

CHAPTER II

LITERATURE REVIEW

2.1 Ingredients Review

2.1.1 Unripe Jackfruit (Tewel)

Unripe jack fruit unripe jackfruit has a fibrous texture, therefore, in this product, it is not only a complementary ingredient that contains the nutrients needed as meat, but unripe jack fruit also makes this analogue meat have a more real texture, namely fibrous. It is known as the poor man's fruit because it is easy to grow and is resistant to pests and diseases, which makes it a perfect candidate for improving food and nutrition security and raising income. (Xinggu Lin, Chao Feng, Tao Lin, A J Harris, Yingzhi Li, 2022)The flesh of jackfruit contains many nutrients such as, carbohydrate, proteins, minerals, fats, and vitamins, this is why jackfruit can be an alternative for starchy staple food (akinmutini, 2006) the protein in jackfruit are considered potentially equivalent and can be as an alternative to animal protein, The jackfruit contains several phytochemicals like carotenoids, flavanoids, volatile acids, sterols and tannins that have antioxidant, antipyretic, antibacterial or hypoglycaemia effects.(R. A. S. N. Ranasinghe, 2019).

2.1.2 Oyster Mushroom

In the making of analogue meat, oyster mushroom are one of the most commonly used in the making of analogue meat. why? Oyster mushroom (*Pleurotus ostreatus*) has played an important role as additive which could enhance the texture and organoleptic quality of analog burger patty by using the high moisture extrusion technology. (Sun Young Cho, Gi Hyung Ry, 2022)

Oyster mushroom of *Pleurotus ostreatus* is rich in Vitamin C & B complex (Randive 2012).

There are about ten times more niacin content in oyster mushrooms than any other vegetable. The mushrooms of oysters contain Folic Acid, which is useful for the treatment of anemia. Mushrooms are scarce sources of both vitamins D and conjugated Linolenic Acid on a vegan diet. Due to the existence of compounds such as ergothioneine, mushrooms have antioxidant properties. (Weigand-Heller et al. 2012). It's known as a nutraceutical ingredient because of that. They are antibacterial and antioxidant. Proven in research (Saskiawan and Hasanah, 2015).

2.1.3 Soy bean

The soy bean paste here serves as one of the additive that are needed for the meat analogue to have a complete nutrition it shows high protein content and low fat contain. You will get 18 grams of that essential macronutrient in one serving. You can put these concerns to rest if you are concerned that this plant based protein is not comparable to animal proteins. Soy is one of a limited category of plant protein products, which means that it's made up of all the amino acids your body needs to make sense of food. (Sarah Garone, NDTR, 2022) soy beans here also helps as a binding agent that helps binds the other ingredients together.

2.1.4 Xanthan gum

Xanthan gum here acts as a binder, not only as a binder, it also helping to make the texture tougher but more concentrated. In addition to serving as a food binder and texture, Xanthan gum also acts as a food preservative. Xanthan gum is a polysaccharide produced by *Xanthomonas campestris* and is a food additive commonly added to foods as a thickener or stabilizer. Xanthan is characterized for its ability

to improve the taste, consistency, texture, shelf life and appearance of foods. (Hidalgo, M.E.; Armendariz, M.; Wagner, J.R.; Risso, P.H., 2016) . Xanthan has many technological advantages that make it a rich raw material with various applications, especially for culinary purposes. The features of xanthan could be listed as follows (Gowthaman, M.K.; Prasad, M.S.; Karanth, N.G., 1999 & Hidalgo, M.E.; Armendariz, M.; Wagner, J.R.; Risso, P.H., 2016):

- 1) high viscosity at low concentrations: for example, a solution with a concentration of 1% appears almost gel-like at rest, yet pours readily and has a very low resistance to mixing and pumping;
- 2) high resistance to a wide pH range (2–12) makes xanthan well-suited to foods;
- 3) high thermal stability; the viscosity is not affected by temperatures in the range of (0–100 °C), and it has excellent freeze-thaw ability;
- 4) high solubility of xanthan gum renders it appropriate for many applications, including foods;
- 5) high compatibility with most of the commercially available thickeners.

