

CHAPTER II

LITERATURE REVIEW

2.1 Ingredients Review

2.1.1 Milk Fish (*Chanos Chanos*)

Fish is a source of unsaturated fatty acids, minerals, protein and vitamins. The chemical composition of each fish will vary, these differences depend on internal and external aspects. Internal aspects include the metabolic rate, reproduction, sex, species and age of the fish. External aspects include aspects of habitat, food availability and water quality (Hafiluddin, 2015).

Milkfish is known for its high protein content, according to several studies that have been carried out regarding proximate analysis of milkfish, including that milkfish without chitosan feed treatment contains ash (0.86%), water (79.42%), carbohydrates (3.88 %), fat (0.45%), and protein (15.38%) (Hafiluddin & Haryo, 2011), the nutrients contained in milkfish from Lamongan are ash (1.60%), water (75, 58%), carbohydrates (4.12%), fat (1.27%) and protein (17.41%), while the nutrients contained in milkfish from Pamekasan are ash (2.80%), water (70.78%), carbohydrates (2.63%), fat (1.41%) and protein (22.31%) (Hafiluddin et al., 2014). The proximate composition of milkfish from brackish water habitats is ash (1.41%), water (70.79%), carbohydrates (2.78%), fat (0.85%) and protein (24.18%) (Hafiluddin , 2015).



Figure 2. 1 Ikan bandeng *Chanos chanos* forsskal (Muslim, 2004)

As an export commodity, milkfish is known as milkfish and has the characteristic of a slim body shaped like a bullet with a branched tail fin as an indication that milkfish has the ability to swim quickly. Milkfish that live in nature have a body length of up to 1 m. However, milkfish cultivated in ponds can only reach a maximum body length of 0.50 m. Milkfish have very unique properties because they are resistant to large levels of salt in the water or have euryhaline properties (Ida 2008). Milkfish can be found in fresh water, brackish water and sea water. During its development period, milkfish like to live in brackish water, or river estuary areas. When they reach adulthood, the fish will return to the sea to breed (Purnomowati, et al, 2007). The growth of milkfish is relatively fast, namely 1.1-1.7% body weight per day, and can reach an average weight of 0.60 kg at the age of 5-6 months if kept in ponds (Sudrajad, 2008).

2.1.2 Curing Salt

Salting is one of the oldest methods of fish preservation. It is based on the penetration of salt into the fish muscle and extraction of water from the fish muscle, thereby lowering water activity and pH. The water extraction is due not only to concentration differences in salt and water between the fish muscle and the surrounding media, but also to structural changes within the muscle (the effects of salt on the proteins). Traditionally, salting is performed either by dry salting, pickling or brining. During the past decades, the use of brine injection has increased to accelerate salting, increase automation, obtain a more equal salt distribution within thick muscles and improve processing yields (Thorarinsdottir et al., 2010b). The salting process has been developed from a single-step to a multi-step process, involving a pre-salting step to meet new demands from buyers and consumers, as well as to increase productivity and automation. The new salting method consists of the injection of brine into the fish muscle followed by dry salting or by

brining and again dry salting. In this chapter, the main focus is on salting species of fish from the Gadidae family.

Salt (sodium chloride) is one of the oldest ingredients used for meat preservation and one that is fundamental to all cured meat products. Salt, in terms of quantity and frequency of use, is the most common ingredient in cured meats. Despite concerns about excessive sodium in human diets and efforts to reduce sodium consumption, salt is so critical to meat processing that this ingredient cannot be eliminated.



Figure 2. 2 Prague Powder #1 (The Spruce/Julia Hartbeck 2023)

Salt (sodium chloride) is a white crystalline solid that is available as evaporated salt, rock salt, or solar salt. Most food grade salt is produced by vacuum evaporation of salt brines which produces the highest purity and cleanest salt. Because salt is a Generally Recognized As Safe (GRAS) substance, food grade salt must comply with the chemical tolerances of the Food Chemicals Codex (Institute of Medicine [IOM], 2003) . For vacuum evaporated salt, the minimum purity is 99.0% NaCl (IOM, 2003) and most commercial evaporated salt is 99.8–99.9% pure (Strietelmeier, 1988) . Rock salt is mined from mineral deposits and solar salt or sea salt is produced by natural evaporation of sea water. Rock salt and solar (sea) salt are required to contain at least 97.5% sodium chloride for food applications (IOM, 2003). A simple and time-tested dry-curing formula is as follows: salt, sugar, sodium nitrate, sodium nitrite (nitrate available; remember, excess nitrite is toxic). Several

ingredients such as sodium nitrate, sodium nitrite and salt have been mixed in one product called Prague powder. In this fish product, the initial weight of the fish was 350 grams, there was a shrinkage of around 56% or almost 200 grams. As is known, salt has the property of removing moisture from fish.

Sugar is an important organic compound that serves as a source of calories because it is easily digested in the body and has a sweet taste. Sugar is also used as a raw material for making alcohol, as a food preservative, and as an ingredient in pharmaceuticals (Goutara and Wijandi, 1975). With the increase in per capita income and population, the demand for sugar is also rising. This reality has led to various efforts to increase sugar production beyond just cane sugar, as relying solely on cane sugar as the only source of natural sweetener is not feasible. According to records from the Agricultural Research and Development Agency, national sugar production in 2011 reached 2,228,591 tons of White Crystal Sugar (GKP), and the estimated sugar production for 2012 was expected to reach 2,683,709 tons. Based on the roadmap for sugar self-sufficiency, the estimated national sugar demand in 2014 was 2,956,000 tons of GKP (Directorate General of Domestic Trade, 2012).

The use of artificial sweeteners is also very limited due to health concerns, necessitating research to find alternative sources of sweeteners other than cane sugar. One alternative that has been pursued is the effort to produce sugar from starch by hydrolyzing starch into sugar (Anugrahati, 1999).

2.2 Product Review

Cured milkfish is a milkfish product that is salted using a special salt called prague powder. This cured fish product can last for a period of time obtained the value of time = 23.2 in units of weeks or 5.8 months of storage. In contrast to the results of research by Ismailet al., (2018). The advantage of this product is that it has a good texture, the aroma does

not smell fishy. The taste it has is also suitable for being the main ingredient in various dishes.

2.3 Process Review

2.3.1 Curing Method

The fish industry employs several methods of fish curing. However, they are all modifications of two basic procedures: dry salt curing and pickle curing. Dry salt curing is no doubt the oldest method. Evolution of the curing art eventually led to the more modern method of pickle curing. Dry salt curing is a method dating back to prehistoric times and was the first curing method practiced by humans. The process uses salt alone, or sometimes in conjunction with nitrite or nitrate. The moisture is drawn out of the fish by the curing agents and drains off, leaving the fish drier and harder and leaving the flavor brackish. The product is usually laid skin side down, and all areas of exposed lean are plastered with the curing mix (Heller 1929). This process is commonly used for fatty cuts such as jowls and fat backs.

2.3.2 Cold Smoking Method

Cold smoking is a preservation technique also used to create new value-added products. Specifically, in cold smoking, after an initial treatment with salt, the product is smoked in order to give the product organoleptic characteristics appreciated by consumers, as well as to transfer to it antimicrobial and antioxidant compounds (aldehydes, ketones, alcohols and phenols), with a significantly longer shelf-life than fresh product. During the different phases of the process, the temperature is never higher than 30 or 33 °C. The effectiveness of combining traditional techniques such as cold-smoking with the addition of natural preservatives on maintaining the quality and prolonging

the shelf life of new value-added seafood products has been investigated.