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# DEVELOPMENT OF GELATIN JELLY CANDY ENRICHED WITH FISH FLOUR

Hari Eko Irianto\*, Subaryono\* and Nina Herlina\*\*

## ABSTRACT

Study on the development of gelatin jelly candy product added with fish flour has been carried out. Fish flour was made of lizardfish, blood cockles and yellow white shrimp. The candy was processed by the addition of fish flour at various levels, i.e. 7.6, 15.2 and 22.8%. Based on the results of chemical, physical and organoleptic evaluation, the candy was suggested to be processed by the addition of 7.6% fish flour. Lizardfish flour showed as the most suitable fish flour to be added into gelatin jelly candy.

## 1. INTRODUCTION

Nutrients for human needs can be obtained from plants and animals. One of them is protein which can be found in fishery products. The quality of fish protein is very high due to the complete arrangement of essential amino acids. According to the Indonesian fishery statistics, marine fish is processed into dried salted fish, boiled salted fish, smoked fish, fermented fish, frozen fish, canned fish and fish meal (Directorate General of Capture Fishery, 2002). Those products are very popular among Indonesians. Processed fish products which are available in various types are highly expected by consumers to give them more choices. Probably, more variative products can attract people to consume fish, eventhough not in original form, such as in forms of fish candy and fish snacks. Gelatin jelly candy enriched with fish, as developed in this study, can be used as a health food which can be consumed directly. Candy using fish as one of raw materials is popular in Japan.

The objective of this study was to develop a fish enriched gelatin jelly candy which is expected acceptable to Indonesian consumers through investigation to determine raw material used for fish flour and the enrichment level of fish flour.

## 2. MATERIALS AND METHODS

### 2.1. Materials

Lizardfish (*Saurida tumbil*), shrimp (*Penaeus* sp) and blood cockles (*Anadara granosa*) were used for fish flour making. Fish flour will be enriched into gelatin jelly candy. Proximate composition of fish flour can be seen in Table 1. Fish flour was prepared by cooking washed fish through steaming for 30 minutes. Cooked fish was pressed and minced, and then dried using mechanical dryer for 12 hours. Dried fish was ground to obtain fish flour.

Other materials needed for the candy processing were gelatin, sucrose, citric acid, essence, sodium propionic, and tapiocaflour.

Table 1. Proximate composition of fish flour

Parameters of Analyses	Fish flour		
	Lizardfish	Shrimp	Blood cockles
Moisture content (%)	6.69	8.12	9.23
Ash content (%)	2.06	4.84	4.11
Fat content (%)	0.08	0.05	0.13
Protein content (%)	91.27	86.99	86.5

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## 2.2. Methods

Formula of gelatin jelly candy as described by Herlina (2001) was used for the base formula to develop a product enriched with fish flour. The formula consisted of 48.74% water, 16.25%

gelatin, 24.37% HFS (high fructose syrup), 9.75% sucrose, essence 0.32%, citric acid 0.32% and sodium propionic 0.24%. Process flow of gelatin jelly candy can be seen in Figure 1.

