CHAPTER IV

RESULT AND DISCUSSION

4.1 Product Result

The nutritional value of Cilembu sweet potato and peanut cereal depends on its ingredients. Major ingredients in this cereal cilembu sweet potato flour. Cilembu sweet potato flour is one of the derivative products of dried cilembu sweet potato. Cilembu sweet potato flour is potential to be alternative food source to replace cereals due to its high amount of carbohydrate. In making Cilembu sweet potato flour this time it is necessary to produce Cilembu sweet potato flour which has the maximum sweet taste, therefore several experiments were carried out with different handling techniques for Cilembu sweet potato.

The flour produced from the three handlings of Cilembu sweet potato has the same characteristics but when the Cilembu sweet potato flour has become flakes it gives a different level of sweetness. First, in the initial handling of raw Cilembu sweet potato which is then dried, blended and filtered to produce Cilembu sweet potato flour which has a little sweetness and has a yellowish orange color. Second, in the initial handling of the Cilembu sweet potato which was steamed for 20 minutes which was then dried, blended and filtered to produce Cilembu sweet potato flour which had moderate sweetness and has a bright orange color. The third treatment which was the last experiment, the Cilembu sweet potato was baked for 45 minutes and produced Cilembu sweet potato which released liquid. Sweet, then dried, blended and filtered to produce maximally sweet Cilembu sweet potato flour and has a pale yellow color. Of the 3 experiments that were carried out, Cilembu sweet potato flour was chosen with the third treatment, namely Cilembu sweet potato which was roasted beforehand to fulfill the desired goal in making Cilembu sweet potato cereal this time. Cilembu sweet potato flour cereal with the third treatment and peanuts produced a round-shaped cereal with a diameter of about

2cm, had a bright yellow color, had a thickness of about 1mm, and had an absorption capacity of 5 minutes until it had a soft texture.

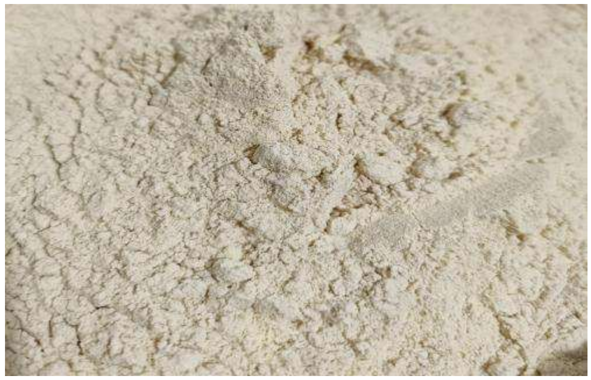

Figure 4.1 The first treatment of cilembu sweet potato

Figure 4.2 The second treatment of cilembu sweet potato

Figure 4.3 The third treatment of cilembu sweet potato

4.2 Nutririon Fact

4.2.1 Nutrition Table

Nutritional content of Cilembu sweet potato flour as follows :

Table 4.10 Nutrition Value of Cilembu sweet potato flour

Content	Cilembu sweet potato flour (%)
Water content	6,11
Ash content	2,44
Fat content	0,95
Protein content	4,77
Carbohydrate content	91,83
Strach content	75,28
Amylose content	11,60
amylopectin	63,68

Source : Pratiwi, 2016

4.2.2 Nutrition Calculation

Table 4.2 Nutritional Value of Ingredients used in The Recipe for Cilembu Sweet Potato and Peanut Cereal

Ingredients	Calories (cal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Sodium (mg/100gr)
Cilembu sweet potato flour (80g)	3,94	73,46	3,81	0,76	9,2	33,6
Margarine (10 g)	6,6	0	0	7,7	0	83
Water (20 ml)	0	0	0	0	0	0
Vanilla Powder (0,5 g)	0,4	0	0	0	0,05	0
Peanut (20 g)	113,3	0,73	5,16	9,84	0,80	3,6
TOTAL	**124**	**74,19**	**8,97**	**18,3**	**10,05**	**120,91**

4.2.3 Nutrition Label

Figure 4.4 Nutririon Fact of cilembu sweet potato

4.3 Food Safety and Packaging

4.3.1 Processing and Storage Temperature

Cilembu cereal cassava production consists of several unit operations, namely drying, size reduction, shaping, roasting, each unit operation has the objective of preparing the cereal to proceed to the next stage.

