

Original Paper

## WILL SOFT-BONED MILKFISH – A TRADITIONAL FOOD PRODUCT FROM SEMARANG CITY, INDONESIA – BREAKTHROUGH THE GLOBAL MARKET ?

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### ABSTRACT

*One of the famous traditional food products from Semarang city is softboned-milkfish (called as bandeng presto). In national level, Bandeng Presto is the trade mark of Semarang City. Bandeng presto are produced by several outlet in Semarang from small to large in scales. The products are vary, in term of variety, quality, processing technique, packaging and prices. The small-scaler produces less in quality standard, safety, packaging, and marketing system. Nevertheless, there are several small-scaler outlets are able to reach the international market after they promoted their product through webside or internet. The objectives of the study were to develop the improved quality in production techniques, lay out designed, and the marketing strategy for bandeng presto in Semarang city to support the regional food security and food safety. The results indicated that nutritional content of bandeng presto are good in general and can be considered as good nutritional resource for human. Raw material and processing technique influence the nutrition value of the product. Based on market survey suggests that bandeng presto is more efficiently promoted through website, especially to touch the long distance customers. In addition, improved in packaging design and in labelling (recently for exposing information on EPA and DHA of the product) will help customers to assure the quality of the product properly.*

**Key-words:** Soft-boned milkfish; traditional food; quality; marketing strategy; Semarang

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### INTRODUCTION

Processing of fisheries resources is one of important aspect in contributing food security and social economic of coastal community. Fish Processing Unit (FPU) is one of the continued chains of fish resource utilization, either from fish catching and fish aquaculture. Fish business is considered as prime-mover in many countries, including in the study area. Along the northern coast of Central Java, milkfish pond culture is one of the leading fisheries industries (Mudjiman, 1983). It provides a significant employment. Processing of milkfish into different processed products is one of the main small-scale of fish processors activities.

Semarang has been known as a city whose producing “bandeng presto” (a typical softened-boned fish). “Bandeng presto” has many variety in term of: quality, processing techniques, price, market’s segments, etc (Arifudin, 1983 and Astawan, 2003) . Standardization and safety of the product have not been much considered, even though few of the products have been penetrated into global market, especially those produced by medium and large scalers.

As time has passed, people become more concern about their health, which in turn affects on change in their food habits. Fish has experienced an upsurge in popularity and

market shares in many countries due to being exotic, tasty, light and healthy (Agustini, *et al*, 2001). Fish provides a source of polyunsaturated fatty acids, taurine, and omega-3 fatty acid and these are found mainly in fatty fish such as herring, scad, tuna, mackerel, while white fish provide high protein and low fat content (Almatsier, 2003). The such components have been considered as the effective item in preventing arteriosclerosis due to its essential function to prevent blood clotting in human body. Consequently, many people concerned about their increase in daily protein intake, especially from fish. The freshness of fish is very important in determining the quality of its nutritional components and it is related with fish handling and fishing techniques.

Milkfish as raw material, generally can be processed by traditional method into smoked fish, salted-boiled fish and some diversification products such as otak-otak (a kind of minced fish product), pepes (pasted and wrapped by banana leaf), and hiraki (boneless milkfish). (Purnomowati, 2006). Method of milkfish processing is salting and boiling process. Salting-boiling is one of fish preservation method that involves salting and boiling/heating process (Wibowo, 1996). By a nature, milkfish's flesh contains with thorny bone. Many processing methods are only change in fish flesh composition, taste and texture, but is not considered to soften the bone (unless for the purpose of 'bandeng presto').

In line with standard requirements on quality control system of fisheries product applied in Indonesia as well as quality system applied in some exported countries, those means are designed to protect the safety of the consumers. Hereby, therefore the Integrated Quality Management Program (IQMP) has been developed in Indonesia based on Hazard Analysis and Critical Control Point (HACCP). (Darwanto & Murniyati, 2003; Direktorat Jenderal Perikanan, 2000a, 2000b). Implementation of IQMP should be based on Pre-requisite Program which involves Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedure (SSOP) (Thaheer, 2005 and Nuraida, 2005). The main objectives of doing such efforts among others are to get safe and good final products for consumers.

