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FIELD TRIAL ON THE UTILIZATION AND MARKETING OF SHARK MEAT PRODUCTS PROCESSING TECHNOLOGY IMPROVEMENT AND PRODUCTION COST CALCULATION

Hari Eko Irianto, Yusro Nuri Fawzya and Suyuti Nasran

ABSTRACT : In order to utilize shark meat, experiments on fish ball, fish sausage, fish satay and fish floss processing were conducted. Consumer test on those products was carried out and the result showed that most of respondents gave a good response.

A preliminary study on marketing of shark meat products was done by asking comments from owners and managers of supermarkets, retailers, traveling traders, and canteens in DKI Jakarta, on the shark meat products. Comments were used for improving the technologies of fish ball, fish sausage, fish satay and fish floss processing. Some experiments are needed to improve the processing technologies which produce better quality.

The production cost of the improved processing technologies was calculated on the base of 1 ton raw material. The production cost of fish ball, fish sausage, fish satay and fish floss were Rp 713,910; Rp 1,654,526; Rp 650,433 and Rp 732,258 respectively. While their basic prices were Rp 1266/kg of fish ball, Rp 3069/kg of fish sausage; Rp 3966/kg of fish satay and Rp 4882/kg of fish floss.

INTRODUCTION

Shark is one of the main Indonesian catches. The production was 35.562 ton in 1985 (Anonymous, 1987). However, shark is not utilized optimally. Generally, shark meat is processed into traditional products of dried salted fish and boiled salted fish and only its fin has a good price.

To optimize shark meat utilization and to increase its added value, Research Institute for Fisheries Technology, Jakarta conducted experiments on shark meat processing into fish ball, fish sausage, fish satay and fish floss; and at once those products have less urea odour. Consumer test on the shark meat products has been carried out in DKI Jakarta to obtain comments from respondents on those products. Organoleptically most of respondents gave a good response (Anonymous, 1987).

The result of consumer test revealed that further research on field trial on the utilization and marketing efforts of shark meat products should be done to get consumer's responses directly in the market. This research aims to see the market feasibility of fish ball, fish sausage, fish satay and fish floss.

METHODS.

Preliminary study on marketing of fish ball, fish sausage, fish satay and fish floss was conducted by asking comments and participation in product marketing to supermarkets, retailers, travelling traders and canteens in DKI Jakarta. Based on their comments, the available processing technologies could be improved, and then their cost production and basic price were calculated. Products resulted from the improved processing technologies were hopefully marketable.

RESULTS

1. Comments of Supermarket Managers and Traders.

Result on preliminary study on marketing revealed that products produced from the available processing technologies were unsuitable for supermarket managers and traders point of view. Their comments for those products were shown in table 1.

Table 1. Comments and Suggestion of Employer

Product	Comment and Suggestion
Fish ball	easily broken and not elastic
Fish sausage	fairly elastic
Fish Satay	its size should be larger and longer.
Fish floss	physical appearance was not interesting

Respondents comment that the addition of 10% of tapioca flour in fish ball processing did not give a good elasticity. To solve this problem an experiment which apply various percentage of tapioca flour was needed.

2. Improvement of Processing Technology

After carrying out experiments, the improved processing technologies of shark meat are as follows :

a. Fish Ball Processing.

Materials and equipments needed for fish ball processing are as follows :

- Materials :**
- Sharks meat
 - Tapioca flour 20%
 - Fine salt 2.5%
 - Ajinomoto (MSG) 0.75%
 - Condiment (the mixture of shallot, garlic and ginger with the ratio of 15 : 3 : 1) 2%
- Equipment :**
- Knife
 - Meat separator
 - Centrifugal dehydrator
 - Mixer
 - Blender
 - Cooker
 - Chopper.

Method :

- Shark is washed, skinned and dressed, and then its meat is cut and filleted.
- The meat is ground and freed from its fiber using meat separator.
- To reduce urea odour, the ground meat is washed 3 times using cool water and then dehydrated using a centrifugal dehydrator.
- The ground meat is then ground again using chooper, and was added fine salt little by little to produce a good elasticity.
- Emptied into mixer, tapioca flour and spices were added little by little.
- The dough produced is rounded to be fish ball with desired size, and then boiled until done (floating).

b. Fish Sausage Processing

Preparation of materials and equipments for fish sausage processing is similar to that of fish ball processing, i.e. as follows ;

- Materials** :
- Shark meat
 - Tapioca flour 10%
 - Fine salt 2.5%
 - Frying oil 3%
 - Fine sugar 1.5%
 - MSG (Ajinomoto) 0.75%
 - Condiment (the mixture of shallot, garlic and ginger with the ratio of 15 : 3 : 1) 2%
 - Casing thread.

