

CHAPTER IV

RESULT AND DISCUSSION

4.1 Product Result

The nutritional value of fruit and vegetable cereals depends on its ingredients. The major ingredients used in fruit and vegetables cereal are whole wheat flour, strawberry, and red spinach. Whole wheat flour is a type of flour made from grinding the entire wheat kernel, including the bran, germ, and endosperm. In whole wheat flour, the bran or germ fraction contributed 83% of total phenolic content, 79% of total flavonoid content, 78% of total zeaxanthin, 51% of total lutein, and 42% of total β -cryptoxanthin (Pande *et al.*, 2017). The whole wheat flour has a high fiber content and also high protein content of 13-14% typically (Cudmore, 2022). During the cooking process, where the wet ingredients are combined with the dry ingredients, the protein in the whole wheat flour absorbs water which enables it to flex into gluten. The more protein in the flour, the more water is needed to effectively hydrate the dough (Mafu *et al.*, 2022).

Strawberries (*Fragaria Vesca*) have a low calorie with a value of 32 calories per 100gr (Jurgiel-Matecka *et al.*, 2017). Strawberry mostly consist 91% of water, 7.7% of carbohydrates, minor amount of fat which is only 0.3% and minor amount of protein which is only 0.7%. Strawberry also consist of 2% fiber and 4.9% of sugar per 100 gr. In Strawberries, fiber comprises around 26% of the carbohydrates content. It provides 2 grams of fiber both soluble and insoluble fibers (Bjarnadottir, 2019). Strawberry also contains Vitamin C, Manganese, Folate (vitamin B9), and Potassium. They also contain small amount of other vitamin such as iron, copper, magnesium, phosphorus, and vitamins B6, K, and E. Therefore, strawberries are an excellent addition to a healthy diet.

While strawberry have a small amount of potassium, Red Spinach (*Amaranthus Tricolor*) have a high amount of potassium than the other

elements which contained 1080.02mg of potassium per 100gr. Red spinach contains $26.60 \pm 0.42\%$ of protein, $4.49 \pm 0.30\%$ of fat, $6.67 \pm 0.33\%$ of fibers, and $39.80 \pm 0.15\%$ of carbohydrates. Overall, 17 amino acid were found in red spinach and the most abundant in red spinach was glutamic acid with a content of 23.61 ± 0.16 mg/g (Jahan *et al.*, 2022).

4.2 Nutrition Fact

4.2.1 Nutrition Table

The nutritional value of Whole Wheat Flour is as follows:

Table 4.1 Nutrition Value of Whole Wheat Flour per 100 g

Calorie (kcal)	340
Protein (g)	13.2
Fat (g)	2.5
Carbohydrates (g)	72
Dietary Fiber (g)	10.7
Sugars (g)	0.4
Calcium (mg)	34
Iron (mg)	3.9
Magnesium (mg)	138
Phosphorus (mg)	346
Potassium (mg)	405
Sodium (mg)	2
Zinc (mg)	3.08

Source: Pathakamuri, 2023

Whole wheat flour is also a good source of vitamin B1 which is thiamin, B2 which is riboflavin, B3 which is niacin, B9 which is folate, and vitamin E. The whole wheat flour has a high fiber content and also high protein content of 13-14% typically (Cudmore, 2022).

The nutritional value of Strawberry is as follows:

Table 4.2 Nutrition Value of Strawberry per 100 g

Calorie (kcal)	32
Carbohydrates (g)	7.7
Protein (g)	0.67
Total Fat (g)	0.30
Dietary Fiber (g)	10.7
Vitamins	
Folates (µg)	24
Niacin (mg)	0.386
Pantothenic acid(mg)	0.125
Pyridoxine (mg)	0.047
Riboflavin (mg)	0.022
Vitamin A (IU)	12
Vitamin C (mg)	58.8
Vitamin E (mg)	0.29
Vitamin K (µg)	2.2
Electrolytes	
Sodium (mg)	1
Potassium (mg)	153
Minerals	
Calcium (mg)	16
Iron (mg)	0.41
Magnesium (mg)	13
Manganese (mg)	0.386
Zinc (mg)	0.14
Phytonutrients	
Carotene- β (µg)	7
Lutein-zeaxanthin (µg)	26

Source: USDA National Nutrient data base, 2019

The nutritional value of Red Spinach is as follows:

Table 4.3 Nutrition Value of Red Spinach per 100 g

Calorie (kcal)	51
Carbohydrates (g)	10
Fat (g)	0.5
Dietary Fiber (g)	1
Protein (g)	4.6
Sodium (mg)	42
Potassium (mg)	340
Phosphorus (mg)	111
Calcium (mg)	368
Iron (mg)	2
Vitamin A (mg)	1.9
Vitamin B1 (mg)	0.08
Vitamin C (mg)	80

Source: Amritha K, 2018

According to the nutrition value above, strawberry and red spinach both are low in calories, which is good for those who are trying to live a healthy lifestyle. Strawberry also contain small amount of mineral such as iron, zinc, magnesium, calcium, and manganese, as well as vitamins such as vitamin K and E. While strawberry have small amount of potassium and calcium, red spinach has high amount of potassium and calcium. Therefore, strawberries and red spinach are an excellent addition to a healthy diet.

4.2.2 Nutrition Calculation

Table 4.4 Nutrition Value of Ingredient used in Strawberry and Red Spinach Cereal

Ingredients	Calories (kcal)	Carbohydrates (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg/100g)
Whole wheat flour (240 g)	814	174.17	32.88	4.49	0.98	29.3	12
Corn meal (60 g)	224	45.75	6	1.87		6	
Ground chia seeds (45 g)	220	19.73	7.03	13.84		17	9
Honey (120 g)	365	98.88	0.36		98.54	0.2	5
Unsweetened Applesauce (60 g)	46	11.95	0.11	0.11	9.9	0.7	2
Strawberry (180 g)	58	13.82	1.21	0.54	8.39	3.6	2
Red Spinach (2 g)		0.07	0.06	0.01	0.01		2
Baking powder (6 g or 1 tsp)	2	1.27					
Baking soda (3 g or ½ tsp)							629.5
Salt (6 g or 1 tsp)							2325
Vanilla extract (5 ml)	14	0.63			0.63		
Water							
TOTAL	1,743	366.27	47.65	20.86	118.45	56.8	2,986.5

4.2.3 Nutrition Label

Nutrition Facts	
7 servings per container	
Serving size	(250g)
Amount Per Serving	
Calories	80
% Daily Value*	
Total Fat 1g	1%
Saturated Fat 0g	0%
<i>Trans</i> Fat 0g	
Sodium 140mg	6%
Total Carbohydrate 17g	6%
Dietary Fiber 3g	11%
Total Sugars 6g	
Includes 0g Added Sugars	0%
Protein 2g	4%
Not a significant source of cholesterol, vitamin D, calcium, iron, and potassium	
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

Figure 4.1 Nutrition Fact of Cereal from Strawberry and Red Spinach

4.3 Food Safety and Packaging

4.3.1 Processing and Storage Temperature

Cereal processing will go through several processes. These processes include weighing, washing, blending, mixing, shaping, and baking. Each process is needed to be done in order to prepare the best quality of cereal. The first step is weighing the ingredients, where each amount of the ingredients needed to be carefully measured in order to find the best consistency and proportions for the final product (Leofy, 2023). Once the ingredients have been measured, the ingredients needed to proceed to the second step which is washing. Raw ingredients such as strawberry and red spinach needed to be wash because contamination can occur at the pre-harvest or post-harvest stage by insects, soil, water, equipment, and also human handling (Zhou *et al.*, 2017).

The next step is blending, in which wet ingredients are combined and blended together make sure that all ingredients are evenly distributed. After blending each ingredient that resulted wet ingredients and dry ingredients, the mixing stage takes place. In this step, the dry ingredients and the wet ingredients are mixed to ensure the ingredients are well incorporated which will result in overall texture and consistency of the final product. Once the ingredients are mixed, the dough will be shaped into identical shaped in order to have a consistent cooking times, texture, and appearance (Leofy, 2023). Shaping can be done by rolling the dough evenly using a roller. Once it's shaped, it has to be cooked by baking them. Baking the cereal removed moisture content which enhance the shelf life of the cereal. Furthermore, baking doesn't have a significant effect on most vitamin and minerals which is good for the nutrition value of the final product (Spritzler, 2019).

Fruit and vegetable cereal that are made from strawberry and red spinach should be stored in a low temperature at 5-10°C in order to maintain the quality of the product and improve shelf life.

4.3.2 Shelf Life

Cereal is classified as a dried food, typically contains a moisture content to up to 12-15%. The degradation of cereal quality and quantity during storage is primarily attributed to fungi, insects, rodents, and mite. Field molds and storage molds play a significant role in grain spoilage.

In the absence of preservatives, cereal stored at room temperature (25 °C) in airtight packaging can retain its freshness for an approximate duration of 2 to 3 months. Conversely, when stored under cold temperature condition (5-10°C) with proper airtight packaging, cereal has the potential to remain viable for an extended

period of around 4 to 6 months or possibly even longer (Chawla, 1984).

4.3.3 Product Packaging

Food packaging is needed for the preservation and protection of the food throughout the entire supply chain. Food packing is able to provide a protective barrier during transportation, handling, and storage. The purpose of food packaging is to safeguard the food products from damage, spoilage, and contamination. Food packaging can maintain the quality and safety of food. It is also used to ensure that the product reached the customer in a high-quality condition (Marsh and Bugusu, 2007).

Strawberry and red spinach cereal is a ready-to-eat food that is usually enjoyed with milk. In this digital era, people turn to online platforms for ordering and delivery which makes it important to package the cereal appropriately for the transportation. However, a major disadvantage of packaging is that it adds to the world's environmental footprint because it is always discarded immediately after the product is used. One packaging that is suitable for this product is standing pouch lithographic paper food grade eco packaging. This packaging is an airtight packaging with zip-lock which helps the cereal to remain fresh and protected from external elements such as moisture, air, and light. This helps the cereal to maintain texture, flavor, and nutritional value.

Standing pouch lithographic paper food grade eco packaging is made from paper which is a high-value and environmental friendly material. The packaging made from paper are designed to meet the food-grade standards which means that it is safe for direct contact with food and do not transfer any harmful substance. Paper packaging has the advantage of being bio-based, biodegradable, and recyclable. Paper-based packaging is a very

versatile packaging and cost-efficient method to transport, protect, and preserve the cereal product (Oloyede and Lignou, 2021).

The standing pouch lithographic paper food grade eco packaging has the dimension of 11,5 cm x 18 cm (750 z / 250 gr).



Figure 4.2 Lithographic Paper Food Grade Eco Packaging

In the food packaging, food label is needed to provide the identity of the product. It gives information about the contents of the product such as, ingredients used and nutrition fact in the product. Food labels is also the way to communicate to the consumers on how to handle, prepare, and consume the product safely (Bandara et al., 2016). In the food label, the product name and the contact lists are listed.



Figure 4.3 Logo



Figure 4.3 Food Label

4.4 Financial Aspects

4.4.1 Product Cost (Variable Cost, Overhead Cost, Fixed Cost)

In order to have a start-up business, capital is needed to buy equipment and utensils. The total monthly cost is used to calculate product costs. The expenses include labor costs, costs for raw materials, packaging costs, and expenses for utilities. Based on monthly working days, which are 26 days per month, the labor cost is taken into account. For the production of the product, it is counted as 5 recipes per day or 130 recipes per month, which are 15 packs per day or 390 packs per month.

1. Start-Up Capital

Table 4.5 Start-Up Capital

Utensils and Equipment	Quantity	Price (/unit)	Sub Total
Large mixing bowl	2	Rp 100.000	Rp 200.000
Blender	1	Rp 310.000	Rp 310.000

Spatula	2	Rp 20.000	Rp 40.000
Tray	2	Rp 45.000	Rp 90.000
Baking paper	30	Rp 1.750	Rp 52.500
Spoon	5	Rp 2.000	Rp 10.000
Knife	2	Rp 75.000	Rp150.000
Cutting board	2	Rp 25.000	Rp 50.000
Peeler	2	Rp 20.000	Rp 40.000
Digital scales	2	Rp 42.000	Rp 84.000
Sauce pan	2	Rp 100.000	Rp 200.000
Small mixing bowl	4	Rp 45.000	Rp 180.000
Scraper	2	Rp 20.000	Rp 40.000
Pasta roller	1	Rp 300.000	Rp 300.000
Rolling pin	2	Rp 80.000	Rp 160.000
Strainer	1	Rp 20.000	Rp 20.000
Oven	1	Rp 1.600.000	Rp 1.600.000
Stove	1	Rp 200.000	Rp 200.000
TOTAL			Rp 3.726.500

