

EFFECT OF RICE AND FISH ON ITS EXTRUSION PRODUCT DURING STORAGE I: CARP (*Cyprinus carpio* L)

Oleh:

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Abstract

The aim of this study is to observe the affect of additional fish meat to the crunchiness and taste of rice snack's extrusion product. A local carp (*Cyprinus carpio* L.) is used as a source of fish protein. The result indicated that the size of grain and the composition between rice and fish meat influenced to the crunchiness and taste of the snack. The best result of fish meat - rice composition is 3 : 17.

Ringkasan

Tujuan studi penelitian ini adalah untuk melihat pengaruh penambahan beras terhadap tingkat pengembangan dan kerenyahan serta rasa produk ekstrusi yang dibuat dari ikan mas (*Cyprinus carpio* L.). Hasil penelitian menunjukkan bahwa besarnya butiran beras dan komposisi antara daging ikan dan beras memberikan pengaruh yang nyata terhadap kerenyahan dan rasa *snack* tersebut. Besarnya komposisi diantara daging ikan dengan beras yang berpengaruh baik terhadap tingkat kerenyahan adalah 3 : 17.

Introduction

The popularity of snack is very wide in Indonesia from urban communities to villages, especially in between children. The snacks are not guaranteed to contain a high protein value. Also the safety are doubted due to many of them unregistered. The food additives contain (such as monosodium glutamate and non-food coloring are suspected as a source of many diseases (such as cancer).

One of the snack production method is extrusion processes. This modern method

can produce a high quality snack and in mass production. Harper (1981) and Sunaryo (1985) defined that an extrusion product is a product that produced by several steps of processes include a kneading of carbohydrate and protein sources, and cooking that involved pressure, heat, and mechanism processes.

The source of carbohydrate could be corn, wheat, potato, or rice, while the source of protein is egg and milk and the cereal itself.

To encounter the spreading of low quality of snack, this study investigated the use of fish meat as a source of protein. Rice was used as the main raw material, as a source of carbohydrate, and also as an expanding agent. Carp (*Cyprinus carpio* L.) is a popular protein resources in West Java Province. The cultures (running water and traditional system) are widely exist. Seem that the increase production faces an obstacle due to market limitation. From this reason, a diversity of product which use carp as a source of raw material is need to be created.

Experimental Methods

Carp and rice were purchased from a local market. The preparation of sample was as follow:

The fish, after handling, was steamed for about 30 minutes. After cooling, the meat was taken out and separated from fish bone.

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The meat was then ground and sun dried to get a grit formed.

The washed and dried rice was ground using a hammer mill. Kneading a mixture of grit rice and fish meat was then done at a different composition. The moisture of dough was kept between 10 to 14 %. Salt was used as a single taste enhancer.

A single ram extruder was used to produce the snack at 180°C (the suitable operational temperature was determined by preliminary experiment). The extrusion spent between 15 to 30 second.

The experiment was carried out to observe the nutrition contain of the snack (lipid, protein, moisture, peroxide value-PV) and consumer Preference Test (organoleptic panel test) during 21 days storage.

The procedures of chemical analysis are: Fardiaz et al. (1984) for lipid and protein and PV, AOAC (1984) for moisture, and Larmond (1970) which was quoted by Tasman (1981) for organoleptic test (using 1 - 9 range hedonic scale).

The chemical reagents (all analytical grade unless otherwise specifically mentioned) were from Sigma.

The data was calculated using factorial random design (Sudjana, 1982).

Result and Discussion

From preliminary experiment indicated that the best quality of snack was produced at 180°C of the extruder's operational temperature. At 160°C, the snack was un-expand optimally, while a 190°C had a good crunchiness (maximum expansion) but slightly burnt. While the composition of fish meat and rice and salt was 150 : 850 : 20 gram. From 1,020 gram of dough was gained about 950 gram of snack. The size of ground rice and fish meat was about a grit size (approximately 0.25 to 0.5 mm in diameter). Bigger than that size resulted un-expand product, while smaller than that gave a burnt snack.

The experiment data was investigated as shown in Table 1.