- Equipment** :
- Knife
 - Meat separator
 - Centrifugal dehydrator
 - Mixer
 - Stuffer
 - Blender
 - Cooker.

Method :

- Shark is washed, skinned and dressed, and then its meat is cut and filleted.
- The fish fillet obtained is ground and freed from its fiber using a meat separator.
- In order to reduce urea odour, ground meat is washed 3 times using cool water and dehydrated using a centrifugal dehydrator.
- The ground meat is mixed with frying oil, tapioca flour, sugar, condiment and MSG. The dough is stirred homogenizely in a mixer.
- The dough is put in a stuffer, and then filled into casing and tied with thread conform with desired length.
- The product is cooked in hot water of $\pm 60^{\circ}\text{C}$ for 15–20 minutes and then in hot water of $80\text{--}90^{\circ}\text{C}$ until done.

c. Fish Satay Processing.

Fish satay processing is relatively easier than fish ball and fish sausage processing. The material and equipments needed are as follows :

- Materials** :
- Shark meat
 - Brown sugar 20%
 - Tamarind 4–8%
 - Salt 5%
 - Coriander seed 1.5%
 - Greater galingale 2.5%
 - Shallot 1.5%
 - Garlic 1%
 - Ginger 0.5%

- Equipment :**
- Knife
 - Blender
 - Bucket
 - Tray.

Method :

- Shark is washed, skinned and dressed, and then its meat is cut and filleted.
- Spices are finely ground, and mixed with sugar before using.
- Meat fillets is dipped in 5% brine solution for 10 minutes, and then drained for an hour.
- Those fillets are then soaked in spices solution over night, and put on trays and dried in the sun for 2–3 days (until dry enough).

d. Fish Floss Processing

Materials and equipment used in fish floss processing is as follows :

- Materials :**
- Shark meat
 - Shallot 3% + 2% (for fried shallot)
 - Garlic 3% + 1% (for fried garlic)
 - Fine sugar 3%
 - Salt 2%
 - Tamarind 1%
 - Ginger 0.5%
 - "Salam" leaf : appropriate amount
 - Citronella grass : appropriate amount
 - Coconut : appropriate amount.

- Equipment :**
- Knife
 - Blender
 - Cooker
 - Press
 - Frying pan
 - Unbleached cotton.

Method :

- Shark is washed, skinned, and dressed, and then its meat is cut into pieces.
- The meat is cooked until done, cooled, wrapped using an unbleached cotton and pressed to remove its water.
- The pressed product is then stretched to be fibers.
- Shallots, garlic and salt is blended.
- Greater galangale, "salam" leaf, citronella grass, sugar and tamarind are cooked in coconut milk. After boiling, the ground spices are added and stirred until boil again.
- Stretched meat is filled into that boiling mixture and fried until dry and done.

3. Production Cost Calculation

a. Limitation of Raw Material and End Product

In general, raw materials used for the processing of fish ball, fish sausage, fish satay and fish floss during experiments were as follows :

- Species : Shark (*Carcharinus limbatus*)
- Weight : in the range of 40–60 kg/fish.

Rendements of end products were different as shown in table 2. The differences of the end products rendements were affected not only by the amount and kind of supporting materials (spices) added but also by end product spesification.

Table 2. Rendement of End Product

Product	Rendement (% of whole shark)
Fish ball	56.4
Fish Sausage	53.9
Fish satay	16.4
Fish floss	15.0

b. Production Cos Calculation

Production cost calculations for all products based on 1 ton of raw material (whole shark), and the processing location was closed to fish landing site. The investment cost was not considered in this calculation.

Price and amount of raw material, supporting material, energy sources, manpower needed in fish ball, fish satay and fish floss processing were shown in table 3. Based on both price and amount of those needs, the production cost of each product could be calculated. Result showed that the prduction cost of fish ball, fish sausage, fish satay and fish floss were Rp 713,910; Rp 1,654,526; Rp 650,433 and Rp 732,258 respectively, and price and amount needed for products processing are shown in table 4.

Table 3. Price and Amount Needed for Fish Ball, Fish Sausage, Fish Satay and Fish Floss Processing.

