



# Addition of Milkfish (*Chanos chanos*) Bone Meal into the Churros Product

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Received: May 22, 2024

Revised: June 30, 2024

Accepted: July 25, 2024

Published: July 31, 2024

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DOI: [10.29303/jppipa.v10i7.8342](https://doi.org/10.29303/jppipa.v10i7.8342)

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**Abstract:** Milkfish production in Karawang in 2016 was 19,166 tonnes which resulted in high bone waste. Therefore, there is a need for innovation in the utilisation of milkfish bone meal as a nutritional enhancer for churros products. The purpose of this study was to determine the process flow of making churros with the addition of milkfish bone meal, determine the quality of hedonic test, determine the chemical quality of microbiological levels, determine the appropriate packaging and business analysis of churros. Churros were made in four treatments with formulations F0 without the addition of milkfish bone meal, F1 2.5%, F2 5%, and F3 7.5%. The results showed that hedonic testing of churros with F3 was the best formulation with a moisture content of 5.73%, the highest moisture content was 37.9% in F0. Ash content in F0 0.56%, F1 2.26%, F2 2.83%, F3 4.13. The calcium content in sample F0 was 10.8.99 mg/100g, F3 1470.71 mg/100g. The results of phosphorus testing on churros, sample F0 as much as 982.2 mg / kg, while in F3 has a phosphorus content of 6,516.75 mg / kg. The ALT test results on F0 and F3 churros have met the SNI 8372: 2018 standard with a value of  $2.5 \times 10^3$  colonies/gram in all samples. The results of the business analysis of milkfish bone meal churros are said to be feasible with a selling price of 45,000 per package.

**Keywords:** Calcium; Churros; Fish bone meal; Milkfish

## Introduction

Milkfish is a superior commodity fish because it has a relatively low price and has a high nutritional content including protein content ranging from 20-24%, glutamic amino acids 1.39%, unsaturated fatty acids 31-32% and has macro and micro mineral content (Hafiludin, 2015). In 2016, Karawang Regency produced 19,166 tonnes of milkfish and will continue to increase every year. The high production of milkfish has an impact on the amount of milkfish bone waste which is also high.

Unutilised milkfish bone waste will cause environmental pollution (Siswanti et al., 2017). Milkfish bone waste in Karawang can be obtained from the production of milkfish fritters and milkfish brains from the C73 milkfish UMKM on Jl. Raya Tambak Sumur, Tambaksari Village, Tirtajaya District, Karawang, West Java. Therefore, there is a need for innovation by

processing milkfish bones so that they do not accumulate so as to reduce pollution and to increase the variety of types of processed milkfish, fish bones can be used as flour and added to processed food so that they can increase the content of phosphorus, carbonate, and calcium in food (Nur et al., 2018). In 2.9 grams of milkfish bone meal contains 5.24% calcium and 2.36% phosphorus (Bakhtiar et al., 2019), so that it can be an alternative to meet the needs of calcium and phosphorus in the body by utilising it as a food additive. Calcium is needed for the formation and maintenance of the body's skeletal tissues and helps in regulating the transport of ions into and out of membranes, plays a role in receiving nerve impulses, blood clotting and blood pumping, muscle contraction, and maintaining hormonal balance (Almatsier, 2009; Whitney & Hamilton, 1987).

Churros is a food that is currently popular with the public (Mahdiyah et al., 2022). This sweet food originating from Spain is favoured by all circles of

## How to Cite:

Soeprijadi, L., Ratnaningtyas, S., & Cahyani, F. D. (2024). Addition of Milkfish (*Chanos chanos*) Bone Meal into the Churros Product. *Jurnal Penelitian Pendidikan IPA*, 10(7), 4179–4187. <https://doi.org/10.29303/jppipa.v10i7.8342>

society because it is a snack food. Churros have an elongated shape that is moulded like a star, fried to get a crunchy texture and soft inside. Churros are made from butter, eggs, flour and water, so they only contain a large amount of carbohydrate nutrients. With this, it is necessary to have additional nutrition in the form of mineral content in the making of churros to complement the nutritional content of churros. Marketing of churros is generally done churros are sold directly through roadside carts and outlets in shopping centres. Facts in the field show that churros products on the market are not immediately sold out, so there needs to be a solution regarding product packaging techniques and making churros products into frozen products so that they can be stored for a longer period of time. Frozen food is a way out for people with today's consumptive patterns that are all instant. Frozen food can also be an alternative to provide good nutritional content in the body quickly.

Based on the description above, to make practical and nutritious frozen churros rich in calcium and phosphorus, have the right packaging by utilising milkfish bone waste which is abundant in the Karawang area, while knowing the quality of churros so that the product is safe, and considering the feasibility of the business, so the author took the title Final Practical Work "Utilisation of Milkfish Bone Flour (Chanos chanos) into Churros Products".

## Method

### *Ingredients and Tools*

The ingredients used for making churros refer to the recipe book *The New Cookie Book* by Atkinson (2003) dalam Maharani (2021) which has been modified by the addition of milkfish bone meal, namely wheat flour, eggs, butter, sugar, water, and milkfish bone meal. The tools used are basin, freezer, bowl, spoon, gas stove, dry mill blender, baking tray, 80 mesh sieve, digital scales, scissors, spatula, churros maker, stewpan, oven, baking paper, toothbrush, and plastic triangle.

### *Location*

This activity was carried out at the Karawang Marine and Fisheries Polytechnic Processing Teaching Factory, Jalan Lingkar Tanjungpura, Karangpawitan, West Karawang District, Karawang Regency, West Java, 41315. Microbiological testing was carried out at the Karawang Aquaculture Production Business Service Centre Laboratory located at RT 04, RW 01, Pusakajaya Utara Village, Cilebar District, Karawang Regency, West Java Province. Phosphorus and calcium testing was carried out at the laboratory of PT Saraswanti Indo Genetech located at Jalan Rasamala, Taman Yasmin No.

20, RT 02/RW 03, Curug mekar, West Bogor District, Bogor City, West Java, 16113.

### *Data Analysis*

The data analysis method used is descriptive analysis, which has the aim of providing an overview (description) of the data so that the data presented becomes easy to understand and informative, with data presentation using tables, diagrams and graphs. Descriptive analysis includes ways of collecting, compiling, or arranging, processing, presenting and analysing numerical data in order to provide a regular picture so that certain conclusions or meanings can be drawn (Sholikhah, 2016).

### *Preparation of milkfish bone meal churros*

The making of churros refers to the recipe book *The New Cookie Book* by Atkinson (2003) dalam (Maharani, 2021). By boiling water, sugar and butter until it melts, then the process of mixing the dough by putting wheat flour and milkfish bone flour little by little into a mixture of butter, water and sugar that has boiled and then stirred until smooth. After the dough is well mixed and smooth, the dough is left to cool or not hot for 15 minutes, then eggs are added to the dough, then the dough is mixed until the dough is smooth again. Then printing the dough that has been smoothly put into a plastic triangle and then put it back in the plastic triangle that has been inserted into the churros mould so as not to stick, press the plastic triangle until the churros dough comes out and print it using a mould and then put it on the surface of the pan or tray which has previously been given a layer of baking paper so that the churros do not stick to the pan. Size the churros evenly with a length of 14 cm.

The moulding process is repeated until the churros dough runs out. After the churros product is moulded, it is placed into a baking tray and then covered using plastic cling wrap so as not to be contaminated, then put into the freezer for 1 hour at -15o C. Then quality testing was carried out by sending samples of milkfish bone meal churros that had gone through the frying process to the laboratory for calcium, phosphorus and ALT tests. In addition, ash content testing was also carried out referring to SNI 01-2354.1: 2010 concerning the determination of ash content and acid insoluble ash content in fishery products and water referring to SNI 2354.2: 2015 concerning Moisture Content Testing in Fishery Products using the gravimetric method (weight) using a non-vacuum oven. Furthermore, packaging is done by putting the churros into an airtight 750 ml thinwall container so that the churros can last a long time.

The churros product also comes with chocolate and tiramisu dipping sauces packaged in small 25 ml

thinwall containers for added flavour variation. After the thinwall was sealed, a label sticker was attached to the thinwall packaging as a differentiating image of milkfish bone meal churros products with churros products on the market.

The treatment of adding milkfish bone meal as much as 0% (F0), 2.5% (F1), 5% (F2), and 7.5% (F3) of the 100% formulation was calculated from the dry ingredients used (flour, butter, eggs and sugar) with a total weight of dry ingredients of 350 grams. The selection of the formulation refers to Bakhtiar et al (2019).

**Table 1.** Formulation of churros with the addition of milkfish bone meal

Material	Formulation			
	F0 0%	F1 2.5%	F2 5%	F3 7.5%
Milkfish bone meal (g)	0	8,75	17.5	26.25
Wheat flour (g)	115	115	115	115
Egg (g)	110	110	110	110
Butter (g)	75	75	75	75
Water (ml)	250	250	250	250
Sugar (g)	50	50	50	50

*Quality Testing*

*Hedonic Quality*

The churros product tested in the cooked state refers to SNI 2346: 2015 concerning guidelines for sensory testing of fishery products, this test includes the parameters of aroma, taste, texture, and appearance. The test used 30 non-standard panellists, (consumers) were asked to give an assessment based on the level of preference with 1 repetition.

*Chemical Quality*

Chemical quality tests observed were moisture content (SNI 2354.2:2015), ash content (SNI 01-2354.1:2010), calcium content and phosphorus content referring to ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometry).

*Microbiological Quality (ALT)*

Microbiological testing (Total Plate Count) on the results of milkfish bone meal churros products refers to SNI 2332.3:2015.

*Packaging*

The packaging of churros is designed to be safe so as to protect the quality of the product. Packaging is done by putting the churros into a container and then given a complementary sauce, closed and given a sticker as a product image.

*Business Analysis*

Financial analysis determines actions to improve and increase profits in entrepreneurship. The following business analysis formula is used: 1) The calculation of the income formula is as follows:  $TR = P \times Q$ ; 2) The BEP formula can be expressed by the formula:  $BEP$  (rupiah)= $TC/TP$ ,  $BEP$  (unit) =  $TC/P$ ; 3) Calculating the R / C ratio value can use the following formula:  $R/C$  Ratio =  $TR/TC$ ; 4) Calculating the value of  $B/C$  Ratio =  $(\pi)/TC$

**Result and Discussion**

*Hedonic Testing*

Hedonic testing uses tested parameters including: appearance, taste, aroma, and texture with a rating scale of 1-9. Testing was carried out at the Karawang Marine and Fisheries Polytechnic, using 30 non-standard panellists who were asked to give an assessment of the level of liking or dislike of the product. The samples used were F0, F1, F2, and F3. Test samples in Figure 1.



**Figure 1.** Hedonic test sample

Hedonic test results were calculated with the mean  $\pm$  standard deviation results in Table 2.

**Table 2.** Hedonic test results

Treatment	Parameters			
	Appearance	Flavor	Aroma	Texture
F0	7.37 $\pm$ 1.14	7.26 $\pm$ 1.28	7.01 $\pm$ 1.33	7.42 $\pm$ 1.18
F1	6.83 $\pm$ 1.40	7.68 $\pm$ 0.98	7.38 $\pm$ 1.24	7.27 $\pm$ 1.41
F2	7.31 $\pm$ 1.23	7.57 $\pm$ 1.13	7.35 $\pm$ 1.36	7.33 $\pm$ 1.49
F3	7.84 $\pm$ 1.15	8.08 $\pm$ 1.25	7.45 $\pm$ 1.36	7.56 $\pm$ 1.39

*Description:*

1) F0 = no addition of milkfish bone meal, F1 = 2.5% milkfish bone meal, F2 = 5% milkfish bone meal, F3 = 7.5% milkfish bone meal; 2) 1 = very strongly dislike; 2 = very strongly dislike; 3 = dislike; 4 = somewhat dislike; 5 = neutral; 6 = somewhat like; 7 = like; 8 very like; 9 = very strongly like.

*Appearance*

The appearance parameter is very influential, because it is the first impression seen directly by consumers. The highest average value of the level of liking for appearance was obtained in treatment F3 with the addition of milkfish bone meal as much as 7.5% with a value of 7.43, which means the panellists like it. The addition of milkfish bone meal affects the increase in calcium and protein levels making the colour of the product brownish yellow (Purwatti et al., 2022). The more the addition of milkfish bone meal, the colour of the churros will increase to golden brown due to the maillard reaction. The maillard reaction occurs because the reducing sugars and proteins in fish bones react on heating to cause a brown colour (melanoidin).

