



Review articles; UTILIZATION OF FISH BONE FOR FLOUR SOURCES OF CALCIUM

Naufal Zharif¹ and Junianto²

1) Fisheries Study Program Student _ Padjadjaran University

2) Lecturer on the Department of Fisheries_Padjadjaran University

Abstract

This article aims to review the process of flouring fish bones. Based on the literature review, information was obtained that fish bone flour was carried out through various washing processes, bone boiling, cleaning, pressure processing, re-boiling, extraction of NaOH base, washing, re-drying, flouring, and packaging. As a result of processing fishery waste, fish bones have a lot of potential to improve the community's economy, especially when fish meal is used as a calcium fortification material in cilok products, cake sticks, and other processed products.

Keywords: *cilok, fortification, boiling, NaOH.*

PRELIMINARY

In the human body, calcium is the most abundant element and cation. Almost about 1.5-2% of the total body weight consists of calcium. The function of calcium in the human body is for the formation and maintenance of skeletal tissue, helping regulate the transport of ions into and out of membranes, maintaining hormone balance, as a catalyst in biological reactions, as well as clotting and pumping blood (Whitney and Hamilton. 1987 in Trilaksani, 2006).

Sources of calcium in food are usually found in milk, vegetables, and fish. However, not all calcium from these foods can be utilized directly by the body because there are several factors that affect the absorption of calcium in the intestine. These factors are divided into two, namely factors that can increase absorption such as: oxalate, fiber, and food phytate. While factors that can increase absorption are phosphorus, protein (lysine and arginine).lactose, and vitamin D (Linder. 1992 in Trilaksani. 2006).

Milk is the best source of calcium and it is easy to get, but the price of milk for some people is still quite expensive, therefore an alternative source of calcium is needed that is cheaper and more easily absorbed by the body. All parts of fish are organic components that

should be used as a source of animal food. Unfortunately, the handling of fishery industry waste only focuses on being processed into animal feed.

According to Aninda *et al.*(2010). Fishery waste such as bones, heads, offal, scales, skin, and fish tails are still not fully utilized and are always experiencing an increase in waste as the industry develops or the level of household fish consumption. Fishery waste such as fish tailbone should be utilized because it contains high nanocalcium and phosphorus (Lestari. 2001). In addition, fish bone waste has the potential to be used as an alternative source of calcium besides milk because it is easily available and has a more affordable price. This article aims to review the process of flouring fish bones.

Fish Bone Waste

Bone is the part of the body of living things that contains the most calcium with an estimated 99% apart from bone also found in teeth, and 1% of it is found in meat and soft tissues. According to Almatier (2009) the need for calcium for living things can be produced from milk, milk products, and fish eaten with bones. As industrial waste, fish bone is one that has not been used properly but has various alternatives to be reused through processing.

As a result of industrial waste, fish bones have many alternative processing by utilizing the calcium content contained therein. Among these processing alternatives are flour, cilok, and cake sticks using raw materials from various kinds of fish bones (Susanto 2019).

Fish Bone Flour

Calcium from fish bones has quite good quality and is easy to obtain. One of the uses of fish bones is processing into bone meal (Putranto 2015). Utilization of fish bones into fish bone meal can reduce the amount of fishery waste and indirectly contribute to calcium intake for the people of Indonesia. Examples of fish meal that have been successfully processed are belida fish bones with a calcium content of 30.93%, tuna fish bones 30%, tilapia bones 20.85%, and milkfish bones 14.16%.

Process of Making Fish Bone Flour

According to Putranto. H. F., *et al.* (2015) in a case study of processing belida fish bones (*Chitala sp.*) into fish bone meal, as follows:

- a. Washing: The bones of belida fish (*Chitala sp.*) were washed with running water and then drained.

- b. Boiling bones: Washed bones are put into an aluminum pot to be boiled in 80°C water. Bones are boiled for 30 minutes with the aim of making it easier to clean fish bones from remaining meat, blood, and fat that are still attached
- c. Cleaning: After boiling, the fish bones are washed with clean water with the aim of removing the remaining meat that is still attached. Furthermore, the fish bones were drained and weighed as much as 200 grams in each treatment.
- d. Presto: The presto pose functions to speed up the cooking time, removes fat from the bones, denatures protein, and softens the bones to make the flouring process easier. Furthermore, the presto process (P) was carried out with two long presto treatments, namely 2 hours (P2) and 3 hours (P3).
- e. Boiling: After the fish bones softened due to the pressing process, a boiling process (R) was carried out with two boiling frequency treatments, namely boiling 1 time (R1) and boiling twice (R2) with a boiling time of each frequency for 30 minutes. The boiling process is carried out by boiling 2 liters of water at a temperature of 100°C. Then the fish bones are inserted and left for 30 minutes. After boiling for 30 minutes, the fish bones were removed and drained (R1). While in the treatment of two boiling times (R2), after boiling once (R1) followed by the process of boiling twice (R2) by replacing the first boiling water with new water. After that, the fish bones are drained.
- f. NaOH Base Extraction, Base extraction process is a process of immersing bones into 1.5 N NaOH solution and carried out for 2 hours at a temperature of 60°C in each treatment. This process serves to remove the remaining protein that is still present in the fish bones.
- g. Washing, fish bones are placed on a filter cloth which is then drained with water and rinsed. The function of this process is to neutralize the pH in fish bones.
- h. Drying, fish bones are then placed on a tray that has been coated with aluminum foil. The bones were dried in a drying oven at 65°C for 48 hours.
- i. Flour, dried fish bone flour will be mashed using a blender and sifted using a flour sieve.
- j. Packaging After the flouring process is carried out, the fish bones are packed into packages with the aim of maintaining hygiene and avoiding infection with other organisms.