Out put	Price	Amount Needed for			
		Fish Ball	Fish Sausage	Fish Satay	Fish Floss
—					
— Shark	Rp 314/kg*)	1000 kg	1000 kg	1000 kg	1000 kg
— Processing water	Rp 0.04/l	5500 l	5500 l	2200 l	2000 l
— Ice	Rp 50/kg	2200 kg	2200 kg	1200 kg	1200 kg
— Tapioca flour	Rp 600/kg	90 kg	45 kg	—	—
— Fine salt	Rp 750/kg	13.5 kg	12.4 kg	7 kg	3.1 kg
— Shallot	Rp 1000/kg	9.5 kg	8.7 kg	9.3 kg	8.6 kg
— Garlic	Rp 5000/kg	2.0 kg	1.8 kg	6.4 kg	0.5 kg
— Ginger	Rp 2000/kg	0.6 kg	0.6 kg	2.9 kg	—
— MSG	Rp 3000/kg	4.1 kg	3.7 kg	—	—
— Frying oil	Rp 1500/kg	1 kg	14.9 kg	—	170 kg
— Fine sugar	Rp 1000/kg	—	7.4 kg	—	0.5 kg
— Brown surgar	Rp 1000/kg	—	—	140 kg	—
— Tamarind	Rp 900/kg	—	—	—	1,55 kg

1	2	3	4	5	6
- Coriander seed	Rp 2000/kg	—	—	8.4 kg	—
- Greater galingale "Salam"	Rp 400/kg	—	—	14.4 kg	0.8 kg
- leaf	Rp 100/tied	—	—	—	appr. amount
- Citronella grass	Rp 200/tied	—	—	—	appr. amount
- Coconut	Rp 200/piece	—	—	—	155 piece
- Casing	Rp 100,000/package	—	8 package	—	—
- Thread	Rp 200/piece	—	315 piece	—	—
- Kerosene	Rp 225/l	20 l	21 l	—	127.5 l
- Electric	Rp 2000/kwh	16.6 kwh	48.8 kwh	1.5 kwh	1.5 kwh
- Manpower	Rp 3000/person/day	7 persons	7 persons	5 persons	5 persons

Note : *) Source : Fisheries Statistic of Indonesia of 1985

Table 4. Production Cost of the Processing of Fish Ball, Fish Sausage, Fish Satay and Fish Floss.

Out Put	Products Cost (Rp)			
	Fish Ball	Fish Sausage	Fish Satay	Fish Floss
Shark	314,000	314,000	314,000	314,000
Processing Water	200	220	88	80
Ice	110,000	110,000	60,000	60,000
Supporting Materials :				
- Tapioca flour	54,000	27,000	—	—
- Fine salt	10,125	9,300	5,250	2,325
- Shallot	9,500	8,700	9,300	8,600
- Garlic	10,000	9,000	32,000	2,500
- Ginger	1,200	1,200	5,800	—
- MSG	12,300	11,100	—	—
- Frying oil	1,500	22,350	—	—
- Fine sugar	—	7,400	—	500
- Brown sugar	—	—	140,000	—
- Tamarind	—	—	10,620	1,295
- Coriander seed	—	—	16,800	—
- Greater galingale	—	—	5,775	320
- "Salam" leaf and Citronella grass	—	—	—	750

Continued table 4

1	2	3	4	5
– Coconut	–	–	–	31,000
– Casing	–	800,000	–	–
– Thread	–	63,000	–	–
Energy Sources and Electric :				
– Kerosine	5,500	5,725	–	28,688
– Electric	33,200	97,600	3,000	3,000
Manpower	21,000	21,000	15,000	15,000
Packaging and Labelling	131,365	146,931	32,800	37,500
TOTAL	713,910	1,654,526	650,433	732,258

c. Basic Price Calculation

Basic price was calculated from production cost and product volume, as shown in the following equation :

$$\text{Basic Price} = \frac{\text{Production Cost}}{\text{Product Volume}}$$

By the use of above equation, the basic price of each product could be calculated (see table 5).

Table 5. Basic Price of Fish Ball, Fish Sausage, Fish Satay and Fish Floss

Product	Production Cost	Volume	Price
Fish Ball	Rp. 713,910	564 kg 42,300 pices	Rp 1266/kg Rp 17/pice
Fish Sausage	Rp 1,654,526	2,820 paks. 539.1 kg 31,807 pieces	Rp 253/pack. Rp 3069/kg Rp 52/piece
Fish Satay	Rp 650,433	2,891 packs. 164 kg 820 packs.	Rp 572/pack. Rp 3966/kg Rp 793/pack.
Fish Floss	Rp 732,258	150 kg 1,500 paks.	Rp 4882/kg Rp 488,2/pack

Note :

1 package of fish ball	=	200 gr
1 piece of fish ball	=	13.3 gr
1 package of fish sausage	=	185 gr
1 piece of fish sausage	=	16.82 gr
1 package of fish satay	=	200 gr
1 package of fish floss	=	100 gr.

d. Product Spesification

Product spesification based on storage life, organoleptical observation, chemical and micro-biological analyses can be seen in table 6.

Tabel 6. Product Spesification of Fish Ball, Fish Sausage, Fish Satay and Fish Floss

Parameter	Fish Ball	Fish Sausage	Fish Satay	Fish Floss
Storage life :				
- Chilled Temp. ($\pm 5^{\circ}\text{C}$)	32 days	20 days	> 25 days	> 50 days
- Ambient Temp.	—	—	—	—
Organoleptic :				
- Appearance	round, smooth	cylindrical, smooth	thin, size : 5 x 20 Cm	stretched, length: 0.5—1 Cm
- Colour	Greyish white slightly dull	Greyish white	Dark Red, slightly dull	Brownish
- Odour	Spesific	Spesific	Spesific	Spesific
- Texture	Elastic	Elastic	Elastic	Smooth
Chemical Analyses :				
- Moisture (%)	75.43	72.72	24.11	9.00
- Fat (%)	0.24	2.65	0.51	23.28
- Protein (%)	12.54	15.31	19.73	40.05
- Ash	1.95	1.73	0.06	3.96
Microbiological Analysis :				
- Total Plate Count/ (TPC)gr (X 10^5)	12.3	20.4	670	1.7

CONCLUSION

Results of consumer test and preliminary study on marketing were very useful to improve the processing technologies of fish ball, fish sausage, fish satay, and fish floss. The benefit of production cost and basic price calculation was to define the selling price of the products and to be a guidance for enterpreneurs in manufacturing of shark meat products, espacially fish ball, fish sausage, fish satay and fish floss.

Further experiment on marketing test should be continued entrusting the products in super-markets, retailers, travelling traders, canteens which have been contacted during preliminary marketing test.

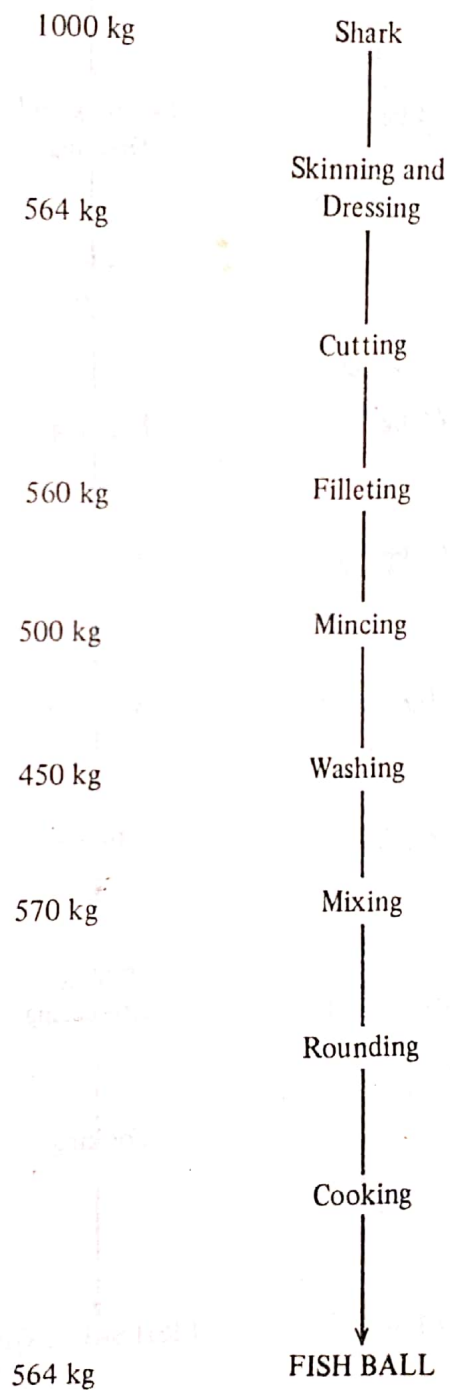
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APPENDICES