The resulting brown colour is caused by carbohydrates or reducing sugars reacting with protein amino groups to produce hydroxymethylfurfural and then furfural. Polymerised furfural is formed due to melanoidin compounds that cause a brownish colour in churros products (Fajarningsih, 2013). Colour is also influenced by the calcium content found in fish bone meal which can affect the appearance of churros to be darker in food products (Bunta et al., 2013), besides that the length and temperature when frying is also very influential. If you want the churros to have a nice yellow-brown colour, you must fry the churros in hot oil and fry for 3-5 minutes. Temperature and time are the main factors that affect the appearance of churros.

#### *Taste*

F3 with the addition of 7.5% fish bone meal was the most popular with the highest mean value of 7.63 which means that it was very liked. The lowest mean value showed F0 without the addition of milkfish bone meal with a value of 6.80, indicating that panellists liked the taste of churros without the addition of fish bone meal.

This is due to the overly sweet taste of the F0 churros because there is no addition of milkfish bone meal, so the sweetness of the churros cannot be suppressed by the taste of fish bone meal which produces a savoury taste so that it can balance the sweetness of the churros. The more the addition of milkfish bone meal in food, the more glutamic acid and the more savoury the taste (Muna et al., 2017). According to Millah et al (2013), the flavour of food is influenced by product formulation. Meanwhile, according to Winarno (2004), flavour is influenced by chemical compounds, temperature, concentration and interaction with other flavour components with flavour enhancers. From the results of hedonic testing, the addition of milkfish bone meal affects the flavour of churros by reducing sweetness.

#### *Aroma*

The aroma that the panellists liked the most was in formulation F3 with the addition of milkfish bone meal as much as 7.5% with an average value of 6.97, which means that the panellists liked the F3 churros. And the lowest average value is in churros F0 (0%) without the addition of milkfish bone meal with a value of 6.53 which means panellists also like churros F0.

The aroma in churros with the addition of the most milkfish bone meal will experience a fading of the aroma of churros as explained by Muna et al (2017) that the addition of milkfish bone meal will fade the aroma of onion sticks. The dominant aroma possessed by churros is the smell of eggs. So given the addition of milkfish bone meal, the smell of eggs becomes softer. The smell of milkfish bone meal in all churros formulations was less noticeable because it was covered by the sweet aroma of sugar and butter. In addition, the amount of sugar is almost 50% of the amount of milkfish bone meal and the addition of milkfish bone meal does not touch the 30% mark as in other fishery products, so the fishy smell in milkfish bone meal churros is not too strong. The fishy odour produced by milkfish bone meal is produced by amino acids in the protein in the fish that form the flavour and aroma components (Muna et al., 2017).

#### *Texture*

The highest average value of texture in formulation F3 with the addition of milkfish bone meal as much as 7.5% with a value of 7.06 which means panellists like F3 churros. The texture of F3 churros tends to be harder and crunchier because the more fish bone meal is added, the harder the product is because milkfish bone meal contains calcium and phosphorus so that the texture of the resulting product will also change according to the amount of added fish bone meal concentration (Bunta et al., 2013). Food products with the frying process are synonymous with crispy texture, so panellists prefer the texture of crispy and harder churros. According to Chen & Stokes (2012), food texture is influenced by the moisture content, fat, cellulose content, starch, and protein contained in a product, so the addition of milkfish bone meal to churros can affect the crunchy and hard texture because there is phosphorus, calcium, proteins that denature to form a network with cross-links (Chaunier et al., 2005), and the water content in the F3 churros formulation which is getting less due to the addition of fish bone meal components.

#### *Chemical Testing*

The nutritional content of churros was tested by conducting chemical analyses including moisture, ash, calcium and phosphorus content. Chemical testing (calcium and phosphorus) was conducted on control churros and selected churros based on the highest score

in the hedonic test. While chemical tests on moisture content and ash content were carried out on all churros

formulations F0, F1, F2, and F3. The chemical test results are shown in Table 3.

**Table 3.** Chemical test results on churros

Parameters	Unit	Test Result				SNI 8372:2018	Regulation
		F0	F1	F2	F3		
Water Content	%	37.91	31.45	28.68	25.44	Maks. 40	SNI 2354.2:2015
Ash Content	%	0.56	2.26	2.83	4.13	Maks. 0.1	SNI 01-2354.1:2010
Calcium Content	mg/ 100 g	108.99	-	-	1.470.71	-	ICP-OES
Phosphorus Content	mg/ kg	982.20	-	-	6.516.75	-	ICP-OES

Description: Data is the average result of two repetitions

*Water content*

Moisture content in food affects the durability or durability of food, freshness, appearance, and taste image of the food (Bakhtiar et al., 2019). So that an increase in moisture content in food products is an indicator of a decrease in the quality of food products.

The results of testing the water content of churros with the highest value are churros formulation F0 (0%) with a value of 37.91%, and churros with the lowest water content value in F3 (7.5%) with a value of 25.44%. Based on the quality requirements of sweet bread in SNI 8372: 2018, the maximum moisture content is 40%, so all churros formulations meet the quality requirements. The smaller the amount of moisture content in food products indicates the better the quality of the food because it can minimise microbial growth media that can reduce quality so that the product will be more durable (Triyono, 2010). The amount of milkfish bone meal added affects the water content of the churros. This is because the lower the amount of milkfish bone meal added to the churros, the lower the volume of dry matter so that the wheat flour used will dominate the dry matter. The dry ingredients of wheat flour used in churros dough contain gluten so that it binds more water. According to Suhardi (1989), water molecules can be bound by wheat flour because of the content of lysine, arginine, glutamate, aspartate (amino acids in flour).

The moisture content of fish bone meal can also affect the durability in making churros because moisture content can make food products moist quickly so that it will become a medium for growth by microorganisms. Table of the test results of the water content of milkfish bone meal in Table 4.

**Table 4.** The results of testing the water content of milkfish bone meal

Parameters	Sample Type	Unit	Test Result	SNI Requirements	SNI
Water content	T1 (simplo)	%	6.07	8	SNI 01-3158-1992
Water content	T2(duplo)	%	5.38	8	

The results of the water content test on milkfish bone meal are in accordance with SNI with a maximum amount of water content of 8%, while the water content value of milkfish bone meal taken from the average test results is 5.73%.

*Ash Content*

The results of ash content testing on milkfish bone meal churros showed that the highest ash content was found in churros with formulation F3 (7.5%) of milkfish bone meal addition with 4.13% ash content. While the lowest ash content was found in F0 (0%) churros without the addition of milkfish bone meal with an ash content of 0.56%. All churros have not fulfilled SNI 8372: 2018 regarding sweet bread with a maximum ash content of 0.1%.

This happened because the milkfish bone meal churros were ripened by frying instead of baking. In SNI sweet bread uses a roasting process for maturation and according to Winarno (2004) the longer and higher the roasting temperature, the more water content evaporates and does not reduce mineral content in food. While milkfish bone meal churros go through a frying process with cooking oil. Cooking oil contains many minerals so that the combustion process of organic matter during testing is difficult to carry out complete combustion and results in increased ash content. In addition, the content of milkfish bone meal contains many minerals such as calcium of 9.69% in every 100 grams of milkfish bone meal which is a mineral or organic material that is not burned in the process of

burning organic matter (Winarno, 2004). The mineral content of a material can be seen from the ash content (Nugrahani, 2005), so the more addition of milkfish bone meal will affect the high ash content of churros. According to Sudarmaji (2005), the ash component decomposes or evaporates at high temperatures, so the temperature of the ash in each material can be different depending on the components contained in the material.

*Calcium Content*

Calcium content testing of milkfish bone meal churros used the best sample from the hedonic test, namely the F3 formulation with the addition of 7.5% fish bone meal and the F0 (0%) sample as a control without the addition of fish bone meal.