Market penetration can be done by market differentiation and segmentation of soft-boned milkfish products. In this case, it is necessary to conduct assistance ship and training on how and what should producers do regarding to improve the soft-boned milkfish. This is in complies with consumer preference with its variety of the product as well as how to produce soft-boned milkfish that fit with different group or segment of consumers (low, middle and high class of community). This study has undergone scientific study on improvement of production technique, lay out of the processing site, application of IQMP and marketing strategy of soft-boned milkfish in Semarang city in order to support its food security and food safety.

## MATERIALS AND METHODS

An analysis of product quality, lay out design of processing site, marketing strategy were undergone for each FPU and its product. The product samples were taken from five FPU with two replication of each analysis (chemical analysis) and lay out design. The samples of 75 respondents (consumers) and five of FPU were surveyed to outline the marketing strategy of this study.

The analytical procedures applied to the study are explained below;

1. Nutritional content of the products covering: moisture, protein, fat, fatty acids compounds (Park and Goins, 1994; Ulberth and Henninger, 1992), minerals (Ca and P), and total energy.
2. Lay out design of FPU was approached based on sanitation and hygiene of production site, efficiency of material movement using modified block plan lay out analysis (Apple, 1990; Muther, 1955; Wignjosoebroto, 2003).
3. Packaging design, was done based on functional and attractiveness of the product by improving color, shape, and simple (Syarif, *et al*, 1989)
4. Marketing analysis was done by assessing consumer's perception on "bandeng presto" product based on its attributes and price using interview which guided by its questionnaire. Descriptive statistic is applied to analyze the data.

## RESULTS AND DISCUSSION

### Nutritional value of the product

Nutritional value of “Bandeng presto” is very important to be informed to consumers in order to get general opinion on the beneficial and nutritional content when people buy the product. The samples from different Fish Processing Unit (FPU) were taken by purposive sampling and be analyzed for its nutritional content. **Table 1.** shows nutritional

value of “bandeng presto” taken from different FPU.

The results indicated that nutritional values of “Bandeng presto” are similar (for small, medium and large scale or FPU). The processing for sample of B4 (using boiling process for 10 hours at 100°C), and sample of B1, B2, B3 and B5 (using autoclave at 105 – 118°C for 2 hours). The nutritional value of ‘bandeng presto’ produced by autoclave processing is relatively better than ‘bandeng presto’ produced by boiling process. This boiling process results in higher water content of the product.

**Table 1.** Nutritional value of ‘bandeng presto’ produced by different FPU

Samples	Mositure (%)	Ash (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Ca (mg/g)	P (mg/g)
B1(‘J’)	51.69	4.33	13.56	27.50	1.03	1.32	0.57
B2(‘D’)	57.36	4.05	7.54	27.87	1.84	0.88	0.46
B3(‘B’)	54.57	5.21	5.48	32.36	0.81	1.03	0.54
B4(‘Dj’)	58.54	4.24	9.11	26.34	0.42	1.00	0.46
B5(‘Kh’)	56.66	3.31	12.24	25.33	1.44	0.64	0.38
Average	55.76	4.23	9.59	27.88	1.11	1.05	0.48

Almost all samples performed good protein source ranging from 25% to 32%. This affirmed that the products are viable as food protein resource for human. Adequacy of protein for adult is 0.75 g / kg body weight is fulfilled by animal food supply which is found in ‘Bandeng presto’ (Almatsier, 2003; Hall, 2005). In addition, ‘bandeng presto’ has relatively higher in protein and in fat contents but lower in moisture content compared to the other fish processed like “Pindang bandeng asin” (salted-boiled milkfish)(Wibowo, 1996). Higher moisture content on “Pindang bandeng asin” due to boiling process is carried out during processing rather than steaming as what is done by ‘bandeng presto’.