2.2 Product review

2.2.1 Vegetarianism

Plant-based diets (PBDs) are increasingly consumed by the Italian population and around the world. In particular, among PBDs, the vegan diet is a food pattern characterized by the exclusion of all animal-origin foods. What drives people to adopt this model are mainly ethical, health and environmental reasons. (Giulia Marrone, Cristina, Guerriero, Daniela Palazzetti, Paolo, Alessandro Marolla, Francesca Di Daniele and Annalisa Noce, 2021)

Vegan diet is generally rich in carbohydrates, ω -6 fatty acids, dietary fibers, carotenoids, folic acid, vitamin C, vitamin E and magnesium and relatively low in proteins, ω -3 fatty acids, vitamin B12, vitamin D and calcium, iron, zinc and iodine (Bakaloudi, D.R.; Halloran, A.; Rippin, H.L.; Oikonomidou, A.C. ,Dardavesis, T.I.; Williams, J.; Wickramasinghe, K.; Breda, J.; 2020). The protein intake in the vegan diet is guaranteed by the combination of legumes and cereals (Hever, J. Plant-Based Diets: A Physician's Guide. Perm. J. 2016,). Current food technologies have made it possible to develop plant-origin food similar to that of animal origin, such as the use of soy and its derivatives, which allows an adequate protein intake that otherwise could be lacking (Mariotti, F.; Gardner, C.D. 2019)

2.2.2 Rendang

Today, food does not simply fulfill people's daily need and appetite, but it also shows the identity of certain community . Every region has specific food which shows the heritage and pride of its people from generation to generation (M. Almerico, Ph. D. The University of Tampa. J Int Bus Cult Stud. 2014).

The diversity in rendang reflects the ability of locals to cope with life's challenges, explore local wisdom and adapt to their surroundings and available natural resources. People living in the mountains are capable of cooking rendang with meat, chicken, eggs or even eel as the main ingredient, while people living in the sea have the ability to cook rendang using available natural resources. found in the sea, such as fish. and oysters, which are the main ingredients. (Fresco LO. Environ Sci Pol. 2009)

Thus the idea for the innovation of making “Vegetarian rendang”was created because of external factors which created and increased the popularity of the vegetarian diet. the idea of making

“Rendang” out of young Jack fruit, and Oyster mushroom as it’s texture and soy beans serves as protein to make a complete “plant base meat” where would be one of the innovation of the a vegetarian version of the popular indonesian culinary food that famously known to be made out of meat.

2.3 Process Review

2.3.1 Meat Analogue

In order to make a meat like texture for the meat analogue, the meat analogue undergo 2 kinds of process method, the “ Moist heat cooking method” which included the process of ‘steaming’ to make sure to bind the product in to a lump of analogue meat, and “Dry heat cooking method” which will be ‘pan searing’ in order to dry the outer side of the analogue meat in order to make sure that the already bind meat analogue does not split and break into chunks.

1) Steaming and boiling

The first step for steaming and boiling are to make sure that all of the other ingredients (Young jackfruit, Soy beans, and Oyster mushroom) will be fully cooked and has the perfect texture for it to be cooked on the 2nd steaming process and will be easier for it to be mix and bind well.

2) Steaming

The 2nd steaming process are to ensure all ingredients will be well combined and adhered. Steaming is a moist-heat method of cooking that works by boiling water which vaporizes into steam; it is the steam that carries heat to the food, cooking it. Unlike boiling food submerged in water, with steaming the food is kept separate from the boiling water but comes into direct contact with the hot steam. Water

boils at 212 degrees, so the highest temperature the food cooks at is 212 degrees.

When cooking vegetables, it is better to steam rather than boil because the food is separated from the hot water, allowing the vegetables to retain more nutrients during the cooking process. It also breaks down the cellular structure of some vegetables and may increase the amount of certain nutrients available in these vegetables. In this case, steaming process are needed to activate the binder of the meat analog, which is xanthan gum and cornstarch, steaming is necessary and an important step to take.

The anionic hydrocolloid polysaccharide xanthan gum is widely used in the food and petroleum industries (among others) as a viscosity enhancement polymer due to its high viscosity at low concentrations and moderate temperatures.