Based on the results of calcium content testing, the highest milkfish bone meal churros sample F3 (7.5%) has a higher calcium content compared to churros without the addition of milkfish bone meal (F0). The calcium content of F3 churros of 1,470.71 mg/100 g has met the mineral adequacy rate of all ages per day according to Permenkes RI number 28 of 2019 with a minimum calcium consumption of 200 mg to 1200 mg and according to the Food and Drug Administration of the Republic of Indonesia (2007) regarding calcium consumption levels in the reference nutrition label (ALG) in general of 800 mg. so that F3 churros can be used as a food that is high in calcium. The weight of 1 fried churros is 10 grams, so consuming 8 milkfish bone meal churros can fulfil the maximum calcium requirement per day.

*Phosphorus Content*

Testing the phosphorus content of milkfish bone meal churros uses the best sample from the hedonic test, namely the F3 formulation with the addition of 7.5% fish bone meal and the F0 (0%) sample as a control without the addition of fish bone meal.

The results of phosphorus content testing on churros formulation F0 and selected formulations according to the average value of the highest hedonic test results F3 (7.5%) can be seen that churros F3 with the highest addition of fish bone meal produces phosphorus as much as 6,516.75 mg/kg and for the results of phosphorus content in F0 (0%) of 982.2 mg/kg. From the results of phosphorus testing F0 and F3 clearly have a very far difference in phosphorus content because milkfish bone meal is a source of calcium and phosphorus minerals (Fitri et al., 2016). The phosphorus content of churros has met the mineral sufficiency rate of all ages per day in accordance with Permenkes RI number 28 of 2019 with a minimum phosphorus consumption of 100 mg to 1,250 mg per day.

*Microbiological Testing (Total Plate Numbers)*

Microbiological testing using total plate numbers (ALT) was used to determine the number of bacterial colonies present in the best churros based on hedonic testing and control churros to make a difference. Alt testing was carried out at the Karawang Aquaculture Production Business Service Centre. The results of the ALT test are shown in Table 5.

Formulation	Unit	Alt Content	SNI Requirement
F0	Colonies/gram	2.5 x 10 <sup>3</sup>	10 <sup>5</sup>
F3	Colonies/gram	2.5 x 10 <sup>3</sup>	10 <sup>5</sup>

ALT testing of milkfish bone meal churros was carried out under conditions of room temperature 23o C and humidity 55o C using the quantitative method. Based on the ALT test results above, churros products without the addition of milkfish bone meal or with the addition of milkfish bone meal obtained ALT results of 2,500 colonies/gram, which means they meet the quality requirements for microbial contamination in churros with SNI 8372: 2018 concerning sweet bread with a maximum ALT requirement of 100,000 colonies/gram. ALT testing is an indicator of the hygienic and sanitary process of a product (Rahmi et al., 2018). The number of bacterial colonies in food products can occur due to factors such as the tools used are not hygienic and sanitary, the materials used are not hygienic, incorrect processing, handling, and storage that are not fast, careful, and sanitary. The freezing and frying process in churros affects the number of microbes in churros, this is because when frying the water content decreases and the high temperature in the churros makes the microbial process stop its growth, while the freezing process makes the churros stored in low temperatures or moves and releases heat from the churros to a low temperature refrigerant in a frozen state. Thus the growth of spoilage bacteria, microbiological activity, and enzymes are inhibited, so that bacterial colonies can be inhibited in growth because the water content will turn into ice crystals, making it difficult for spoilage bacteria colonies to develop.

*Churros Packaging*

The type of packaging used for milkfish bone meal churros uses a black thinwall plastic container with a transparent lid to make it easier for consumers to see the contents of the product inside the package. The black colour was chosen as the container so that minimal light is exposed to the product so that the product does not melt quickly and experience quality deterioration. The selection of thinwall containers as packaging is because they are square-shaped containers that are expected to be protective from physical damage from impact and friction, airtight, can be stored at cold temperatures to

extend the shelf life so that the product is less contaminated and made of materials that do not contaminate the product because they are made of polypropylene (PP) plastic with a food grade symbol and BPA free (Azmi, 2022).

Thinwall packaging with PP plastic material is superior to PE (Polyethylene) plastic because it has a high enough melting point (190-200o C) so that it can be put into the microwave, has high chemical resistance, but this PP material has low hitting resistance, so the container is prone to cracking.

