

## CHAPTER IV

### RESULT AND DISCUSSION

#### 4.1 Product Result

Perkedel is a food that affected by colonization and the differentiation status on Netherlanders and Inlander makes perkedel diverse, in this case perkedel is like nugget based on chickpea. Chickpea is a rich source of proteins with well-balanced amino acids, fats, carbohydrate, dietary fiber, vitamins, and minerals, and antioxidants (Elif Yaver., 2022). On digestive system, the presence of trypsin inhibitors may decrease availability dietary protein (Avilés-Gaxiola et al.,2018). Process of making chickpea mixture refers to Herrera and Gonzales (2021) by soaking the beans for 12 hours which aims to reduce contain anti-nutrition, such as trypsin inhibitors, phytic acid, and tannins. The oil-binding capacity of chickpea protein is particularly useful in the formulation of meat analogs and plant-based products, where fat mimicking is desired (Konstantina et al., 2021). Chickpea protein can be used in various forms, such as isolates, concentrates, or textured proteins, offering flexibility in creating a wide array of plant-based products, from burgers and sausages to meatless nuggets and meatballs (Ismail et al., 2020). Referring to Romano et al. (2021) Using chickpea as a sausages and nugget based on chickpea could promotes in improved yield, increased protein content, better texture, and global acceptability. The improved yield and better texture are affected by the water binding and oil binding of chickpea.

## 4.2 Nutrition fact

### 4.2.1 Nutrition table

Below the nutritional value of dried and cooked chickpea is presented in Table 4.1

**Table 4. 1** Nutritional properties of 100gr Chickpea

Parameter (%)	Chickpea	Literature
Water content	10,92 ± 0,00	7,68
Ash content	2,63 ± 0,01	3
Protein content	22,85 ± 0,51	16-21
Fat content	8,32 ± 0,31	3-7
Carbs content	55,29 ± 0,83	59-67
Dietary Fiber	17,65	19-22,7

Source: *Soedirga et al, 2020.*

Chickpeas have several possible health benefits, and when combined with other pulses and grains such as digestive illnesses due to its high fiber content (Singh et al., 2022) and according to Rajnincová et al. (2019) state that the Codex Alimentarius limits the gluten content to 20 mg·kg<sup>-1</sup> for naturally gluten-free foods, chickpea contain tiny amount of glutelin and prolamin so it can be categorized as gluten free.

### 4.2.2 Nutritional calculation

General composition of desi chickpea seeds as it follows:

**Table 4. 2** General composition of desi chickpea seeds

Macronutrient	Unit	Minimum	Maximum
Calorific Value	Cal/100g	334	387
Protein	%	16.7	30.57
Fat	%	2.9	7.42
Carbohydrate	%	-	12.2
Fiber	%	3.7	13
Ash	%	2.04	7.42

Sugar	%	5.33	11.8
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Source: Shandu *et al.* 2023.

it contains many minerals and it is also a very rich source of dietary fiber, it reduces constipation due to the high fiber as it enhances bowel movement (Ismail *et al.* 2017; Singh *et al.*, 2022). chickpea contain tiny amount of glutelin and prolamin so it can be categorized as gluten free.

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

Ingredients	Calories (Kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg/Qty)
Boiled chickpea (50g)	164	27,4	8,86	2,59	4,8	7,6	7
Msg (1g)	-	-	-	-	-	-	125
Salt (1g)	-	-	-	-	-	-	387
Black pepper (1g)	2,51	0,64	-	-	0,01	0,25	0,2
Corn starch (6 g)	22,86	5,47	0,01	-	-	-	0,54
Fried egg (6g)	47	0,21	3,54	3,85	0,1	-	38,7
Fried ground beef (20g)	48	0,12	0,5	2,9	-	-	17
Water (10g)	-	-	-	-	-	-	-
Beaten egg (30g)	42,9	0,22	3,78	2,85	0,11	-	28,4
<b>TOTAL</b>	<b>327,27</b>	<b>34,06</b>	<b>16,69</b>	<b>12,19</b>	<b>5,02</b>	<b>7,85</b>	<b>601,84</b>

Nutritional calculation above is referring to USDA (2019) data calculation.

