

CHAPTER II

LITERATURE REVIEW

2.1 Ingredient Review

2.1.1 Chicken Breast

Main advantage of chicken meat is in its low caloric value and a low portion of saturated fat, so consumption of chicken meat is recommended to people who want to reduce the fat intake, as well as to people suffering from heart and coronary diseases. When compared to cholesterol content, chicken meat does not differ much from other types of meat, however, if considering other benefits (more protein, less total fat, less saturated fat and less calories), it has better nutritional quality and therefore, it is recommended for consumption to anyone who takes care of diet and health. High protein content makes chicken meat an ideal foodstuff for all consumers who need high-quality, easily degradable protein (athletes, children, the elderly) (Gordana Kralik, 2018).



Figure 2. 1 Chicken Breast

Average daily requirement (AR— average requirements) of adults for protein is 0.66 g/kg body weight (BW), while young children and athletes' needs are twice as high (1.12 g/kg body weight). Pregnant women's needs for protein are considerably higher and they depend on the pregnancy trimester, by increasing to an additional 23 g/day for the third pregnancy trimester. Because of all stated above,

chicken meat is recommended as a rich source of high-quality protein in human nutrition. Chicken meat contains low collagen levels, which is another positive characteristic. Collagen is a structural protein that reduces meat digestibility, so chicken meat is easier to digest than other types of meat products. Broiler chicken meat has different nutritional values, depending on the part used. According to (Talebe et al., 2020), broiler chicken meat in the breast part has a protein composition of 35.24 g/100 g.

2.1.2 Pumpkin Seed

Pumpkin seeds (*Cucurbita sp.*) are a highly nutritious and versatile food ingredient known for their distinct nutty flavor and crunchy texture. These seeds are an excellent source of protein, healthy fats, particularly omega-6 fatty acids, and fiber, making them beneficial for digestive health. They are also packed with various minerals such as magnesium, zinc, and iron, which play crucial roles in supporting immune function, bone health, and overall cellular metabolism. The health benefits of pumpkin seeds extend beyond basic nutrition. They are known to help improve heart health due to their high content of antioxidants and magnesium, which can help regulate blood pressure and reduce heart disease risk. Furthermore, the zinc in pumpkin seeds is vital for immune system function and skin health, and can also support male reproductive health by improving sperm quality. gluten-free option for individuals seeking healthier alternatives in their diet.



Figure 2. 2 Pumpkin Seed

A research team investigated Pumpkin seeds offer a rich nutritional profile per 100 grams, they contain 10.71 grams of carbohydrates and provide 559 calories of energy. The total fat content is significant at 49.05 grams. These seeds are also a good source of protein, with 30.23 grams, and have 6 grams of fiber. (Qamar et al, 2019).

2.1.3 Edamame

Edamame (*Glycine max L. Merill*) is an excellent source of protein, generally contain 35% protein, and in superior varieties, it can reach 40-43% (Cahyadi, 2017). making it a favorite among vegetarians and vegans looking for plant-based protein alternatives. Each serving contains significant amounts of protein, which supports muscle repair and growth. Beyond protein, edamame is rich in fiber, which aids in digestion and helps maintain a healthy gut. It's also loaded with essential vitamins and minerals such as vitamin K, which is crucial for blood clotting, and folate, important for DNA synthesis and cell growth. Furthermore, edamame contains antioxidants and isoflavones, compounds that may help reduce the risk of heart disease and improve bone health.



Figure 2. 3 Edamame

Edamame has a fairly high nutritional value, containing 582 Kcal, 11.5g of protein, 7.4g of carbohydrates, 6.5g of fat, 100mg of vitamin A, 0.26mg of vitamin B1, 0.15mg of vitamin B2, 1mg of vitamin B3, and 27% of vitamin C, as well as minerals such as 150 mg of phosphorus, 70mg of calcium, 1.7mg of iron, and 145mg of potassium per 100g of edamame (Kardina et al, 2021). It contains little saturated fat and is rich in fiber, folate, vitamins C and B, calcium, iron or magnesium, and the nine essential amino acids needed by the body, and it does not contain cholesterol (Ariyantini, 2017).

2.1.4 Tempeh

Tempeh, a fermented soy food, was originally developed in Central Java, Indonesia. For many decades, tempeh has been regarded as a meat alternative for poor communities because of its high protein content. As a result of the cheap technology available for processing this food, a low price, and nutritious value, tempeh is a traditional food consumed by indigenous Indonesians. Indonesia has the highest soybean consumption among Southeast Asian countries, and tempeh consumption makes a major contribution to these figures. One of the nutrients which contained in functional food is protein (amino acids). Amino acids are nutrients that have an important function in the human body, such as leucine, isoleucine, and valine that can prevent protein catabolism caused by decreased levels of glycogen in muscle.

Soybeans are one of the foods that contain high protein (Damanik et al, 2018).



Figure 2. 4 Tempeh

According to Jubaidah (2016), tempeh is a nutrient-rich food, offering a diverse range of nutrients in every 100-gram serving. It provides a substantial amount of protein at 20.8 grams and a moderate amount of fat, totaling 8.8 grams. Carbohydrates are also present in a significant amount, measuring 13.5 grams. Additionally, this serving of tempeh supplies 0.19 mg of vitamin B1 and 155 mg of calcium. However, it is important to note that tempeh contains only a small amount of fiber.