Churros products that are packaged using thinwall packaging are more durable than ordinary mica packaging, because thinwall packaging is airtight so that during the storage period the sparks on the churros are less than with ordinary mica packaging. Churros in thinwall packaging also have a durability of up to two months if put in the freezer and tightly closed with thinwall packaging. This can be seen when the storage in the freezer is still good, still bright in colour and has a little ice flower even though it has been two months. While at room temperature around 25o C the churros can remain frozen and in good shape for up to 15 minutes. Based on organoleptic tests, churros that have been stored for two months in frozen form using thinwall are still suitable for consumption. However, further testing is still needed to prove the safety level of the product. Image of the difference between churros storage in mica and thinwall packaging in Figure 2.



Figure 2. Churros storage on thinwall and mica

Appropriate packaging labels containing the required information such as product name, composition, net weight, expiry date, storage advice, description of advantages with other products, manufacturer's name, production date, serving size, product nutritional content, and serving advice. The packaging label will be attached to the outside of the

thinwall so that it can be read clearly. The picture of the churros packaging is in Figure 3.



Figure 3. Churros packaging

Business Analysis

Business analysis of milkfish bone meal churros processing includes profit and break event point (BEP). This calculation requires the calculation and collection of fixed costs, non-fixed costs, and income. The calculations used are the calculation of tool depreciation costs, other costs, and material costs during the production process. Calculation of business analysis can be seen in Appendix 6. Churros with milkfish bone meal is sold at a price of Rp 45,000 per package because it competes with similar products without the addition of milkfish bone meal in the market with the same packaging size of 750 ml thinwall with a price of Rp 30,000 per package. The results of the business analysis calculation are in Table 6.

Table 6. The results of business analysis calculation

Komponen Biaya	Hasil
Fixed cost	IDR 287.148,00
Variable cost	IDR 232.750,00
Total cost of expenditure	IDR 519.898,00
Total cost of revenue	IDR 1.125.000,00
Benefits	IDR 605.102,00
BEP units	12 Units
BEP Rupiah	IDR 20.795,00
B/C ratio	1,17
R/C ratio	2,17
Depreciation	IDR 107.148,00

The B/C ratio value is 1.17 which is more than 1, so this business is feasible to run. The selling price of milkfish bone meal churros can be reduced if the production process in one month is more than once.

Break Event Point (BEP) of milkfish bone meal churros processing is influenced by fixed and non-fixed costs and production quantities. The break-even point or BEP of milkfish bone meal churros is reached at sales

with a capacity of 1 time production of 25 pcs and the break-even point will be reached if the milkfish bone meal churros are 12 packs and must sell the product at a selling price of Rp 20,795.00 in order to return capital. The BEP calculation can be seen in Appendix 6.

Meanwhile, the Benefit Cost Ratio (B/C) is a value that can determine whether a business is feasible or not. Based on the calculation of the B / C ratio, the value obtained is more than 1, namely 1.17, so the costs incurred of Rp 519,898.00 provide a profit of Rp 605,102.00.

## Conclusion

Based on the research results, it was concluded that: 1) Churros with the addition of 7.5% milkfish bone meal is the best formulation, with aroma, appearance, and texture parameters like, and taste very like; 2) Water content in F0, F1, F2, F3 was 0.56%, 2.26%, 2.83%, 4.13% respectively; 3) Calcium and phosphorus testing on churros with the addition of 7.5% milkfish bone meal showed results of 1470, 71 mg/100 g and 6,516.75 mg/kg, respectively; 4). Total Plate Numbers testing on churros (F0) control and churros with the addition of (F3) 7.5% milkfish bone meal met SNI requirements; 5) The packaging used in churros is a black thinwall container with a transparent lid made from polypropylene (PP) plastic with a food grade symbol and BPA free with a weight of 200 grams of churros per package; 6) The results of business analysis based on the calculation of B/C and R/C ratios obtained values of 1.17 and 2.17 respectively, which means that the B/C ratio value is more than 1, so this business is feasible to run.

## Acknowledgments

We would like to thank all parties involved in the completion of this research. This research was partially funded by DIPA Politeknik Kelautan dan Perikanan Karawang.

## Author Contributions

LS: Developing ideas, analyzing, writing, reviewing, responding to reviewers' comments; SR, FDC: analyzing data, overseeing data collection, reviewing scripts, and writing.

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

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