

## CHAPTER IV

### RESULT AND DISCUSSION

#### 4.1 Product Result

The value and quality of beer depends on the barley grain produced, the main ingredients of beer are barley, water and yeast. Barley comes from the grain tribe, which means it has characteristics similar to wheat. Certain types were developed to produce flavor variants for different types of beer. Barley is very important because beer gets its color, taste, aroma, protein which can make a good head of beer or beer foam and most importantly natural sugars for fermentation. The role of barley in beer can be compared to the role of grapes in wine.

Whole barley grains consist of about 65–68% starch, 10–17% protein, 4–9%  $\beta$ -glucans, 2–3% free lipids, and 1.5–2.5% minerals (Czuchajowska et al., 1998 ;Izydorczyk et al., 2000, Quinde et al., 2004). Total dietary fiber ranges from 11 to 34% and soluble dietary fiber from 3 to 20% (Fastnaught, 2001). Hulled or hulled barley grains contain 11–20% total dietary fiber, 11–14% insoluble dietary fiber and 3–10% soluble dietary fiber (Marlett, 1991, Fastnaught et al., 1996, Marconi et al., 2000).

The nutmeg pulp, which is the largest part of the nutmeg fruit (77.8%), is usually not utilized. One of the uses of nutmeg flesh is to make a beverage product that is rich in benefits. The nutritional value contained in every 100 g of nutmeg flesh is calories (42 cal), protein (0.30 g), fat (0.20 g), carbohydrates (10.90 g), calcium (32 mg), phosphorus ( 24 mg), iron (1.50 mg), vitamin A (29.50 IU), vitamin C (22 mg), and water (88.10 g) (Arief et al. 2015). The active ingredients found in nutmeg are minerals, vitamin A, vitamin B, vitamin C, folic acid, fiboflavin, niacin (Drazat, 2007).

## 4.2 Nutrition Fact

### 4.2.1 Nutrition Table

The nutritional value of Barley is as follows:

**Table 4. 1** Nutrition Value Barley per 100 g

Calorie(kcal)	354
Protein(g)	12.5
Fat(g)	2.3
Carbohydrate(g)	73.5
Fiber(g)	17
Calcium(mg)	33
Iron(mg)	3.6
Magnesium(mg)	133
Potassium(mg)	452
Sodium(mg)	12

**Table 4. 2** Nutrition Value Nutmeg per 100 g

Calorie(kcal)	524
Protein(g)	6
Fat(g)	36
Carbohydrate(g)	49
Fiber(g)	21
Calcium(mg)	184
Iron(mg)	3
Magnesium(mg)	183
Potassium(mg)	350
Sodium(mg)	16

#### 4.2.2 Nutrition Calculation

**Table 4. 3** Nutritional Value of Ingredients used in The Recipe for beer

Ingredients	Calories (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg/100g)
Berley (1kg)	1.700	367,5	62,5	11,5	-	85	60
Nutmeg (500g)	2.620	245	30	180	-	105	80
Sugar (126g)	400,8	100,26	-	-	100,26	-	-
Hops (16g)	-	-	-	-	-	-	-
Yeast (5g)	59	7,64	7,63	0,2	-	4,2	10
water (6L)	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>4.779,8</b>	<b>720,4</b>	<b>100,13</b>	<b>191,7</b>	<b>100,26</b>	<b>194,2</b>	<b>150</b>

#### 4.2.3 Nutrition Label

<b>Nutrition Facts</b>	
usually 1 servings per container	
<b>Serving size</b>	<b>1 bottle (500ml)</b>
<b>Amount Per Serving</b>	
<b>Calories</b>	<b>800</b>
% Daily Value*	
<b>Total Fat</b> 32g	<b>41%</b>
Saturated Fat 0g	<b>0%</b>
<i>Trans Fat</i> 0g	
<b>Sodium</b> 25mg	<b>1%</b>
<b>Total Carbohydrate</b> 120g	<b>44%</b>
Dietary Fiber 32g	<b>114%</b>
Total Sugars 17g	
Includes 0g Added Sugars	<b>0%</b>
<b>Protein</b> 17g	<b>34%</b>
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 Facts of Beer

## **4.3 Food Safety and Packaging**

### **4.3.1 Processing and Storage Temperature**

Alcoholic drinks are drinks that contain ethanol. Ethanol is a psychoactive substance and its consumption causes loss of consciousness. In various countries, the sale of alcoholic beverages is limited to a number of groups, generally people who have passed a certain age limit (Sriyani, 2008).

The raw material used for making beer is malt, which is germinated and dried barley seeds or a kind of wheat. Malt is a raw material that contains lots of starch, protein, vitamins and minerals. Another ingredient is hops or Humulus, which is a type of shrub that has a distinctive aroma and taste. The part of the plant used for brewing is the flower, the sap from the plant, which is dried. This ingredient will add to the aroma and taste of the resulting liquid. The existence of this bitter taste is the distinctive bitter taste that is desired to be found in beer.