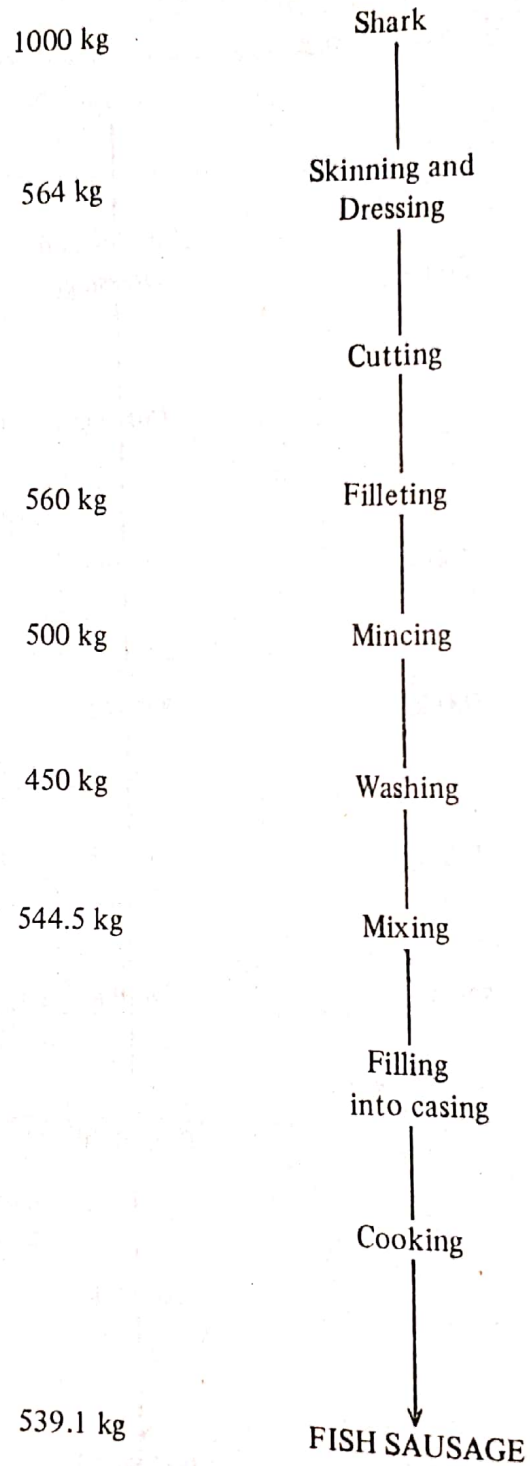
Appendix 1. Process Flow of Fish Ball

Material Balance



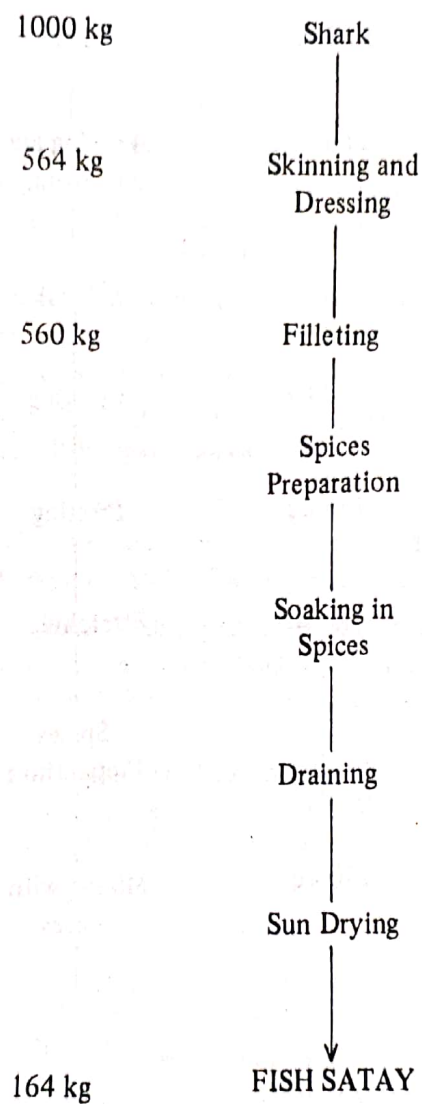
Appendix 2. Process Flow of Fish Sausage

Material Balance



Appendix 3. Process Flow of Fish Satay

Material Balance



Appendix 4. Process Flow of Fish Floss

Material Balance