### Fatty acids content of bandeng presto

Fatty acids content of bandeng presto resulted from different FPU can be seen at the following

Fisheries product usually considered as high unsaturated fatty acid resource compared to other food materials. Bandeng presto product has fairly good omega-3 fatty acid, omega-6 fatty acid and omega-9 fatty acid with total content of 25.23% - 42.8%. Meanwhile for total unsaturated fatty acid of fresh milkfish is 46.27%. Decrease in total unsaturated fatty acid during processing is considered due heating process taking place in the product. This phenomena is in line with salted-boiled fish (ikan pindang) of short body mackerel that decrease in total omega-3 fatty acid after processing comparing to that of fresh short body mackerel (Nugroho, 1997).

According to gas chromatography analysis, profile of fatty acid of bandeng presto and fresh milkfish tend to have same profile of fatty acid, except for the percentage is different. This is due to heating process which results in degradation of the fatty acids.

**Table 2.** Profile of fatty acids content of bandeng presto at different FPU

Fatty acids	Samples Code					Fresh fish
	(B <sub>1</sub> ) %	(B <sub>2</sub> ) %	(B <sub>3</sub> ) %	(B <sub>4</sub> ) %	(B <sub>5</sub> ) %	
Caprylic acid	-	-	-		0.07	-
Capric acid	0.03	-	-		0.42	0.41
Lauric acid	0.17	0.35		0.62	0.63	2.99
Myristic acid	1.23	1.98	0.17	1.42	0.77	3.89
Myristoleic acid	2.57	2.85	3.77	2.31	1.71	4.79
Palmitic acid	27.28	26.96	21.99	22.16	18.97	18.97
Palmitoleic acid	6.47	9.59	7.04	4.23	1.27	8.58
Heptadecanoic acid	0.39	-	4.27	0.32	0.63	-
Stearic acid	12.26	8.87	6.89	16.17	25.25	5.60
Oleic acid	19.23	14.27	5.74	20.05	17.25	16.48
Linoleic acid	11.29	10.48	7.17	14.83	14.68	7.47
Linolenic acid	2.18	2.29	1.17	2.48	2.21	2.00
Arachidonic acid	1.14	-	0.88	0.17	0.53	-
Eicosenoic acid	1.03	1.37	0.94	0.69	0.27	2.76
Eicosapenta Enoic acid (EPA)	2.49	4.27	5.80	1.83	0.91	8.15
Docosa Hexaenoic acid (DHA)	4.97	4.21	4.41	2.92	0.23	9.41

**Table 3.** Unsaturated fatty acids content for bandeng presto

Sample code	Unsaturated fatty acids content (%)			Total (%)
	Omega-3	Omega-6	Omega-9	
B1	9.64	11.29	20.26	41.19
B2	10.77	10.48	15.64	36.89
B3	11.38	7.17	6.68	25.23
B4	7.23	14.83	20.74	42.80
B5	3.35	14.68	17.52	35.55
Fresh fish	19.56	7.47	19.24	46.27

Data variation of fatty acid found during the research was mainly caused by variation of raw material. The raw material used by processors, it depend on feed type, fish habitat, composition of fatty acid will be determined. Percentage of fatty acid content in bandeng presto also depends upon the processing technique used by processor. Processing technique by boiling with long processing time as perform by FPU B4 (with length of boiling time for 10 hours) without pressure has resulted in decrease in omega-3 fatty acids as well as FPU B5. Nugroho (1997) stated further that the longer and higher the heating process, the faster is oxidation reaction taking place. This occurrence more significant where high unsaturated fatty acids present in food. Long boiling process cause decrease in total

unsaturated fatty acid with high number of double bonds such as linolenic acid, EPA and DHA. In contrast to product resulted from FPU B3 which involve relatively short heating process (1 hour) and apply small pressure and volume can retard in total omega-3 fatty acid, means that the unsaturated fatty acid less suffering from damage.

### Product packaging design

From this research, improving packaging of 'bandeng presto' have been done for FPU B2 and B4. Packaging is an important factor in product marketing either as protection and promotion facilities. Packaging covers three points, namely: brand, packaging and labelling. Packaging should ensure the safety, distribution

and benefit aspects (Peleg, 1985). Design of the packaging preferably should considering some matters that are simple, functional, create positive visual and emotional response of the buyers and attractive and such how able to impulse the added value to the products.

The packaging of 'bandeng presto' has to printed some information of the nutritional value (include EPA and DHA, amino acid etc), no preservative, weight of the product, barcode, batch produced and expired of the products.

## Marketing Analysis

### Profile of home industry of 'Bandeng Presto'

Most of home industry (FPU) of 'bandeng presto' in Semarang city are traditional with small and medium scales.

**Table 2.** Profile of 'bandeng presto' home industry in Semarang city (small and medium scale, n=5)

No	Items	Description
1.	Period of business	13 – 17 years
2.	Raw material	
	- Purchased from	Pasar Rejo Mulyo Pasar Kobong Pasar Bugangan
	Salt	
	- Average of raw material used per day	180 Kg – 400 Kg
	- Raw material price	Rp. 10.000 /kg – Rp. 12.000 /kg
3.	Facilities / Equipments	
	- Stove	2 – 4 pieces
	- Fuel	Fuel, LPG
	- Storage rack	2 – 4 units
	- Cooling machine	1 – 4 units
	- Vacuum machine	1 unit
	- Bamboo basket	12 units
4.	Labours	4 – 6 persons
5.	Production (hours/batch)	3 – 10 hours
	Production (kg/day)	100 Kg – 400 Kg
6.	Pricing:	
	- Per kg	Rp. 30.000 – Rp. 50.000,-
	- Per pieces	Rp. 3.000 – Rp. 6.000,-
	- Shelf life of the product	2-3 days
7.	Marketing area	
	- Local	Gang Baru, Peterongan and Banyumanik markets, Tlogorejo, Kariyadi, Elisabeth, Citarum hospitals, Semarang and surrounding
	- Regional	Jakarta, Yogyakarta, Bandung.

Problems frequently observed by FPU of 'bandeng presto' is the availability of raw material with its price fluctuation due to the season. 'Bandeng presto' from B4 sample has fixed supplier. But many of FPU have to find raw material from the markets. In addition 'bandeng presto' B2 has already the market in Demak, Pati, Pekalongan, Kudus, Tegal, Brebes and Yogyakarta.

### Consumer's Perception on the Respective Attributes

The price of 'bandeng presto' as a specific traditional food from Semarang has considered as a reasonable price by most of buyers surveyed. People who dropped by Semarang city and going some where to family and relatives are used to bring the 'bandeng presto'. Further, people in Semarang and its surrounding are also consumed the 'bandeng

presto' for their daily meal. Consumers are used to buy in traditional market for a cheaper price (Fig 1 - 3). Packaging of 'bandeng presto' in good performance and showing nutritional and safety information of the product was preferable by consumers (Fig. 4). Most of

customers are preferred to buy the original-taste of presto as argued by 67% respondents. However, to accommodate the buyers from several segment and to enlarge the market, thereafter producers are trying to do product diversification.

