CHAPTER IV
RESULT AND DISCUSSION

4.1 Product Result

The main application of TVP is the creation of meat analogues such as meat patties, nuggets, and sausages (Cornet et al., 2022; Dekkers et al., 2018a). LM-TVP are used as meat extenders to improve viscoelasticity, colour stability, moisture retention, firmness, and juiciness (Yeater et al., 2017; Vatansever et al., 2020). The most widespread TVP are made using soy, wheat or pea proteins and mixtures thereof. LM-TVP are characterized by a porous structure and a stable shelf life. Upon hydration, the texture become chewy and juicy to mimic meat texture (Maningat et al., 2022). Improving the structuring potential of protein sources to recreate meat-like bite is gaining lot of interest *(Umami, R. 2019)*

Meat analogue nugget is an imitation product that should have the texture, flavor, and look of a meat nugget. Soy protein or gluten are the most common components in meat substitutes. To get the desired texture, textured vegetable protein (TVP) may be added. The purpose of the study was to describe the meat analogue nugget as a result of TVP addition. Four meat analogue nugget recipes were created. Texture, color, and liquid separation measures were used to investigate the influence of TVP (10, 30, 50, and 70%). An increase in TVP in the formula from 10% to 70% reduced hardness, adhesiveness, cohesiveness, springiness, gumminess, and chewiness. Shear force and work of shearing were also reduced as TVP concentration was increased. The addition of TVP caused the substitution of isolated soy protein, gluten and water in the formula which resulted in a fibrous structure of the product. The addition of TVP increased lightness and redness while decreased yellowness and chroma values of the uncooked meat analogue nuggets. