

Turnitin-Nutrition Retention of Product Based on Soybean Sprouts Flour and Corn Sprout Flour Enriched with Duck Eggshell

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Nutrition Retention of Product Based on Soybean Sprouts

Flour and Corn Sprout Flour Enriched with Duck Eggshell

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Abstract. Grains including soybean sprouts have better bioactive component than the seeds, and they have potential as a functional food specifically for bone health. The formulation of carbohydrate source and the sprout-based protein provides high nutritional composition which is capable to give better effect to bone health when it is enriched by calcium source ingredients. One of the natural ingredients of calcium sources that have not been used to enrich calcium in food products is eggshell. The combination of formula-based sprouts of corn and soybeans (KEJALE) with eggshell flour can be advanced into food products might be considered as an alternative functional food for bone health. Nevertheless, high nutritional content of food is worsening by food processing. This study aimed to evaluate nutritional retention in some processed products based on corn starch flour and soybean seed flour enriched by eggshells. Processed products based on KEJALE flour in this study are cereals, cookies, and steamed buns. Eggshell flour added as much as 10% of the total formula KEJALE. The results showed that cookies and steamed buns products decreased in protein, fiber and ash. Cereal products generally have higher carbohydrate, protein, fiber, ash, and calcium retention than the other two products except fat. Cereals with enrichment of eggshell 10% had the highest carbohydrate retention (19.34%); whereas the highest protein retention was available in the treatment of eggshell addition 5% (293%). Furthermore, calcium retention of cereal was the highest among the products which revealed 558.82%; 594.74% and 979.37% in eggshell enrichment 5%, 10%, and 15% respectively.

Keywords: *Nutrition, corn sprout, soybean sprouts, eggshell*

1. Introduction

Isoflavones are known to have health benefits, such as preventing loss of bone mass in postmenopausal women, prevents osteoporosis [1], [2], [3]. Soybean is one of the food sources of isoflavones [4]. Corn is a source of good carbohydrates and also contains various vitamins such as carotene, thiamine, vitamin C, niacin, and riboflavin likewise with soybeans, which is one source of vegetable protein high, in addition also contain compounds isoflavones are good for bone health [5]; [6] Soybean and other grains such as corn in the form of sprouts have nutritional components better [7], [8]. [Soybean sprouts also has a component of isoflavones, antioxidant activity and phenolic components of other [9].



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higher than soybean products other. The components in the soybean sprouts have the potential to maintain bone health.

With germination that can be done to reduce the compounds of anti nutrients such as tannin and phytic acid in addition it also occur increase vitamin and minerals bioavailability [10], [11]. With the combination of both the above materials then it will create a new product with health benefits is high. Corn sprouts and soybean sprouts are formulated to be one form of food product with a nutritional composition that is more complete. The sources of carbohydrate and protein when combined have the effect of supplementation.

Some of the important roles of calcium in the body is: for the formation of bones and teeth, regulates blood clotting, catalyst reaction-the reaction of the biological and contraction of the muscle [12]. One of the good sources of calcium is milk. The calcium is also found in some natural materials such as egg shells. Mineral components, especially calcium every kind of egg is different. The shells of chicken eggs contain calcium is quite high (calcium carbonate 98, 43% and calcium phosphate of as much as 0.75 percent [13]. The method of extraction of the egg shell also affect calcium levels as reported by [14], that there are differences in the characteristics of the results of the extraction of the shell of the eggs using acid and which are not.

Some research showed the potential of egg shell is a source of calcium that can be applied in food products [15]. The fortification of the shell of chicken egg on flour MOCAL, which is applied in products, brownis cake, can increase the calcium and have organoleptic characteristics that are acceptable panelists . The addition of 15 % of egg shell on the making of the cookies produce chemical and physical optimum characteristic [16]. However, the components of the shell of the egg is different from any kind of animal, and the data associated with the information is not yet available, then need to be reviewed to be able to utilize the waste egg shells are best as a source of calcium.