#### 4.2.3 Nutrition Label

<b>Nutrition Facts</b>	
5 servings per container	
<b>Serving size</b>	<b>pieces (32g)</b>
<b>Amount Per Serving</b>	
<b>Calories</b>	<b>330</b>
<small>% Daily Value*</small>	
<b>Total Fat</b> 12g	<b>15%</b>
Saturated Fat 0g	<b>0%</b>
<i>Trans Fat</i> 0g	
<b>Sodium</b> 600mg	<b>26%</b>
<b>Total Carbohydrate</b> 34g	<b>12%</b>
Dietary Fiber 8g	<b>29%</b>
Total Sugars 5g	
Includes 0g Added Sugars	<b>0%</b>
<b>Protein</b> 17g	<b>34%</b>
<small>Not a significant source of cholesterol, vitamin D, calcium, iron, and potassium</small>	
<small>*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.</small>	

Figure 4. 1 Nutrition Fact of Perkedel Chickpea.

### 4.3 Food safety and Packaging

#### 4.3.1 Processing and Storage Temperature

Perkedel is a food commonly made from fried potatoes or boiled before being crushed and then mixed with minced meat, sliced leaves onions, and celery leaves then mixed with spices. Round shape flattened dipped in beaten chicken eggs (Rafiansyah, 2017). The fact that perkedel raw material could be adjusted or even changed makes this dish has a diversity on its nutritional value, in this research the perkedel is using Chickpea as the substitution of mashed potato. Chickpea is a rich source of proteins with well- balanced amino acids, fats, carbohydrate, dietary fiber, vitamins, and minerals, and antioxidants (Elif Yaver., 2022). Process of making chickpea mixture refers to Herrera and Gonzales (2021) by soaking the beans for 12 hours which aims to reduce contain ant i- nutrition, such as trypsin inhibitors, phytic acid, and tannins. On digestive system, the presence of trypsin inhibitors may decrease

availability dietary protein (Avilés-Gaxiola et al.,2018). After soaking, boiled for 30 minutes, drained then blend with the blender.

Adding other ingredients such as cornstarch and ground beef give an effect on the product. According to Soedirga et al., (2020) Adding maizena or cornstarch into a chickpea paste can increase the hardness of the product result due to starch content, High starch content able to bind a certain amount of water so affect the hardness of a product. Starch consists of two fractions, namely the dissolved fraction (amylose) and the insoluble fraction (amylopectin), Cornstarch is higher in amylose. high amylose content can create the texture becomes compact and solid because dissolved amylose binds to each other. Amylose has bigger hydrogen bonds so it can enhance gel strength. Not only just that but the increase of protein content also increases the hardness of the product. From Sadaf et al., (2013) cited in Soedirga et al., (2020) said Cohesiveness value of a product is directly proportional with higher protein content the protein content then the product will be more compact. Proteins effect the shape of the dough to becomes difficult to trap the air so it will form a firm and compact product. In this study the product contains almost 90% protein this cause the result to be firmer and more compact.

Frying loss is one characteristics of food products with high fat content. This is because the frying can affect the juiciness of the product the high fat content can cause higher loss of water content during the frying process and results in a loss of stability emulsion from the hydrophobic interaction between fat and water (Abdullah et al., 2018). Chickpea as the main ingredients is high in protein and low in fat this is compatible to the research done by Soedirga et al., (2020) in other hand

The protein quality of legumes is improved by heat treatment because heat inactivates several heat liable anti-nutritional factors (Singh et al.,2022) but some other ingredients such as ground beef and beaten egg will be affected by the deep-fried method because it contains more fat.