Xanthan gum here works as a binding agent together with corn starch. the structural modification of starch was usually achieved through chemical and enzymatic procedures (Wang et al., 2020). However, this is disadvantageous in food industry, since it involves complex technological procedures and potential concerns over food safety. In fact, all of these can be avoided using physical technologies. In past decades, many physical treatments, such as dry heating (Lee, Lee, Chung, & Park, 2020), frying (Chen et al., 2018), and freeze-thawing (Zhang & Lim, 2021), have been developed to replace the chemical methods. Heat-moisture treatment (HMT), as a safe, efficient, and high throughput physical technology, is widely used in food industry. HMT is always conducted at a controllable condition with a moisture level of 10–35% w/w, a temperature range of 80–120 °C, and a processing time of 0.5–16 h. This efficient technique could allow a starch modification without damaging its granular structure (Chung, Hoover, & Liu, 2009). It has been reported that

HMT could significantly influence the morphology, structure, and functional properties of starches (Zavareze & Dias, 2011; Zavareze, Storck, de Castro, Schirmer, & Dias, 2010).

The main objective for the 2nd steaming process are to make sure that the ingredient are well bind and can keep it shape for it to be pan seared on the next step.

3) Pan searing

Searing is a cooking technique that exposes ingredients (usually meat) at high heat to create a crispy brown crust. This method enhances the flavor of the dish and is usually done with a small amount of oil, butter or fat. Cooking the surface of food at high temperature helps to brown it and keep it crispy while preserving the softness and moisture of the dish.

After the steaming process, the analogue meat still has a quite high water content (Moist) and are still not quiet firm yet. After the steaming process, the meat needs to be rest for a bit to help it to firm up a bit and then proceed to be pan sear. The meat needs to be pan seared to lessen it's moisture and firming up more it also helps in giving the meat more texture.

There are a few misconceptions when it comes to searing. Searing is often referred to as a process which locks in moisture and seals the juices of meats. But those statement are not 100% correct, pan searing is a dry-heat cooking method where rather, is about building another layer of flavor, not locking in an existing one. Searing also helps improve the texture of a piece of meat.

2.3.2 Rendang Spice

1) Sauteing the spices

Sautéing is a relatively quick and easy way to bring out the flavours of a dish. By browning ingredients in a small amount of fat, flavours and colours remain vivid, and is ideal for presentation. Sautéing is also a great way to retain nutrients, without cooking away the freshness of ingredients. And since this method requires minimal fat, it is a healthier alternative to frying

2) Cooking the analogue meat together with the rendang spice

The rendang sauce are made in advance, the reason why the meat are not cooked together with the rendang sauce are as to not destroy the texture and as to not overcooked the meat analogue.

2.3.3 Difference Between Vegetarian Meat & Red Meat

Plant protein-based meat analogues that mimic the sensory properties of meat could be a route to help consumers to reduce their meat consumption (Elzerman, Hoek, van Boekel, & Luning, 2011; Hoek et al., 2011; Michel, Hartmann, & Siegrist, 2021). A reduction of meat consumption might lead to a lower environmental footprint of the diet because meat production leads to intensive use of land, water and energy (Tilman & Clark, 2014; Weinrich, 2019). However, the different nature of plant materials compared to those of meat, renders the imitation of meat texture a challenge. For example, plant proteins do not naturally occur in fibrillar orientation (Fuhrmeister & Meuser, 2003; Sun & Arntfield, 2010; Taherian et al., 2011). Although meat products are widely different in their properties, they do share many characteristics that they do not share with plant proteins. For example, the very small length scale of meat muscle structure consists of myofibrillar protein and myoglobin positioned into a hierarchical fibrillar structure that is not easily replicated in plant-based meat analogues.

Analogue meat and red meat has many kinds of difference, start from the texture of the meat, nutrition, and fat content. The meat the texture of most analogue meat are much softer and chewy then real meat where if using the wrong cooking technique could make the meat to become tough because of the meat fibers. Real meat has a muscle structure where it needs time to absorbs flavors and to tenderize while analogue meat is the exact opposite, analogue meat are much easy to absorbs flavors because of it's structure that are made out of plants fibers.

Young jackfruit that are being used in the making of the analogue meat are fibrous and rich with nutrients such as, carbohydrate, proteins, minerals, fats, and vitamin. With the help of protein from soy beans and mushroom to further helps in giving it a more texture to replicated the texture of real meat. based of it's nutrients, analogue meat can also gave almost the same nutrients that a real meat could give. But on the other hand, analogue meat texture as a whole still needs improvement. .