Based on the description above and consider the potential of wheat sprouts the corn and wheat soybean sprouts, as well as the waste egg shell as one of the ingredients source of calcium, it is necessary to do the innovation formula for the development of food products based on flour, corn and soybeans fortified with flour shell chicken as a source of calcium. However, the manufacture of food products cannot be separated from the role of temperature / heat. Some of the components of the material are sensitive to heat.

Processing methods using heat has been a common food Processing with the use of warming known as the process of ripening is the process of heating food to a temperature of 100°C or more with the main purpose is to obtain good taste, better aroma, texture is more soft, to kill microbes and unactivating the enzymes [17], [18]. . Food processing can be done by boiling and steaming at 100°C, baking , frying with oil or without oil [19]. . The use of heat in the cooking process is very influential on the nutritional value of the foodstuff. Some food processing methods can also reduce the nutritional content of food [20].

The purpose of this study was to determine the nutritional composition of the formula the sprouts of corn and soybeans fortified with egg shell flour duck with some the level of enrichment, and evaluate the retention of nutrients in processed products the formula that is processed using the method of steaming with the product steamed buns, put in the oven with cookies products and extrusion with cereal products.

2. Material and Methods

2.1 Design, The place and Time

In this research use complete random design (CRD). This study was conducted at the Laboratory of Food Processing and Chemical Laboratory University of Muhammadiyah Semarang. The manufacture of extrusion products made in the Laboratory of Food Engineering of the University Sugiyopranata Semarang.

2.2 Materials and Tools

The materials used for the manufacture of sprouts includes yellow corn varieties Bima 19 is obtained from the Seed Center in Gunung Kidul Yogyakarta and local yellow soybean varieties *Anjasmoro* obtained from The Research Institute For Legumes And Tubers (Indonesian) Kendal Payak Malang East Java Indonesia. The shells of duck eggs are obtained from merchant's martabak around the Campus of University of Muhammadiyah Semarang. The materials used to product steamed buns and cookies, refined sugar, butter and eggs. Various chemicals for analysis of nutrients.

The necessary equipment includes: equipment germination of corn and soybean (cupboards germination, basin, spray bottle, baking sheet of plastic, tissue paper); disk mill; basin, extruder single screw brands Lucky, water bath, oven, cabinet dryer, balance sheet analytics, and equipment the glass and equipment the analysis of other chemicals.

2.3. Stages of research

2.3.1. Corn and soybean Sprouts Production

Making corn sprouts and soybean sprouts (modification of procedure) Rusydi and Azrina,2012)[11]. Corn and soybeans do sorting on sesame seeds damaged and foreign objects, then washed. Further soaking for 6 hours and then drained, washed thoroughly, and drained again. Furthermore, corn and soybeans placed on the baking sheet plastic net and given a base cloth wipes, then placed in a closed room in the dark conditions Germination is performed for 36 hours, and was done spraying water every 6 hours. After the sprouts obtained are then carried out washing, draining and sprouts were dried in a cabinet dryer with a temperature of $\pm 50^{\circ}\text{C}$ for 8 hours. Grinding the sprouts of corn and soybeans is done using a coffee grinder, then sift with a size of 80 mesh. While the sprouts are used for cereal products diminished the size using a disk mill in the form of grits (not flour).

2.3.2. Egg Shell flour production

The shells of duck eggs, washed and shrunk its size manually using hand made size reduction of approximately (0,12 - 0,52 mm). Further soaking with distilled water at a temperature of 100°C for 10 minutes followed by immersion using larutan acetic acid (CH_3COOH) with a concentration of 2 N during 3 hours at a temperature of 60°C using a water bath, each extractant has a concentration of 2 N and the comparison of the shell with a solution of the marinade is 1 : 2. The next is lifted, drained and rinsed, drained again and chill it. For can be shrunk in size then in order to speed up the process of drying, then carried out the drying using a cabinet dryer at 50°C for ± 1 hour. Next the shells of the eggs used as ingredients in the manufacture of steamed buns and cookies egg shell made in the form of flour using the flouring machine, disk mill. The egg shell is sifted using a sieve with a size of 80 mesh.

Making cookies is made by mixing all the ingredients in the form of flour. The amount of material used as in Table 1 below. Next bake cookies dough at a temperature of 140°C for 50 minutes. Removed cookies from the oven, after that pack in plastic packaging and stored until analysis is done.

Table 1. Material Composition Formula For Making of Cookies

Material	The percentage of enrichment of flour the shells of duck eggs (%)		
	5	10	15
Corn Sprouts flour	100	100	100
Soybean Sprout flour	100	100	100
Egg shells flour	10	20	30
Icing Sugar	200	200	200
Butter	100	100	100
Egg	240	240	240

Steamed buns is made with the formula presented in Table 2. In steamed rice lines, steamed buns is made to mix all ingredients using minxer until homogeneous. Then the mixture is put in a molded pan and steamed for 40 minutes. After cold the buns is packed and stored until the time of analysis.

Making cereals is done through the stage of reducing the size of corn sprouts, soybean sprouts and eggshells in the form of grits, using a discmill. The composition of the formula for cereal production is presented in Table 3.

Table 2. Material Composition Formula For Making of Steamed Buns

Material	The percentage of enrichment of flour the shells of duck eggs (%)		
	5	10	15
Corn Sprout flour	100	100	100
Soybean Sprout flour	100	100	100
Egg Shells flour	10	20	30
Icing Sugar	200	200	200
Butter	100	100	100
Egg	120	120	120

Table 3. Material Composition Formula For Making of Cereal

Material	The percentage of enrichment of flour the shells of duck eggs (%)		
	5	10	15
Corn Sprouts Grits	125	125	125
Soybean Sprout Grits	125	125	125
Egg Shells Grits	12,5	25	37,5

Such materials are further incorporated in the extruder machine slowly, the temperature of the processing of cereals 135 °C. Products out are accommodate, packaged and storage until the implementation of the analysis. [3] Chemical analysis. Formula of raw materials and products cookies, steamed buns and cereals analyzed its chemical composition which includes proximate analysis fiber content proximat [21] and levels of calcium (AAS) .

3. Analysis of data

The analysis of the data using test statistics ANOVA (Analysis Of Variants) with the help of the software SPSS 17.0, if there is an influence where the p-value <0.05 then tested further posthoc LSD use.

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4. Results and Discussion

Table 4 shows the nutrient composition of the formula flour corn sprouts and soybean sprouts flour enriched with egg shell flour duck.

Table 4. Nutrient composition Formula of the raw material flour the sprouts of corn, soybean sprouts flour and flour the shells of duck eggs

The percentage of enrichment of flour the shells of duck eggs (%)	Carbohydrate (%)	Fat (%)	Protein (%)	Ash (%)	Water (%)	Fiber (%)	Casium (%)
0	52,12	12.79	23,74	3,88	7,47	25,85	0.002
5	46,38	12.97	24,32	7,31	9,03	26,93	0.021
10	41,71	15.92	23,31	11,27	7,79	21,93	0.085
15	47,08	13.85	17,42	14,21	7,44	28,68	0.095

Based on results of Table 4 are known to not there is a tendency to increase the nutritional value with the magnitude of the addition of the shells of the eggs, except for ash content. The higher the addition of the shells of the eggs the higher the ash content. The ash content describes the mineral content in the material.