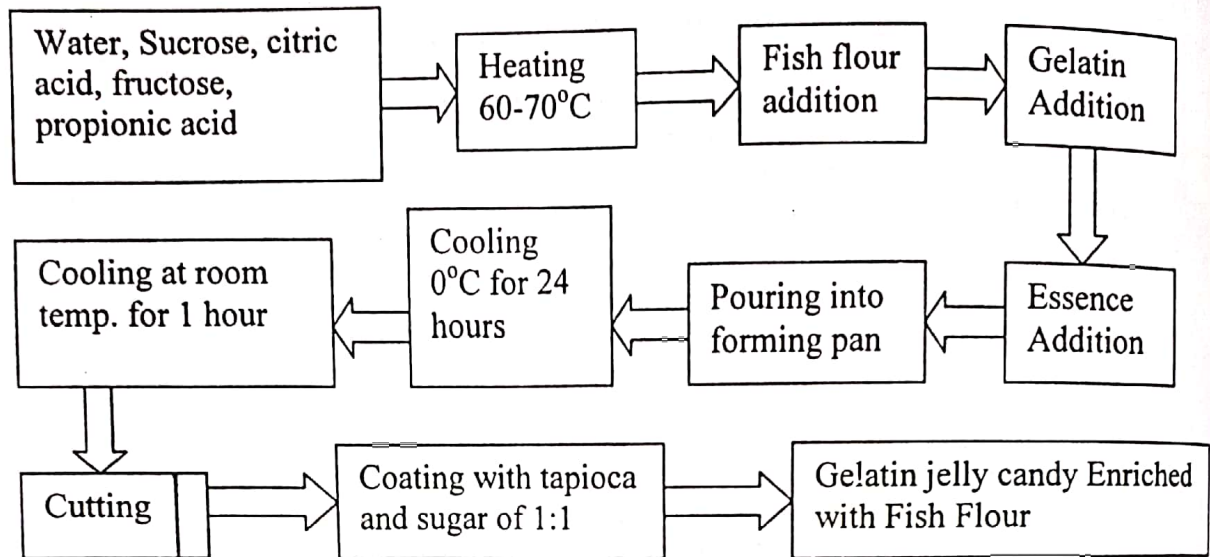


Figure 1. Process Flow of Gelatin Jelly Candy Enriched with Fish Flour

The amounts of fish flour added into the candy varied 0%, 7.6%, 15.2% and 22.8%. The fish flours used were lizardfish, blood cockle and shrimp flours. The experiment was conducted using completely randomized experimental design with three replications. The products were evaluated organoleptically, physically and chemically. Organoleptic properties to be evaluated were product acceptability in terms of texture, odour, appearance and taste involving 20 panelists.

Physical analysis was emphasized to elasticity measurement using Setamatic Penetrometer Controller mk VI (Salamah, 1998). Chemical analyses were moisture, fat, protein and ash contents (AOAC, 1984). Amino acid profiles of the products showing the highest acceptability scores from each fish flour were determined using HPLC – Waters model 510 completed with Fluorescence Detector and Pico Tag 420 column as well as Hitachi 15-20 spectrophotometer. Method used for amino acid profile analyses followed as described by Anonymous (1987).

## 3. RESULTS

### 3.1. Organoleptic Evaluation

The addition of various fish flours at several concentration levels significantly affected the acceptability scores of candy texture. Panelists showed higher preference to the texture of the candy added with lizardfish and shrimp flours compared to the one added with blood cockles flour. Meanwhile, the more fish flour added tended to produce candy with lower texture acceptability score. Gelatin jelly candy processed with higher fish flour concentration level had harder texture.

Odour acceptability scores of developed candy was insignificantly influenced by the kind of fish flour and its concentration level. Fishy odour of fish flour and gelatin odour which were not accepted by panelists have probably reduced the odour acceptability of the product. This was shown by the fact that increasing fish flour addition tended to result in product with lower odour acceptability score. According to Theresia *et al* (1998) the odour of fish flour was less accepted inducing difficulty in utilizing the flour into the products for human consumption.

Appearance acceptability of gelatin jelly candy enriched with fish flour was pronouncedly affected by the kinds of fish flour and its addition levels. Colour of the product seemed to be the main factor determining the appearance acceptability of the candy. Candies added with lizardfish flour at 15.2% and 22.8% had a dark brown colour. Enrichment using blood cockle flour at all addition levels resulted in product with blackies colour. The colour of blood cockle flour was blackies and that colour has probably given blackies impression to the candy. Appearance of all products added with cockle flour were unacceptable according to panelist evaluation. Meanwhile shrimp flour added to the formula of gelatin jelly candy

resulted in product with yellowish colour which was nearly the same as the colour of product without fish flour addition. The colour of candies added with shrimp flour at all concentration levels were accepted by panelists, in which the product having the highest appearance acceptability score was

the one treated with 7.6% shrimp flour.

Kind of fish flour and its addition level significantly influenced the taste acceptability of the candy. The taste of the product added with shrimp flour was more acceptable compared to the ones enriched with lizardfish and blood cockles flours. However, the higher fish flour added tended to result in candies with lower taste acceptability score.

Table 2. Organoleptic acceptable scores of gelatin jelly candy enriched with fish flour\*)

Organoleptic Parameter	Fish Flour	Fish Flour Addition Levels (%)			
		0 (Control)	7.6	15.2	22.8
Texture	Lizardfish	5.5	4.5	3.6	3.3
	Blood cockles		4.0	3.8	3.7
	Shrimp		4.7	4.1	3.6
Odour	Lizardfish	4.5	3.7	3.7	2.8
	Blood cockles		3.4	3.0	3.0
	Shrimp		3.7	3.8	3.4
Appearance	Lizardfish	5.6	4.3	3.1	3.4
	Blood cockles		3.1	3.0	3.0
	Shrimp		4.5	4.4	3.8
Taste	Lizardfish	5.4	4.5	3.6	3.3
	Blood cockles		4.3	3.9	3.5
	Shrimp		5.0	4.2	4.3