Drying is a step taken to reduce the water content so that it can meet the requirements for making flour and with this drying process will create cereals that have a low water content as well. next to the size reduction step which is one of the requirements in making flour. The selection of particles that have a smaller and finer size can create dough that is easily formed in the shape and size that has been determined and because the particles of the material become smaller, the product will be easier to eat and digest. Likewise with the next process, namely the forming process in which the dough is formed in such a way, not too big and not too small so that consumers can easily consume it and still get the texture of the product. after the dough has been shaped to the desired size, it enters the baking stage which creates a dough that has a low water content so it has a crunchy texture.

4.3.2 Self Life

Breakfast cereal products are products that have raw material formulations with high starch content, this serves to produce flakes with a more robust structure. The materials used in the manufacture of flakes are hygroscopic materials (easily absorb moisture). Flakes include snack products or dry food ingredients which can experience a decrease in the quality of product hardness and product crispness because products with a low water content level easily absorb air and water so that the product is easily damaged (Lindriati and Maryanto, 2016). In addition, the very low moisture content of cereal products can accelerate the auto-oxidation reaction of fat, shorten shelf life and cause product flavor deviation.

The starch content in cereals undergoes a retrogradation process which is a process of re-crystallization and the formation of a starch matrix which has undergone gelatinization due to the influence of temperature. Amylose retrogradation results in strong, enzyme-resistant retrogrades. This causes retrograded starch to require more water to become mushy. In snacks, retrogradation aims to form a crunchy texture (crispy).

Based on its durability, food is categorized into three, namely perishable food, semi-perishable food and perishable food. Cereal is one type of semi-perishable food product which is a food that can last without any signs of spoilage for several weeks or several months where the temperature and humidity of the environment make a big difference. In cold climates such as in western countries, these foods are considered durable, but countries with hot and humid seasons make these foods not very durable but, if handled and stored properly will have a long shelf life.

According to Nuraini and Widanti (2020), the process of absorbing water by products during storage can cause damage to food products. The rate of absorption of water during storage time is due to the water vapor pressure pure at a certain temperature. The storage conditions of a product need to be considered due to temperature is one of the extrinsic factors that causes a rapid decline in product or food quality (Asiah, Cempaka and David, 2018). Based on research by Lindriati and Maryanto (2016), the shelf life of cassava flakes products is affected by the high RH of the environment which causes greater absorption of water vapor so that the moisture content of the product increases. Flakes are dry products and are included in the type of snack, related to this, based on the research of Surahman, et al (2020) snack bar is a product similar to cereal, storage is carried out for 35 days has a shelf life of 75.76 days at 30oC, and has a longer shelf life of 84.96 days at 15oC. This slightly resembles the shelf life of cereals in general which can last for 12 months at normal temperatures, which is around 25oC and 24 months below 20oC, with storage regulations storing the product in a dry place, away from direct sunlight, etc. Therefore, cereal is a type of processed food that is included in the type of fast-moving consumer good (FMCG) which is a type of food that moves quickly among consumers due to non-durable goods or short-lived goods, and is consumed with fast. High water content is one of the causes of changes in the decreasing flakes content so that the durability of the flakes decreases. According to Lindrianti and Maryanto (2016), the shelf life of cassava flakes shows that the higher the permeability of the packaging, the shorter the shelf life of cassava flakes will be. Therefore, the right type of packaging is needed in the packaging of a food product.

4.3.3 Product Packaging

Figure 4.5 Multi-layer Flexible Packaging

The packaging for breakfast cereal this time uses a multi-layer flexible packaging material for primary packaging which is in direct contact with food and functions as a container, protector for food, means of promotion and information. This cereal packaging does not use secondary packaging like cereal products in general in order to reduce costs, so the graphic design is directly printed on the outermost layer of the primary packaging.