Table 5. The Nutritional composition of processed formula product corn sprouts flour, soybean sprouts flour and flour the shells of duck eggs (cookies; steamed buns and cereals)

Sampel	Carbohydrate (%)	Fat (%)	Protein (%)	Ash (%)	Water (%)	Fiber (%)
A5	56,35±0,25	23,43±1,43	11,45±0,63	4,22±1,16	5,20±1,94	16,77±,69
A10	52,48±1,43	26,31± 0,49	11,30±0,27	5,13±0,41	4,78±0,57	16,75±,50
A15	48,54±1,32	28,71±0,76	11,25±0,27	6,46±0,48	5,04±0,90	26,05±7,87
B5	45,05±2,15	21,10±0,49	11,01±0,27	3,60±0,43	19,24±1,15	18,60±2,82
B10	47,07±0,85	19,03±0,49	11,20±0,27	4,05±0,02	19,47±1,27	19,26±2,72
B15	38,68±6,24	23,18±2,94	11,16±0,27	6,33±0,32	21,33±5,21	20,89±0,64
C5	52,15±1,11	8,45±0,49	28,76±0,27	8,11±0,61	2,52±0,16	50,43±6,32
C10	49,78±2,15	8,69±0,75	25,12±0,76	13,57±0,57	2,96±0,59	37,30±4,77
C15	48,25±2,05	7,17±0,81	26,01±0,58	16,42±0,92	2,16±0,46	38,14±0,83

Description: A5 (cookies with addition of shell flour 15 %); A 10 (cookies with addition of shell flour 10 %); A15 (cookies with addition of shell flour 15 %); B5 (steamed buns with the addition of shell flour 5 %); B10 (steamed buns with the addition of shell flour 10 %); B15 (steamed buns with the addition of shell flour 15 %); C5 (cereals with addition of shell flour 15 %); C 10 (cereals with addition of shell flour 10 %); C15 (cereals with addition of shell flour 15 %);

The carbohydrate content of the product is calculated based on the calculation by difference (100 – (protein + fat + Ash + water). The levels of carbohydrates cookies is high compared with other products, including in the control. Statistical test results obtained that there is influence on α of 0.05 with p-value=0.000. The treatment of the carbohydrate content of the product. The difference is seen from the test results. with the LSD in the treatment of cookies with the addition of shell flour 5% with a steamed sponge at all levels of the addition of shell flour, and on the cereals the addition of a shell of 15 %. Cookies with the addition of 10 % different with a steamed sponge in all treatments, steamed sponge 15% different with the cereal at all concentrations of egg shell flour.

The fat content of the product is strongly influenced by the composition of the raw material. Three products that are made in this research has a fat content that varies, cereal products contains low fat.

Steamed products cookies and cake, contain high fat. Both products are processed with the oven and steamed given additional margarine and eggs, while cereal products no other mixture.

Statistical testing shows that there is influence of the treatment processing and the addition of egg shell flour to the fat content of the product, at α 0.05 and $p=0.003$. The different treatment of the results of the test are very different in all treatments the addition of egg shell flour with the two other products in all treatments. Cookies 5 % different with cookies 15 %, steamed sponge 10 %; cookies 10 % different with the steamed sponge 10 and 15 % , and cookies 15 % steamed sponge at all levels of consistency.

Protein content of the product also depends on the material composition and processing techniques. The process of processing using high heat will generally affect the protein. The principle of processing using the extruder is the onset of ripening (evaporation), the drying and at the same time printing, so the raw material that is inserted will come out as a finished product. The raw material is processed using an extruder requires a uniform size, in the form of grit. The composition of the cereals in this study consisted of flour, corn and soy sprouts with the control treatment and the addition of flour the shells of duck eggs in the level 3 concentration.

Statistical analysis results obtained that there is influence of the processing methods and concentration enrichment of egg shell flour on the levels of protein at the α 0.05 and $p=0.008$. The test further shows the different treatment is the treatment processing by extrusion (of cereals) with a processing of steaming (steamed sponge) and the oven (cookies) at all levels of the concentrations of egg shell flour. While the cookies and steamed sponge is no different. Previous research reports also showed that the addition of eggshell flour had an effect on the levels of protein cookies. The higher the addition of eggshell, the lower protein cookies. This is because the mineral content of the eggshell is high, but the protein content is low [16].

