of sausages, whole sausages produced meets National Standard Indonesia 01-3820-1995
2. Sensory acceptable composition panelists are treated chicken D = 75%: 15% Sago starch : tofu dregs flour 10%
3. Characteristics of the best sausage and accepted by the panelists is 64.54% water content, fat content 3.02%, ash content 1.83%, 13.85% protein, 16.75% carbohydrate content, cooking yield of 74.25%, juiciness 20.87%, -1.47% reduction in diameter, Reduction in Thickness 2.89%, 3.67% Folding Test.

V. SUGGESTION

To improve the aroma of rotten sausages that still need to be enforced unpleasant smell, so the use of tofu dregs can be improved.

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