The type of packaging commonly used for dry food products or low moisture content is packaging that has low permeability to water and gases (especially oxygen, light, and flavours). The materials used for the manufacture of cereals are generally hygroscopic (easily absorbs water vapor) so that for primary packaging, materials with low water vapor permeability must be used. Cereals also contain vegetable fat, so primary packaging should also have low oxygen permeability.

Figure 4.6 Plastic LDPE

Figure 4.7 Aluminium Foil Material

The first layer of multilayer flexible packaging that will be in direct contact with the product is Low density polyethylene (LDPE) coded 4 which has a thickness of 70 microns with strong, flexible, water-repellent and translucent properties. In addition, LDPE relatively has a longer durability. Packaging that uses LDPE materials includes bread wrappers, food packaging, and food containers.Then for the second layer there is aluminum foil packaging. Aluminum foil packaging has low permeability to moisture and water, besides that aluminum foil has low water absorption so it can protect products from moisture and air containing moisture (Saffitriani, et al (2020). This packaging also has a reflective surface. light so that the appearance is attractive, the surface is smooth, can be shaped as desired and easily folded, not affected by light, resistant to high temperatures up to above 290° C, tasteless, odorless, non-toxic and hygienic. acids and bases are still lacking, so it requires an additional layer of wax or other chemical layers. besides that the thickness of the aluminum foil determines its protective properties so if the layer is lacking thick, then the foil can be passed by gas and steam. in this layer of packaging, the thickness of the aluminum foil is at a thickness of 0.007 mm or 7microns.

Figure 4.8 PET Plastic Packaging Material

On the outermost layer there is a type of PET plastic material with a thickness of 12 microns. The advantages of this PET-based packaging are its high clarity, rigidity, and its properties as a gas barrier. Due to the small pores in bottles made of PET material, they can store gas and aroma for a longer time. PET material is still classified as food grade so it is safe for food or beverage packaging materials. PET plastic can be combined with the 2 plastic materials above to expand its applications such as increasing protection against oxygen and moisture. PET is commonly used as a printing coating on flexible packaging and is widely used in a variety of product applications. finally added packaging with a label on the packaging that serves as a means of information and promotion. The label on the packaging has many functions, namely as a brand identity, a means of information on the product and to attract consumers.

In addition to the type of packaging considered, to increase the resistance of packaged products to mechanical stress, the primary packaging can be filled with an inert gas, for example nitrogen, so that the packaging is denser (inflated) and resistant to mechanical stress. For food that is smooth and easily crushed, you can use an alternative method by incorporating nitrogen gas into the package. This method has the same effect as the vacuum process, namely inhibiting damage by removing oxygen. The ingredients for making cereals contain fats and oils of vegetable origin. This content is very sensitive to the influence of oxygen gas. When active fat will be formed by absorbing oxygen gas. As a result, an unstable peroxide will form and turn into a more stable aldehyde, which will change the nature and flavor of the fat and the oil will become rancid.

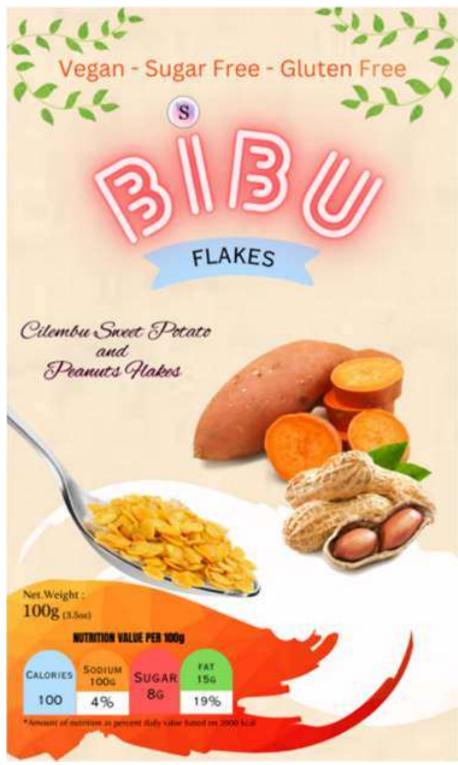

Figure 4.9 Front Packaging Design

Figure 4.10 Left and Right Packaging Design

4.4 Financial Aspects

4.4.1 Product Cost

Product costs are calculated based on the total of all costs per day. These costs consist of labor costs, raw material costs, packaging costs, and utility costs. Labor costs are calculated based on monthly working days, which is 25 days per month. The raw material count is calculated for 50 recipes per day, namely 60 packs per day or 1.250 recipes per month with 1.500 packs per month.