Ash content generally describe the mineral components in the product. The results of the analysis of the ash content showed a tendency the higher the level of addition of egg shell flour ash content getting high on all kinds of products. This is because the eggshell is composed of lime (CaCO_3), so the higher the addition of eggshell the product's ash content increases [16]. Ash content is on the mush with the addition of egg shell flour 15 %.

The composition of the material or the water content of the initial material, processing methods can affect the moisture content of the product. The processing that uses the medium of water such as boiling and steaming tend to have a high water content in the final product. Being processing by drying using an oven or a dryer that another reduce the water content of the product. In the drying process evaporation occurs because heat energy release of the product. So the characteristics of the dried product results very different from boiling or steaming.

The results of this study show the high water content is on the steamed sponge. Statistical test results obtained that there is influence of the treatment processing and the level of enrichment of flour the shells of duck eggs against the water content of the product. The results of the test is the treatment of processing into cookies at the level of addition of egg shell flour 5 % different with the cereal at all levels, steamed sponge all levels. The water content of the product steamed sponge 5 % different with the cereal all levels and with different cookies all level.

Fiber content shows a tendency to increase in fiber content with increasing concentration of addition of egg shell flour. Cereal products either control or treatment group have a fiber content which is high compared with other products. Statistical test results showed no influence of the treatment processing and enrichment of egg shell flour to the fiber content ($p=0.000$). As for the different treatment groups are cereals cookies and cake steamed on all of the treatment. Cookies 5 % different with cookies 15 % and steamed sponge 5 %; cookies 15 % different with cookies 10 %, steamed sponge 5 %.

Calcium levels product indicates the presence of a tendency the higher the level of enrichment of duck egg shell flour, calcium content higher. Some previous studies have shown that adding eggshell or shellfish flour increases calcium levels of cookies, extrudate products and soy milk [16], [22], [23]. This is very possible because the content of eggshell calcium or calcium from shellfish has heat

stability. Previous research showed that autoclave heating time had no effect on the chemical parameters of dried clam flour, including calcium levels [24]. The results of the statistical analysis showed that there is influence of processing and treatment the addition of egg shells to calcium levels. Different treatment is cookies the addition of egg shell flour 5 % with cookies 10 and 15%, steamed sponge 10 & 15% cookies, 10 % with cereals all samples; cookies 15% steamed sponge 5 % and cereals all level. Cereal in contrast to the two other products steamed sponge and cookies.

The previous study showed that the processing temperature influence the retention of nutrients on a side dish source of protein. Frying method will cause higher decreasing in the appeal of boiling [25]. Retention is meant the presentation of the nutrients are still retained in the product results of the research Calculated based on the nutrients in the formula of the material before processing The retention of nutrient-based products sprouts of corn and soybeans can be seen in Table 6.

Table 6. Retention of nutrients in processed products based on germinated maize and soybean sprouts enriched with shells of duck eggs

Sampel	Carbohydrate	Fat	Protein	Ash	Water	Fiber	Calcium
A5	21.5	70.67	-52.91	-42,32	-42,45	-37,72	200,00
A10	28.81	65.26	-51,51	-54.45	-37,68	-23,64	13,73
A15	3.09	107.27	-35,4	-54.54	-32,21	-9,17	85,96
B5	-2.87	65.71	-52.75	-50.80	146,98	-15,19	1.18
B10	12.86	19.56	-35,73	-64-06	161,74	-32,83	1.40
B15	-17.83	67.34	-35.94	-55,48	186,74	-27,16	2.11
C5	12.43	-34.83	293,86	10.99	-72,06	75,84	558.82
C10	19.34	-45.41	122.86	20.44	-62,05	30,04	594.82
C15	2.48	-48.22	83.02	15.53	-71,01	127,4	974.74

Description: a negative number indicates the presence of decreasing nutrients.