Potential and Utilization of Fish Bone Flour

a. Potential

Calcium is an important mineral for humans, because it has many vital functions in the body. Calcium plays a role in the process of bone and tooth growth, the process of coagulation or blood clotting, the work function of muscles including the heart muscle, metabolism at the cellular level, the respiratory system and so on (Shita and Sulistiyani, 2010). According to Ferazuma (2011) the level of food consumption of calcium sources among Indonesian people is still low. Calcium deficiency in children causes rickets (rickets) and in adults it can cause osteomalacia (adult rickets) and osteoporosis (Whitney and Hamilton, 1987). According to Whitney and Hamilton (1987) the World Health Organization recommends the recommended amount of calcium intake per day for adults is around 400-500 mg, but if the protein consumption is high it is recommended to consume 700-800 mg. Thus, the demand from the Indonesian people for products containing calcium is quite high, but the source of fish bones is still quite low, so the potential for processing fish bones into fish meal or products made from calcium is quite high.

b. Utilization of Fish Bone Flour

There are various products processed from fish bones by utilizing the calcium contained in them, including belida fish meal which is used as additional flour for making cilok (Susanto 2019). Then there is tuna fish meal which is used in making sticks (Lestari 2016). One of the uses of fish bone is to process it into bone meal which can be used as a supplement as well as a medicine to prevent osteoporosis (Jiancong et al. 2010 in Putranto. 2015).

In the research conducted by Darmawangsyah (2018). Milkfish bone meal (*Chanos chanos*) is used as an ingredient in pastry making and an alternative source of calcium and phosphorus. The addition of milkfish bone meal (*Chanos chanos*) is useful as a provider of nutrient-rich food sources and reduces the negative impact on the environment due to pollution. Milkfish bone flour (*Chanos chanos*) itself has a calcium content of 14.6%. After analyzing the nutritional content, the addition of 12% milkfish bone meal in the manufacture of pastries effectively increased the calcium content of the pastries by 1.41%. According to Rachman and Setiyohadi (2007). the addition of fish bone meal serves to meet the needs of calcium in the human body and prevent osteoporosis in the community. Other than that, the function of add some calcium are for grow up a bone and tooth catalysator react in biology, and muscle contraction (Mulia 2004).

Conclusion

Based on the literature review, information was obtained that fish bone flour was carried out through various washing processes, bone boiling, cleaning, pressure processing, re-boiling, NaOH base extraction, washing, re-drying, flouring, and packaging. As a result of processing fishery waste, fish bones have a lot of potential to improve the community's economy, especially when fish meal is used as a calcium fortification material in cilok products, cake sticks, and other processed products.

REFERENCES

- Almatsier, S. 2009. Basic Principles of Scholar Nutrition. Jakarta.
- Aninda RA, Siti NK, Nikmatur R. 2010. Student Creativity Program Utilizing Milkfish Bone Waste (*Chanos Chanos*) as High Calcium Meatballs. Poor. Malang State University.
- Darmawangsyah, D., & Kadirman, K. (2018). Fortification of milkfish bone meal (*Chanos chanos*) in the manufacture of pastries. *Journal of agricultural technology education*, 2(2), 149-156.
- Ferazuma, H., Marliyati, SA and Amalia, L., 2011. Substitution of head meal of African catfish (*Clarias gariepinus* sp) to increase the calcium content of crackers. *Journal of Nutrition and Food*, 6(1), pp.18-27.
- Lestari S. 2001. Utilization of tuna bone waste into flour. Bogor. Faculty of Fisheries and Marine Sciences, IPB.
- Lestari, WA and Dwiyanana, P., 2016. Utilization of tuna bone waste (*Thunnus* sp.) in the form of flour in the manufacture of sticks. *Journal of Health Sciences*, 8(2), pp.46-53.
- Glorious. 2004. Study on the potential of catfish bone waste (*Pangasius* sp) as an alternative source of calcium in dried noodle products. Essay. Bogor: Faculty of Fisheries and Marine Sciences, IPB.
- Putranto, HF, Asikin, AN, & Kusumaningrum, I. 2016. Characterization of belida fish bone meal (*Chitala* sp.) as a source of calcium by protein hydrolysis method. *Ziraa'ah Agricultural Scientific Magazine*, 41(1), 11-20.

- Rachman IA, & Setiyohadi B. 2007. Osteoporosis. Makassar, (online). (<http://www.medicastore.com/osteoporosis/index.html> Access Date 01 September 2015).
- Shita ADP, Sulistiyani. 2010. Effect of calcium on the development of children's teeth. Stomatognathic (JKG Unej) 7(3):40-44.
- Susanto, AH, Ridho, R. and Sulistiono, S., 2019. Utilization of Tuna Fish Bone Waste in Making Cilok as a Source of Calcium. Lemuru Journal, 1(1), pp.25-33.
- Trilaksani, W., Salamah, E., & Nabil, M. 2006. Utilization of tuna bone waste (Thunnus sp.) as a source of calcium by protein hydrolysis method. Journal of Indonesian Fishery Products Processing, 9(2).
- Whitney EN, Hamilton EMN. 1987. Understanding Nutrition. New York: West Publishing Company