1. Start-Up Capital

Table 4.3 Start-Up Capital

No	Tools and Equipment	Quantity	Price (/unit)	Sub Total
1.	Spoon	1 lusin	Rp 8.700	Rp 8.700
2.	Fork	1 lusin	Rp 8.700	Rp 8.700
3.	Knife	2	Rp 60.000	Rp 120.000

4.	Teflon	1	Rp 70.000	Rp 70.000
5.	Hand glove latex	1 box	Rp 46.000	Rp 46.000
6.	Baking Papper	1 pack	Rp 16.000	Rp 16.000
7.	Food dehydrator	1	Rp 675.000	Rp 675.000
8.	Blender	1	Rp 250.000	Rp 250.000
9.	Digital scale	1	Rp 150.000	Rp 150.000
10.	80 mesh sieve	1	Rp 75.000	Rp 75.000
11.	Ring cutter diameter 2 cm	3	Rp 5.000	Rp 15.000
12.	Rolling pin	2	Rp 17.500	Rp 35.000
13.	Oven	1	Rp 2.450.000	Rp 2.450.000
14.	Big Mixing bowl	2	Rp 30.000	Rp 60.000
TOTAL				**Rp 3.979.400**

2. Labour Cost

Table 4.4 Labour Cost

Occupation	Personnel	Salary (/ month)	Sub Total
Manager Operational	1	Rp 3.000.000	Rp 3.000.000
Staff	2	Rp 2.000.000	Rp 4.000.000
TOTAL			**Rp7.000.000**

3. Packaging Cost

Table14.5 Packaging Cost

Packaging	Quantity	Price (/unit)	Sub Total
	60 pack	Rp 2.850 (/pc)	Rp 171.000
Cardboard	5 sheets	Rp 4.000 (/sheet)	Rp 20.000
TOTAL (/day)			**Rp 191.000**
TOTAL (/month)			**Rp 4.775.000**

4. Utility Cost

Table 4.6 Utility Cost

Facility	Quantitiy	Price (/unit)	Sub Total
Water	100 L	Rp 2.000 (/m3)	Rp 200
Electricity	9 kWh	Rp 1.500 (kWh)	Rp 13.500
Gas	1kg	Rp 120.000 (/5,5kg)	Rp 18.500
TOTAL (/day)			**Rp 32.200**
TOTAL (/month)			**Rp 805.000**

5. Raw Material Cost

Table 4.7 Raw Material Cost

Raw Materials	Quantity	Price (/unit)	Sub Total
Cilembu sweet potato flour	4 kg	Rp 45.000 (/1kg)	Rp 180.000
Margarine	500 g	Rp 5.500 (/200g)	Rp 13.750
Water	1 L	Rp 19.000 (/19L)	Rp 1.000
Vanilla powder	25 g	Rp 45.000 (/100g)	Rp 11.250
Peanuts	1 kg	Rp 31.000 (/kg)	Rp 31.000
TOTAL (/day)			**Rp 237.000**
TOTAL (/month)			**Rp 5.925.000**

6. Total Cost

Fixed Cost = Labour Cost

Variable Cost = Raw Material Cost, Packaging Cost, and Utility Cost

Total Cost (/month) = Labour + Raw Material + Packaging + Utility

= Rp 7.000.000 + Rp 5.925.000 + Rp 4.775.000 + Rp 805.000

= Rp 18.505.000

4.4.2 Selling Price

$$\text{Product Price} = \frac{\text{Total Cost (/month)}}{\text{Total Product Units (/month)}}$$

$$= \frac{\text{Rp } 18.505.000}{1.500 \text{ packs}}$$

= **Rp 12.500 / pack**

Product Selling Price = Product Price + (Product Price x Profit Perentage)

= Rp 12.500 + (12.500 x 50%)

= Rp 12.500 + Rp 6.250

= **Rp 18.750 = Rp 19.000 / pack**