Table 6. show that the retention of calcium on all products showed an increase. Product steamed buns has calcium retention, which is lower than the product cookies and cereals. Steamed buns has a higher moisture content compared with the two other products. The composition of the material affect the retention of nutritional flour-based products KEJALE. As seen in cereal products there are no element of the addition of fat on the formula of the material. Are products cookies and steamed buns there is the addition of fat.

5. Conclusion

Cereal products processed by extrusion have better nutritional retention than cookies and steamed buns. Even though it uses high heat, the extrusion process runs in a shorter period of time, so it can maintain its nutritional value.

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References

- [1] Aminah, S., Suparmo, Naruki, S., Wuryastuty, H., 2017. Soybean Sprouts Inhibit Bone Turnover in Ovariectomized Rats. *Pakistan Journal of Nutrition*. 16 (9): 666-671.
- [2] Shedd-Wise, K.M., Alekel, D.L., Hofmann, H., Hanson, K.B., Schiferl, D.J., Hanson, L.N. dan Van Loan, M.D. 2011. The Soy Isoflavones for Reducing Bone Loss (SIRBL) Study: Three year effects on pQCT bone mineral density and strength measures in postmenopausal women. *J Clin Densitom*. 2011 ; 14(1): 47–57. doi:10.1016/j.jocd.2010.11.003
- [3] Wong, W.W., Lewis, R.D., Steinberg, F.M., Murray, M.J., Cramer, M.A., Amato, P., Young, R.L., Barnes, S., Ellis, R.J., Shypailo, R.K., Fraley, J.K., Konzelmann, K.L., Fischer, J.G., dan O'Brian Smith, E. 2009. Soy isoflavone supplementation and bone mineral density in menopausal women: a 2-y multicenter clinical trial. *Am J Clin Nutr* 2009;90:1433–9.
- [4] O'Bryan, C.A., Kushwaha, K., Babu, D., Crandall, P.G., Davis, M.L., Chen, P., Lee, S-K. Ricke, S.C., Soybean Seed Coats: A Source of Ingredients for Potential Human Health Benefits-A Review of the Literature. *Journal of Food Research*; Vol. 3, No. 6; 2014
- [5] Marzuki 2008. *Analisis Perubahan Kandungan Gizi Jagung (Zea mays) Selama Penyimpanan dalam Kemasan Kantong Plastik*. J.Teknosains, vol.2(2), 94-101
- [6] Muhtadi D., 2010. *Kedelai Komponen untuk Kesehatan*. Alfabeta. Bandung
- [7] Aminah, S. dan Wikanastri, 2012. *Karakteristik kimia tepung kecambah serelia dan kacang-kacangan dengan variasi blanching*. Prosiding Seminar Hasil-hasil Penelitian, 15 Agustus 2012. Hal. 196: 1 -453.
- [8] Bhattacharyya, P., Ghosh, U., Gangopadhyay, H., dan Raychaudhuri, U.2007. Effect of thermal treatments and germination on physic-chemical properties of corn flour. *African J. of Biotechnology*. Vol.6 (6). ISSN 1684-5315.Hal. 998: 994-999.
- [9] Devi, A.M.K., Gondi, G.M., Sakthivelu, P. Giridhar, T. Rajasekaran, Ravishankar, G.A. 2009. Functional attributes of soybean seeds and products, with reference to isoflavone content and antioxidant activity. *Food Chemistry 114 (2009): 771-776*. ScienceDirect. Elsevier
- [10] Rusydi, M, dan A Azrina. 2012. "Effect Of Germination on Total phenolic, tanning and phytic acid content in soybean and peanut." *International Food Research Journal*. 19 : 674: 673-677.
- [11] El-Adaawy, TR. 2004. "Nutritional potential and functional properties of Germinated mung bean, pea, and lentil seeds." *Plant Food for Human Nutrition*, 1-54.
- [12] Strain JJ (S) and Kevi D Cashman. 2009. Mineral and Trace Elements in Introduction to Human Nutrition. Gibney MJ., Lanham-New S., Cassidy A., Voster HH. (Ed).2009. *Wiley-Blackwell*.pp.189-194
- [13] Mansur, R.A. 2010. Mahasiswa UGM Manfaatkan Limbah Cangkang Telur Menjadi Pakan Unggas November 19, 2010. <http://indonesiaproud.wordpress.com/>
- [14] Puspitasari, I. (2009). Skripsi. *Karakteristik Hasil Ekstraksi Cangkang Telur dengan Pelarut Asam Asetat(CH3COOH)*, <http://eprints.undip.ac.id/16145/>
- [15] Meikawati, W., & Suyanto, A. (2014). *Uji Organoleptik Tepung dan Brownies Berbahan Dasar Tepung MOCAF (Modified Cassava Flour) Terfortifikasi Kalsium Dari Cangkang Telur Ayam Ras*. Prosiding Seminar Nasional Hasil-hasil Penelitian dan Pengabdian.
- [16] Rahmawati, W. A., & Nisa, F. C. (2015). *Fortifikasi Kalsium Cangkang Telur Pada Pembuatan Cookies (Kajian Konsentrasi Tepung Cangkang Telur dan Baking Powder (3)*, 1050–1060.
- [17] Borowski J.Narwojsz A., Borowska E.J., and Majewska K., 2015. Tehe Effect of Thermal Processing on Sensory Properties, Texture Attributes and Pectic Changes in Broccoli. *Czech J. Food Sci.*, 33, 2015 (3): 254-260. Doi: 10.17221/207/2014-CJFS
- [18] Cozmuta A.M., Cozmuta L.M., Varga C., Marian M., and Peter A. 2011. Effect of thermal processing on qualit polyfloral honey. *Romanian J. of Food Science*. 1 (1): 45-52.
- [19] Simth J.S. and Hui Y.H., 2004. *Food Preccessing Principles and Application* (Ed). *Blackwell Publishing. Australia*