2.1.5 Egg White

Egg whites (*albumen*) are a highly valued ingredient in both culinary and nutritional contexts, primarily because of their versatility and health benefits. One egg weighing 53 grams contains 65.64% egg white, 23.61% egg yolk, and 10.75% eggshell. The egg white is high in protein. Egg whites are low in calories and contain no fat, making them an excellent choice for those looking to maintain or lose weight. The proteins in egg whites are of high quality, providing all the

essential amino acids needed by the body for muscle repair and growth (Ramdani et al, 2018).



Figure 2. 5 Egg White

Using egg whites as a binding agent is a culinary technique that enhances the texture and cohesiveness of various dishes. When egg whites are added to a mixture of ingredients, they act as a glue, helping to hold everything together during the cooking process. This method is particularly useful in recipes where maintaining a delicate structure is crucial, such as in steamed foods. The process involves whisking the egg whites until they are slightly frothy, then gently folding them into the other ingredients to ensure even distribution without deflating the egg whites. Steaming the mixture allows the egg whites to set, forming a firm yet tender matrix that encapsulates the flavors of all the components. This technique not only helps in forming a more solid dish but also contributes to a lighter, airier texture, making it a favored method in creating healthier, well-composed meals.

2.2 Product Review

According to Mordor Intelligence (2018), the global protein market was valued at \$468.72 million in 2016, witnessing a compounded annual growth rate of 3.58%; the category of protein bars accounted for almost 56% of the total protein products in 2016. Consumers expressed a lot of interest in healthy snack items that highlighted ‘low fat’ or ‘low sugar’ and

attributed protein food only to muscle building (Bhaludra, 2019). Protein bars are one of those attenuated products which attempt to offer different meanings to different people that are all positive. A savory protein bar crafted with a unique blend of chicken breast, pumpkin seed, edamame, and tempeh. This product is designed to serve as a nutritious, high-protein snack option, appealing to health-conscious individuals who seek an alternative to traditional sweet protein bars. It aims to fulfill the increasing demand for protein-rich snacks that support muscle development, recovery, and general wellness, offering a savory choice for those who prefer non-sweet flavors in their dietary supplements. Each component of the bar contributes specific health benefits, such as the essential fatty acids found in pumpkin seeds, the antioxidants present in edamame, and the probiotics provided by tempeh. This product targets consumers who favor savory tastes, setting it apart in the protein bar market. The texture of the bar might not appeal to all consumers due to the drying process of the ingredients, which tends to make it dry but is necessary to extend its shelf life.

2.3 Process Review

2.3.1 Steaming

Steam cooking is widely used in household and industrial cooking process and become more and more popular in daily life, because it is a convenient and healthy cooking method with typical characteristics of color, flavor, texture, palatability and nutrients retention (Kahlon et al., 2008, Xu et al, 2015). To steam the savory protein bar crafted with chicken breast, pumpkin seeds, edamame, and tempeh using egg whites as a binding agent, begin by finely chopping the chicken breast, pumpkin seed, edamame, and tempeh. Mix these ingredients in a bowl. Then, whisk the egg whites until frothy and add them to the mixture, using them as a glue to bind everything together. The purpose of this method is to maintain the nutrients.

2.3.2 Drying

Drying is defined as the process of removing water using heat and airflow to prevent or inhibit the growth of fungi and bacteria so that they can no longer proliferate or they proliferate slowly. The basis of the drying process is the evaporation of water from the material into the air due to the difference in moisture content between the air and the material being dried. For a material to dry, the air must have a lower relative humidity or moisture content than the material to be dried. During the drying process, two processes occur simultaneously: heat transfer and mass transfer of water. Heat is needed to evaporate the water from the material to be dried. Evaporation occurs because the temperature of the material is lower than that of the air (Sukmawaty et al, 2019). Savory protein bar, which includes ingredients such as chicken breast, pumpkin seed, edamame, and tempeh, the dehydrating method plays a crucial role. This process involves the controlled application of heat and airflow to effectively remove moisture from the ingredients, ensuring longevity and stability of the product. By reducing the water content, we inhibit the growth of microorganisms and prevent spoilage, thereby extending the shelf life of the bars. Use a dehydrator at 50°C for 8 hours to achieve the best results. Do not dehydrate for too long, as it can make the texture of the protein bar too dry and less enjoyable to eat. The dehydration process is carefully calibrated to preserve the nutritional integrity and flavor of the ingredients, especially the protein-rich chicken and tempeh. Additionally, this method enhances the texture of the bar, providing a satisfying chewiness that complements the savory profile of the product.

2.3.3 Air Frying

Hot air frying is a new technique to get fried products through direct contact between an external emulsion of oil droplets in hot air and the product into a frying chamber. The product is constantly in motion to promote homogeneous contact between both phases. In this way, the product is dehydrated and the typical crust of fried products gradually appears. The amount of oil used is significantly lower than in deep oil frying giving, as a result, very low fat products. Today, it is possible to find, on the market, home equipment designed from this principle to obtain low-fat fried products (Shaker and Arafat, 2014). The air frying method is the final step in crafting a savory protein bar made with chicken breast, pumpkin seeds, edamame, and tempeh, adding a crispness to the bar. Use an air fryer at 200°C for 1 minute. This helps the protein bar achieve a crispy texture that makes the protein bar more enjoyable. Do not air fry for too long, as it can cause the protein bar to burn. The air frying process ensures that the protein bar is cooked evenly while creating a satisfying crunch on the outside. This method is favored for its ability to mimic the texture of fried foods without excessive oil, making it a healthier option for enjoying a crispy protein snack.