2. Labor Cost

Table 4.6 Labor Cost

Occupation	Personnel	Salary (/month)	Sub Total
Cook Helper	1	Rp 4.500.000	Rp 4.500.000
Administration officer	1	Rp 3.500.000	Rp 3.500.000
Cleaning service officer	1	Rp 3.000.000	Rp 3.000.000
TOTAL			Rp 11.000.000

3. Packaging Cost

Table 4.7 Packaging Cost

Packaging	Quantity	Price (/unit)	Sub Total
FB Eco Pack	15 pcs	Rp 2.000 (/pc)	Rp 30.000
Front labels (logo)	15 pcs	Rp 10.000 (/sheet)	Rp 9.400
Back labels	15 pcs	Rp 10.000 (/sheet)	Rp 18.800
Plastic bag	15 pcs	Rp 10.000 (/62 pcs)	Rp 2.000
Silica Gel	15 pcs	Rp 2.000 (/20 pcs)	Rp 1.500
TOTAL (/day)			Rp 61.700
TOTAL (/month)			Rp 1.604.200

4. Utility Cost

Table 4.8 Utility Cost

Facility	Quantity	Price (/unit)	Sub Total
Water	550L	Rp 2.100 (/m3)	Rp 1.155
Electricity	15 kWh	Rp 1.500 (/kWh)	Rp 22.500
TOTAL (/day)			Rp 23.655
TOTAL (/month)			Rp 615.030

5. Raw Material Cost

Table 4.9 Raw Material Cost

Raw Materials	Quantity	Price (/unit)	Sub Total
Whole wheat flour	1,2 kg	Rp 16.000 (/500 g)	Rp 38.400
Cornmeal	300 g	Rp 20.000 (/500 g)	Rp 12.000
Ground chia seeds	225 g	Rp 80.000 (/kg)	Rp 18.000
Honey	600 ml	Rp 70.000 (/kg)	Rp 42.000
Apple	2 kg	Rp 3.500 (/100 g)	Rp 70.000
Strawberry	900	Rp 14.000 (/200 g)	Rp 63.000
Red Spinach	10 g	Rp 8.000 (/ kg)	Rp 80

Baking powder	30 g	Rp 13.000 (/110 g)	Rp 3.500
Baking soda	15 g	Rp 5.000 (/81 g)	Rp 900
Salt	30 g	Rp 10.000 (/ kg)	Rp 300
Vanilla extract	25 ml	Rp 8.500 (/60 ml)	Rp 3.500
Water	525 ml	Rp 3.000 (/600 ml)	Rp 2.600
Gas (12 kg)	1 kg	Rp 20.000 (/kg)	Rp 20.000
TOTAL (/day)			Rp 274.280
TOTAL (/month)			Rp 7.131.280

6. Rent Cost

Table 4.10 Rent Cost

Facility	Size	Price	Sub Total
Land	15 m x 5 m	Rp 3.500.000	Rp 3.500.000
Building	10 m x 5m	(/month)	(/month)
TOTAL (/month)			Rp 3.500.000

7. Total Cost

Fixed Cost = Labor Cost and Rent Cost

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

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

= Rp 11.000.000 + Rp 7.131.280 + Rp 1.604.200 + Rp 615.030 + Rp 3.500.000

= Rp 23.850.510

4.4.2 Selling Price

$$\begin{aligned}\text{Product Price} &= \frac{\text{Total cost (month)}}{\text{Total product unit (month)}} \\ &= \frac{\text{Rp 23.850.510}}{390 \text{ packs}} \\ &= \mathbf{\text{Rp 61.155,15 / pack}}\end{aligned}$$

$$\begin{aligned}\text{Product Selling Price} &= \text{Product price} + (\text{Product Price} \times \text{Profit Percentage}) \\ &= \text{Rp 61.155,15} + (\text{Rp 61.155,15} \times 50\%) \\ &= \text{Rp 61.155,15} + 30.577,58 \\ &= \mathbf{\text{Rp 91.732,73} \approx \mathbf{\text{Rp 92.000,00}}}\end{aligned}$$