- [20] Sundari D., Almasyhuri, dan Lamid A., 2015. Pengaruh Proses *Pemasakan terhadap Komposisi Zat Gizi Bahan Pangan Sumber Protein*. Media Litbangkes, Vol. 25 No.4 . Desember 2015, 235-242
- [21] [AOAC] Association of Official Analytical Chemistry. 2005. Official Method of Analysis. Association of Official Analytical Chemistry 19th Edition. *Gaithersburg (US): AOAC*.
- [22] Safitri A.I., Muslihah N., Winarsih S., 2014. *Kajian Penambahan Tepung Cangkang Telur Ayam Ras Terhadap Kadar Kalsium, Viskositas, dan Mutu Organoleptik Susu Kedelai*. Majalah Kesehatan FAUB. Vol.1. No.3. 2014
- [23] Agustini TW., Ratnawati SE., Wibowo BA., Hutabarat J. 2011. Pemanfaatan Cangkang Kerang Simpson (*Amusium pleuronectes*) sebagai Sumber Kalsium pada Produk Ekstrudat. J. Pengolahan Hasil Perikanan Indonesia. Vol. XIV No.2 Tahun 2011:134-1
- [24] Harjuno I., Agustini T.W., Anggo A.D., 2013. *Karakteristik Tepung Kalsium Dari Cangkang Kerang Simpson (Amusium Pleuronectes) Dengan Waktu Pemanasan Yang Berbeda*. J. Pengolahan Dan Bioteknologi Hasil Perikanan Vol 2, No 3 (2013)
- [25] Sundari D, Almasyhuri and Lamid A., 2015. Pengaruh Proses Pemasakan Terhadap Komposisi Zat Gizi Bahan Pangan Sumber Protein. Media Litbangkes, Vol.25 No.4.235-24

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