Note: \*) Score range: 1 - 7, 1 = very dislike and 7 = very like

Table 3. Elasticity, moisture content and protein content of gelatin jelly candy enriched with fish flour

Parameter of Analyses	Fish Flour	Fish Flour Addition Levels (%)			
		0 (Control)	7.6	15.2	22.8
Elasticity (mm/gr/sec)	Lizardfish	0.91	0.40	0.36	0.49
	Blood cockles		0.67	0.38	0.46
	Shrimp		0.74	0.37	0.48
Moisture content (%)	Lizardfish	37.85	37.52	36.6	32.0
	Blood cockles		38.27	35.52	35.28
	Shrimp		37.89	39.46	34.93
Protein content (%)	Lizardfish	16.49	18.28	26.25	33.52
	Blood cockles		17.07	23.48	29.54
	Shrimp		17.94	21.99	32.83

### 3.2. Physical and Chemical Analyses

Elasticity is one of the important parameters for a gelatin jelly candy. Elasticity of the candy is induced due to the addition of gelatin, HFS and cane sugar (Hartati, 1999). Gelatin jelly candy enriched with fish flour was insignificantly influenced by the kind of fish flour and its addition level. Fish flour has low solubility and rehydration properties. The reduction of water binding properties of fish flour showed that its addition into gelatin jelly candy did not pronouncedly influence the product elasticity. In fact, elasticity of gelatin jelly candy was mainly determined by gelatin which was present in the formula.

Moisture content of gelatin jelly candy was not significantly affected by the kind of fish flour and its addition level. Relatively high moisture content in candy was due to liophilic properties of colloid from gelatin. Gaman and Sherington (1992) described

that jelly is a solid product having high water content.

The addition level of fish flour significantly influenced the protein content of gelatin jelly candy. The more fish flour added into the candy, the higher protein content in the product will be.

### Nutrition Contents

Nutritional properties of gelatin jelly candies, particularly in terms of proximate composition and amino acid profiles can be seen in Table 4. Protein contents of the candies enriched with fish flour tended to be higher than the one without fish flour addition. This means that the use of fish flour in the processing of gelatin jelly candy have increased its protein content. Meanwhile, the addition of lizardfish and blood cockle flours elevated aspartic acid, glutamic acid and proline content of the candies.

**Table 4.** Nutritional Properties of Gelatin Jelly Candies Enriched with Fish Flour.

Parameters of Analyses	Gelatin Jelly Candy Enriched With			
	7.6% Lizardfish flour	7.6% Blood cockle flour	7.6% Shrimp	0% Fish flour (control)
Moisture content (%)	37.52	38.27	37.89	37.85
Protein content				
% wet basis (w.b.)	18.28	17.07	17.94	16.49
% dry basis (d.b.)	29.26	27.65	28.8	26.53
Fat content (% w.b.)	0.02	0.38	0.03	0
Amino Acid Profiles (mg/g):				
Aspartic acid	4,06	1,05	0,16	0,14
Glutamic acid	1,02	1,11	0,12	0,11
Serine	0,12	0,10	0,09	0,09
Glycine	0,94	0,91	0,16	0,15
Histidine	0,00	0,00	0,00	0,00
Arginine	0,05	0,00	0,04	0,00
Threonine	0,06	0,10	0,07	0,09
Alanine	0,09	0,19	0,09	0,09
Proline	2,29	2,24	0,49	0,29
Tyrosine	0,11	0,21	0,21	0,11
Valine	0,01	0,09	0,01	0,01
Methyonine	0,95	3,09	0,90	0,95
Cysteine	0,46	1,04	0,49	0,46
Isoleucine	0,43	0,95	0,43	0,43
Leucine	0,19	1,02	0,12	0,19
Phenylalanine	0,21	0,46	0,24	0,21
Lysine	0,46	4,96	0,96	0,46

#### 4. CONCLUSIONS

With respecting to the results of organoleptic, physical and chemical observations of gelatin jelly candies enriched with fish flour, the suitable addition levels of lizardfish, blood cockle and shrimp flours, were 7.6% each. Significant increase of protein content in the candy can be achieved through the enrichment of fish flour at high levels, e.g. 15.2 and 22.8% as applied in this study. In general, enrichment using shrimp flour yielded gelatin jelly candy with better organoleptic acceptability compared to enrichment using other fish flours.

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