Table 1. Chemical composition of carp snack (wet basis)

TIME STORAGE	PROTEIN (%)	LIPID (%)	MOISTURE (%)	ORGANOLEPTIC VALUE	
				TASTE	TEXTURE
DAY 0 th	13.61	0.78	6.39	5.05	5.65
DAY 7 th	13.13	1.56	6.60	5.60	6.25
DAY 14 th	13.95	1.36	8.75	4.80	4.05
DAY 21 st	12.98	0.84	8.95	5.25	5.15

Note: the protein contain of dough was 15.12 %.

From the above table shown that the chemical composition of sample were slightly change during 21 days storage (insignificant at 5 %). The changing had a tendency a fluctuation for protein, lipid, and organoleptic value, while the moisture sharply increase. The increasing of moisture was certainly caused by high ambient humidity in the lab, where the average was nearly 85 %. If observed from the initial raw

material, the dough, and the produced snack, the changes of chemical component can be seen as stated on Table 2.

As shown on the Table 2, the protein contents of snack decreased if compare to the dough (13.61 to 15.12 %). This would be caused by high temperature (180°C) application that evaporated all volatile nitrogen in the sample. Smith (1976) mentioned that extrusion processes will denature protein.

Protein molecule will change from globular into fibers formed that indicate a cut off of ionic, hydrogen, disulfide, and Van Der Wall's links (Harper, 1979).

Table 2. The percentage of chemical composition of carp, rice, dough, and the snack

No.	CHEMICAL COMPONENT	CARP ¹⁾	RICE MEAL ²⁾	THE DOUGH ³⁾	THE SNACK ³⁾
1.	Protein	16.0 %	7.0 %	15.1 %	13.6 %
2.	Lipid	2.0 %	0.5 %	1.85 %	0.78 %
3.	Moisture	80 %	12.0 %	12 %	6.4 %
4.	Carbohydrate	0 %	80 %	66.67 %	71.58 %
5.	Unknown	2.0 %	0.5 %	4.38 %	7.64 %

Note: 1) Anonymous (1978); 2) Hubels (1984); 3) result of calculation at 0 day

Loss of protein was also occurred during steaming of the fish meat which followed by grinding and drying. Most of water content of fish meat was released during steaming (leaching). This drip would carried some nutrition include protein. The calculation was indicated that the protein loss of fish meat during steaming as much as 19.27 %. This is logic if we see that the decrease of moisture reached to 68 %.

As also protein contents, the lipid of snack decreased after processing. Decreasing of lipid mostly occurred during steaming. The lipid deposits were released due to protein denaturation and leached along with the drip.

During 21 days storage, the lipid contents was nearly stable. However, as a whole the lipid decreased from raw material to end product. Beside the leaching as mentioned above, lipid would deteriorated by hydrolysis and oxidation processes. This was due to moisture contents in the snack product that changed lipid into glycerol and free fatty acid (Sjachri et al., 1981). Ketaren (1986) stated that the oxidation process will occur if the lipid reacted with oxygen which present during the storage. The oxidation will release aldehyde, ketone, and free fatty acid, and also rancidity. The probability of oxidation is high since the fish lipid is known

to contain high degree of unsaturated fatty acid.

In the moisture changing, the preliminary processing resulted about 12 % of moisture. It was kept at this level due to optimization of snack expanding during extrusion. The final product of snack has moisture contents about 6.4 %. The porous structure of snack give a hygroscopic characteristic that lead to a risk condition of oxidation and hydrolysis of product. Therefore, the post handling is needed to keep the snack has lower moisture contents. Sunaryo (1985) explain that the high protein extrusion product is very hygroscopic due to present at mono-molecular layer of sorption-isotherm.

The unknown chemical component (see Table 2) on fish meat and rice was regarded as minerals (calcium, phosphors, iron, iod), vitamins (A and B for fish meat and B for rice), and volatile compounds (mostly for fish meat). On the dough and snack, the unknown component could be the same. However, due to lower moisture contents the percentage of unknown component was slightly higher.

The peroxide value determination was carried out to the whole sample. The result indicated that until 21 days of storage, there was no peroxide detected. This was indicated that there was no peroxide present or still at low level. The very low of snack's

lipid contents (see Table 1) was supported this probability.

The organoleptic taste indicated slight changes. This was effected by the increase of moisture content which led to decreasing the snack crunchiness.

Conclusion

The size of rice and fish meat as a dough particles was about grit size and the moisture content at 12 %. Fish meat of carp can be used as a fortification of snack product in order to substitute the common low protein content of snack.

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