Beer processing begins with the malting process, namely to obtain malt which contains a lot of starch and protein-breaking enzymes, namely  $\alpha$ -amylase,  $\beta$ -amylase and protease. Germinated barley will produce a distinctive flavor and color component. Furthermore, the mashing process is carried out, namely the process of dissolving malt and malt adjuncts so that they can be used as a fermentation medium as efficiently as possible. The principle of the process is to heat the malt and malt adjuncts separately and then mix them so that the temperature is around 57-77°C.

The resulting filtrate (wort) must be cooked and mixed with hops and if necessary, sugar is also added as an additional substrate. The wort is cooked at 100°C for 1.5 to 2.5 hours. After that it is filtered through the

remnants of the hops so that the protein and hop solids are retained. The precipitate that is separated from the substrate is washed again and filtered to hold the solids and so on so that quite a lot of filtrate is formed. Comparison of raw materials and complete processes can be seen in Fig

Fermentation usually takes place at temperatures below 10oC. The addition of starter is carried out at 3.3-14oC. At that time the pH of the media was around 5.0-5.2 at the beginning of the fermentation which was carried out anaerobically so that alcohol could be produced. Fermentation will be allowed to take place for 8-20 days depending on several factors such as raw materials, starter conditions and other factors that affect the fermentation process

At the end of the fermentation, agglomeration of yeast cells will occur and it will sink to the bottom of the fermentation container. This process is followed by the process of aging or aging. Aging takes place at 0-3oC for several weeks to several months. During aging, coagulation of the components will occur which will be separated at the end of the process. These components include proteins, yeast cells and resins. At this time the beer will be clear and have a distinctive aroma, due to the formation of esters

#### **4.3.2 Shelf Life**

Beer flavour starts to deteriorate almost immediately after production ends. Strategies to ensure and extend the beer shelf-life has mainly been studied, namely, the impact of the production process and raw material, the packaging and more recently, the transport and storage conditions. This review discusses the studies carried out on the impact of transport and storage in beer flavour characteristics for the first time. The impacts of the temperature, time and vibrations, the external factors which most impairs the overall beer quality, are reviewed and discussed according to the results published in the last 15 years. The temperature was the impact

factor studied in more detail; nevertheless, recent studies highlight that this cannot be studied individually due to the importance of vibrations (e.g. trucks, ships, trains or aeroplanes) that bottled beer experiences during transport. The shelf life for the products produced is 1 month 10 days in silicone glass bottles at temperatures of 20-25 °C.

#### **4.3.3 Product Packaging**

Food and beverage packaging is used to protect food and beverages along the supply chain. Otherwise, the handling of food and beverage products can be expensive and inefficient. In addition, food and beverage packaging is to protect food and beverage products from possible harm; such as physical, chemical, or even microbiological; It can have an impact on the quality and safety of the food itself. Choosing food packaging materials must consider cost, product quality, and its ability to protect food and beverages (Alamri et al., 2021).

Beer is an alcoholic beverage product that is produced through a starchy material fermentation process without going through the distillation process after fermentation and for packaging beer is a glass bottle with a silicone lid. Most beer bottles are made of brown, green or clear glass. All three colors let in light brown although lets in a lot less than the other two.

Bottle packaging can assure prolonged flavor stability by reducing the concentration of carbonyl compounds associated with staling, thereby diminishing the intensity of off flavors related to beer aging. Furthermore, sulfites produced by yeast metabolism enhance flavor stability as well. The anti-aging mechanism of sulfites is exerted by radical scavenging, thus inhibiting the oxidative reactions; otherwise, they can bind to present aldehydes and form adducts with hydroxysulfonate structures.

Target flavor modification by bottle conditioning is considered as a type of bioflavoring and can be applied to generate distinctive flavors and produce beers with unique sensory profiles. Flavor modification is a result of multiple reactions and metabolic steps. The extent to which each type of reaction will manifest depends on a plethora of factors, including type of yeast strain, preparation of starter, amount of added sugar, temperature, and duration, as will be discussed in the next section. light weight, transparent, and low gas and moisture permeability (Yaris and Sezgin, 2017).



**Figure 4. 2** Glass bottles 500ml

**INGREDIENTS:**  
 BARLEY 2  
 RYE, NUTMEG, SUGAR, YEAST, HOPS  
 PELLET, WATER

**MYRISTICA BEER**  
 08124722645



*Flavor Nutmeg taste*

Nutrition Facts	
usually 1 servings per container	
<b>Serving size</b>	<b>1 bottle (500ml)</b>
<b>Amount Per Serving</b>	
<b>Calories</b>	<b>800</b>
<b>Total Fat</b> 27g	41%
Saturated Fat 1g	0%
Trans Fat 5g	1%
Sodium 210mg	1%
<b>Total Carbohydrate</b> 123g	44%
Dietary Fiber 10g	114%
<b>Total Sugars</b> 17g	
Includes 1g Added Sugars	0%
<b>Protein</b> 12g	24%



Figure 4. 3 Logo



## 4.4 Financial Aspects

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

Product cost is calculated based on the total of all cost per month. The costs consist of labour cost, raw material cost, packaging cost, and utility cost. The labour cost is considered based on monthly working days, which are 25 days per month. As for raw material, the quantity of raw materials is counted as 1 recipes per day, which are 6 portions per day or 150 portions per month.