#### **4.3.2 Shelf life**

This perkedel chickpea is using chickpea as a main ingredient and this main ingredient are high in protein, not only that but several others ingredient are mostly high in protein. thus, this product is firm and compact due to high protein content. The high protein content makes this product do not last long in room temperature. Food spoilage is influenced by temperature because most biochemical activities are either slowed down at reduced temperatures or speeded up at increased temperatures, Elevated temperatures enhance food spoilage, by altering the biological mechanisms in the food, which may lead to enzyme or protein denaturation and a subsequent increase in solute concentration, which may subsequently cause changes in pH and ionic strength of the medium (food).Subsequently the application of reduced temperatures (refrigeration) during food storage has become a widely accepted method of storing minimally processed foods as a means of controlling and decreasing the progression of biochemical and microbial degradation in the food. Low temperature is effective in preserving chilled foods because it either totally inhibits the growth of microorganisms in the foods and or reduces subsequent growth of these microbes by prolonging the lag phase (Siddiqui et al., 2022). The desired texture of perkedel is soft so the recommended for consumption is maximum 1 day in room temperature and 7 days in refrigerator but need to be microwaved for 1 min.

#### **4.3.3 Product packaging**

Packaging today does not only have a function to protect the product whether from heat, sunlight, humidity or in terms of distribution but packaging is also required to provide a sense of comfort to consumers

using this product is done in order to fulfill consumer satisfaction. Packaging also has an important role to increase a selling point and the function of a product, more than that packaging can make the product have a lifespan durable, maintain food quality and safety, protect product quality, and as a means of product communication and branding to consumers (Soehardi *et al.* 2019). Thus, packaging needs to be adjusted to product needs.

Perkedel chickpea is a deep-fried product therefore it is high in oil content and it is cook-by-order so it's need to delivered and consumed as soon as possible therefore packaging that could maintain heat and absorb oil are very suitable for this product. Laminated paper kraft and MG paper are considered suitable for this product. There are some followings consideration Kraft paper has characteristics such as very strong, relatively price, affordable, brownish in color, produced as single-ply, or multi-layers (Soehardi *et al.* 2019). But in the other hand paper packaging also has disadvantages, namely its sensitivity to water and very easily affected by air humidity from the surrounding environments (Soehardi *et al.* 2019) by laminating the paper kraft with plastic PE (polyethylene), here are the few characteristics of the plastic, the color of this PE plastic is usually transparent, textured, flexible, good strength and good flexibility. This type is a good type to be exposed to continuous heating processes, so it can be said that this plastic is flexible and has a strong resistance to heat. One drawback polyethylene is not resistant to oil (Windarti *et al.*, 2021) but this plastic can prevent the disadvantage of paper kraft, Therefore laminated paper kraft are the selected one to prevent the sensitivity to water and air humidity and because of perkedel chickpea is a deep fried product thus perkedel chickpea is high in oil content but Plastic PE is resistant to oil therefore adding MG paper is considered as needed to help absorb the oil.

Laminated paper kraft and MG paper for perkedel chickpea have

dimensions of 10 x 8.5 x 4.5 cm and 25 x 27 cm, respectively.



Figure 4. 2 Laminated paper kraft size M



Figure 4. 3 MG paper size 25 x 27

Packaging also has an important role to increase a selling point and the function of a product, more than that packaging can make the product have a lifespan durable, maintain food quality and safety, protect product quality, and as a means of product communication and branding to consumers (Soehardi *et al.* 2019).The packaging label for perkedel chickpea includes information such as product name, product advantages,



ingredients, and contact lists.



**Figure 4. 4** Logo

#### **4.4 Financial Aspect**

##### **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 20 working days per month. As for raw material, the quantity of raw materials is counted as 36 recipes per day or 144 recipes per month, which are 9 portions per day or 36 portions per month.