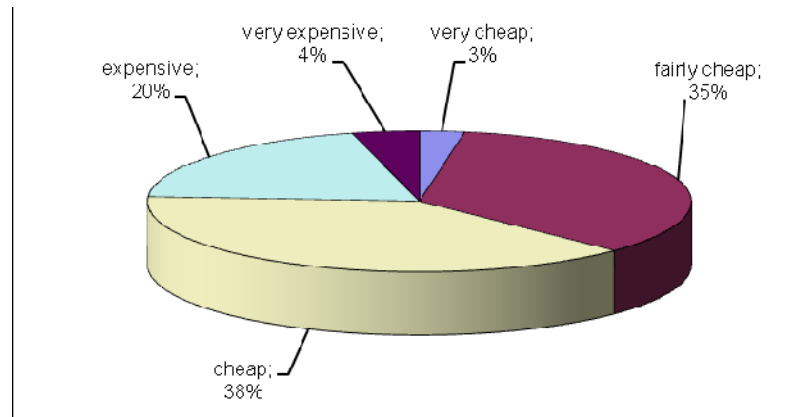


Fig. 1. Price of 'bandeng presto' perceived by respondents

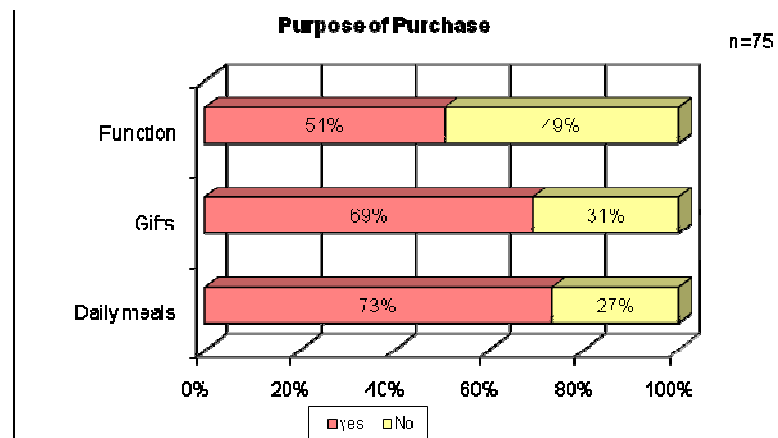


Fig. 2. Purpose of buying 'bandeng presto' as perceived by respondents

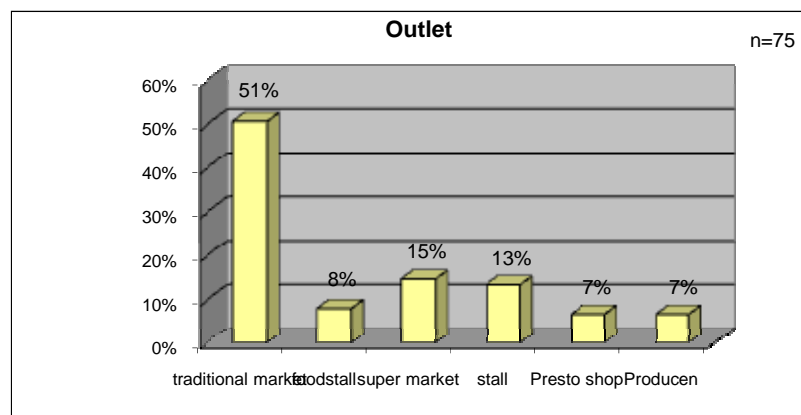
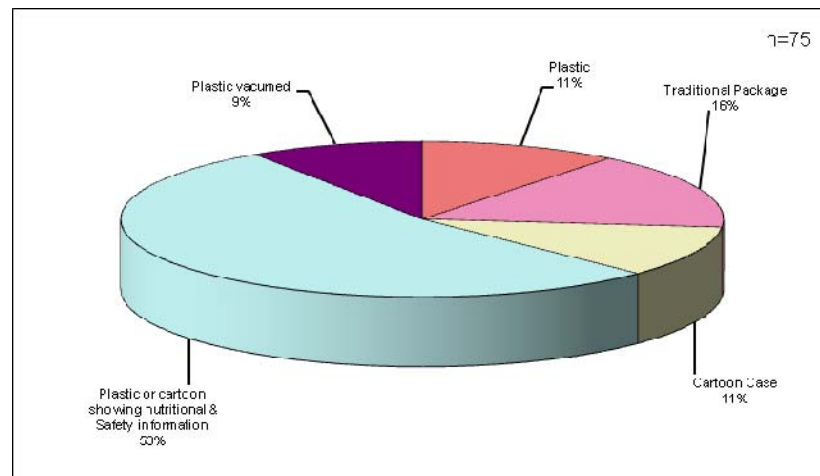


Fig. 3. Outlet to buy 'bandeng presto'

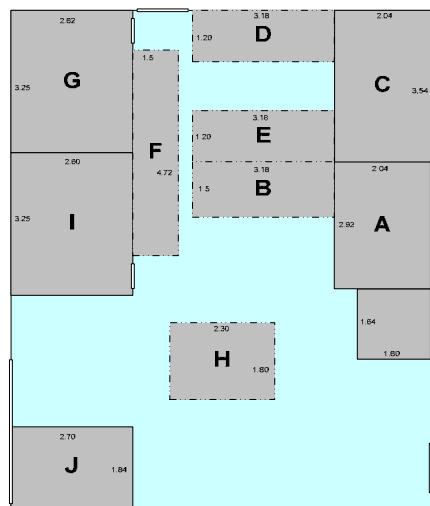


**Fig. 4.** Packaging of 'bandeng presto' preferred by respondents

In general, the producers of 'bandeng presto' have a good packaging design as a wrapping purpose, however in term of aesthetic and health or nutrition information (such as its nutritional value of EPA, DHA, proximate