#### 1. Start-Up Capital

**Table 4. 4** Start-Up Capital

<b>Tools and Equipment</b>	<b>Quantity</b>	<b>Price (/unit)</b>	<b>Sub Total</b>
Fermented glass jar	1	Rp 156.000	Rp 156.000
Digital thermometer	1	Rp 11.000	Rp 11.000
Stella san Sanitizer	1	Rp 230.000	Rp 230.000
Fermentation airlock	1	Rp 15.000	Rp 15.000
Glass bottle 1L	3	Rp 38.000	Rp 114.000
Food Grade Nylon Filter	1	Rp 95.000	Rp 95.000
Scales	1	Rp 50.000	Rp 50.000
Hand glove	1	Rp 7.000	Rp 7.000
Stock pot	1	Rp 50.000	Rp 50.000
Hose filter	1	Rp 30.000	Rp 30.000
Liquid siphon hose	1	Rp 14.000	Rp 14.000
Alcohol tester	1	Rp 100.000	Rp 100.000
Wooden spatula	2	Rp 15.000	Rp 30.000
<b>TOTAL</b>			<b>Rp 902.000</b>

## 2.Labour Cost

**Table 4. 5** Labour cost

<b>Occupation</b>	<b>Personnel</b>	<b>Salary (/month)</b>	<b>Sub Total</b>
Assistant helper	1	Rp 4,000,000	Rp 4.000.000
Cleaning service	1	Rp 3,000,000	Rp 3.000.000
<b>TOTAL</b>			<b>Rp 7.000.000</b>

## 3.Packaging Cost

**Table 4. 6** Packaging Cost

<b>Packaging</b>	<b>Quantity</b>	<b>Price/(unit )</b>	<b>Sub Total</b>
Bottle 500ml	6 pcs	Rp 18.000	Rp 108.000
Packaging sticker	6 sheets	Rp 3.000	Rp 18.000
Plastic bag	6 pcs	Rp 2.000	Rp 12.000
<b>TOTAL</b>			<b>Rp 138.000</b>

## 4.Utility Cost

**Table 4.7** Utility Cost

<b>Facility</b>	<b>Quantity</b>	<b>Price/(unit )</b>	<b>Sub Total</b>
Gas	3 kg	Rp 15.000/ kg	Rp 45.000
Water	15 L	RP 2.000(/m3)	Rp 30.000
<b>TOTAL</b>			<b>Rp 75.000</b>

## 5.Raw Material Cost

**Table 4.8** Raw Material Cost

<b>Raw Materials</b>	<b>Quantity</b>	<b>Price (/unit)</b>	<b>Sub Total</b>
Nutmag flesh	500 g	Rp 15.000/(100g)	Rp 75.000
Berley seeds	1kg	Rp 30.000/(500g)	Rp 60.000
Yeast	5 g	Rp 47.000/(10g)	Rp 16.000
Water	6 L	Rp 5.000/(1L)	Rp 30.000
Hop pellets	18 g	Rp 25.000/(18g)	Rp 25.000
Sugar	126g	Rp 27.000/(1kg)	Rp 8.000
<b>TOTAL</b>			<b>Rp 214.000</b>

## 6. Rent Cost

**Table 4.9** Rent Cost

<b>Facility</b>	<b>Size</b>	<b>price</b>	<b>Sub total</b>
Land	15m x 5	Rp 2.500.000	Rp 2.500.000
Building	10 m x5		
<b>TOTAL</b>			<b>Rp 2.500.000</b>

## 7.Total Cost

Fixed Cost = Labour Cost and Rent Cost *Variable Cost*  
 = *Raw Material Cost, Packaging Cost,*  
*and Utility Cost*

Total Cost (/month) = Labour + Raw Material + Packaging + Utility Rent Cost  
 = Rp 7.000.000 + Rp 214.000 + Rp 138.000  
 + Rp 75.000 + Rp 2.500.000  
 = **Rp 2.934.000**

#### 4.4.2 Selling price

$$\begin{aligned}\text{Product price} &= \frac{\text{Total cost(/month)}}{\text{Total product units(/month)}} \\ &= \frac{\text{Rp2.934.000}}{6 \text{ portions}} \\ &= \text{Rp.489.000}\end{aligned}$$

$$\begin{aligned}\text{Product selling price} &= \text{Product price} + \left( \frac{\text{product price} \times}{\text{profit percentage}} \right) \\ &= \text{Rp.489.000} + (\text{Rp.489.000} \times 50\%) \\ &= \text{Rp.489.000} + 9,78 \\ &= \mathbf{\text{Rp 244.500}}\end{aligned}$$