##### **1. Start-up Capital**

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

Tools and Equipment	Quantity	Price (/Unit)	Sub Total
Scale spoon	1	Rp 4.000	Rp 4.000
Spoon	1	Rp 1.300	Rp 1.300
Pot	1	Rp 50.000	Rp 50.000
Pan	1	Rp 35.000	Rp 35.000
Medium bowl	1	Rp 10.000	Rp 10.000
Blender	1	Rp 125.00	Rp 125.000
Oil drainer	1	Rp 9.000	Rp 9.000
Gloves	1	Rp 2.000	Rp 2.000

Wooden spatula	1	Rp 4.000	Rp 4.000
Electric scale	1	Rp 23.000	Rp 23.000
Small bowl	1	Rp 3.500	Rp 3.500
Fork	1	Rp 1.000	Rp 1.000
<b>TOTAL</b>			<b>Rp 267.800</b>

## 2. Labor Cost

**Table 4. 5** Labor Cost

Personnel	Quantity	Salary(/month)	Sub Total
Cook	2	Rp 2.000.000	Rp 4.000.000
Cleaning Service Officer	1	Rp 2.000.000	Rp 2.000.000
<b>TOTAL</b>			<b>Rp 6.000.000</b>

## 3. Packaging Cost

**Table 4. 6** Packaging Cost

Packaging	Quantity	Price(/Unit)	Sub Total
Laminated paper kraft	36	Rp 500 (/pcs)	Rp 18.000
MG paper	36	Rp 17.500 (/100pcs)	Rp 6.300
PEX Plastik Bag	36	Rp 9.000(/100pcs)	Rp 3.240
Label sticker	36	Rp 10.000 (/40pcs)	Rp 10.000
<b>TOTAL(/day)</b>			<b>Rp 36.540</b>
<b>TOTAL (/month)</b>			<b>Rp 731.000</b>

4. Utility cost

**Table 4. 7** Utility cost

Facility	Quantity	Price(/Unit)	Sub Total
Electricity	15 Kwh	Rp 1.400/kwh	Rp 21.000
Water	700L	Rp 1.700/1m <sup>3</sup>	Rp 1.190
Gas	0.15 kg	Rp 175.000/3kg	Rp 1.167
<b>TOTAL (/day)</b>			<b>Rp 23.357</b>
<b>TOTAL (/month)</b>			<b>Rp 467.140</b>

5. Raw Material Cost

**Table 4. 8** Raw Material Cost

Raw Material	Quantity	Price (/Unit)	Sub Total
Raw Chickpea	100 g	Rp 20.500(/kg)	Rp 1.025
Msg	1 g	Rp 13.000(/250gr)	Rp 52
Salt	1 g	Rp 2.500(/250gr)	Rp 10
Black pepper	1 g	Rp 28.500(/250gr)	Rp 114
Corn starch	7,5 g	Rp 12.000(/500gr)	Rp 60
Ground beef	20 g	Rp 65.000(/kg)	Rp 1.300
Water	10 ml	Rp 17.000(/5ltr)	Rp 34
Egg	36 gr	Rp 37.500(17pcs)	Rp 2.205
Oil	750ml	Rp 25.000(/1ltr)	Rp 18.750
<b>TOTAL(/day)</b>			<b>Rp 25.857</b>
<b>TOTAL(/month)</b>			<b>Rp 103.428</b>

6. 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

$$\begin{aligned}
 &= 6.000.000 + 4,905.600 + 731.000 + \\
 &467.140 \\
 &= \mathbf{12.148.740}
 \end{aligned}$$

#### 4.4.2 Selling price

$$\begin{aligned}\text{Product price} &= \frac{\text{total cost (/month)}}{\text{total product units (/month)}} \\ &= \frac{\text{Rp } 12.148.740}{720} \\ &= 17.000/\text{portion}\end{aligned}$$

$$\begin{aligned}\text{Product Selling price} &= \text{product price} + (\text{product price} \times \\ &\quad \text{profit precentage}) \\ &= 17.000 + (17.000 \times 15\%) \\ &= 17.000 + 2.500 \\ &= \text{RP } 19.500\end{aligned}$$