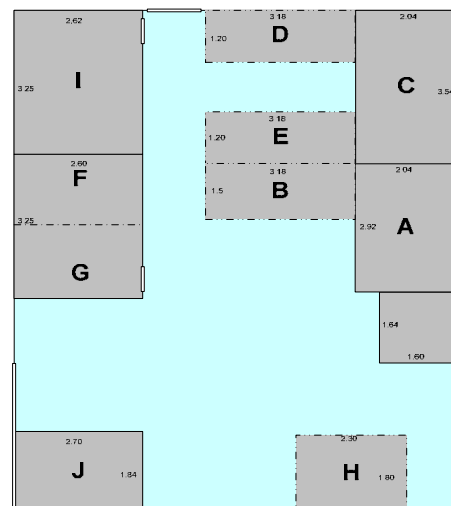
analysis and safety information) are have not sufficient. Therefore, it is indeed need to be restructured and added the necessary information into the ideal packaging.

**Layout Design of FPU (medium scale FPU)**



- A. Dressing area
- B. Seasoning area
- C. Cooking area
- D. Drying/draining area
- E. Frying and steaming area
- F. Packaging room
- G. Storage of cooked product area
- H. Raw material storage
- I. Tools inventory
- J. Display room

**Fig. 5.** The existing layout design of FPU B2



- A. Dressing area
- B. Seasoning area
- C. Cooking area
- D. Drying/ draining area
- E. Frying and steaming area
- F. Packaging room
- G. Storage of cooked product area
- H. Raw material storage
- I. Tools inventory

**Fig. 6.** The modified layout design of FPU B2

**Fig.5** showed inefficiency material flow from preparation to cooking area (C) due to long distance and should pass through the drying area (D), packaging room (F) and frying (E) area. Therefore it is potential causing microbial hazard (Winarno and Suroño, 2002a, 2002b). This study tried to modified lay out design to increase the efficiency of material flow so that ensure the quality and safety of the product. Modified design offered follow U model on material flow (**Fig. 6**).

The layout of FPU B2 was modified for removing the barrier between preparation and cooking area so that the fish material can pass through directly. In addition in this new layout design, flow material of ingredients from preparation area to cooking area do not pass through the drying, frying and packaging rooms so that cross contamination can be prevented. The utility of the existing room has been changed in function based on the efficiency and preventing cross contamination point of views (Joko, 2004). For example the existing

packaging room was omitted and moved together to storage room, where contamination was considered less. These efforts were done to improve the layout design of FPU B2 that has potential for development the product to improve quality and safety of product resulted.

### Efforts to Improve the Market

For market attributes improvement, the study had has facilitate the selected small-scaler producers to prepared the marketing on-line through internet (using blog) and also to provide technical assistanceships for the necessary consultation in marketing and quality assurance (processing and nutritional matters). One of the specimen for marketing online done is for Mina Makmur processor ([www.mina-makmur.blogspot.com](http://www.mina-makmur.blogspot.com)) as shown below. It is presumed that with on-line marketing can enhance the production capacity of the producers and finally will induce the fish processors capacity building.



**Fig. 7.** Blog of bandeng presto 'MINA MAKMUR'

## CONCLUSION

Based on the results, it can be concluded that: Nutritional value of 'bandeng presto' was determined on quality of raw material and processing technique applied. EPA and DHA content of 'bandeng presto' was comparable to that of salted-boiled fish product. Design layout of FPU was analyzed for medium scaler only (FPU B2) based on modified

bloclplan with approach on sanitation and production efficiency. Effort to improve the market of 'bandeng presto' was done through website Mina Makmur using Blog system. This effort was purposed to increase the information access of FPU by local, regional and global levels. Good packaging with appropriate information on its nutritional value will improve the consumers demand in buying the product.



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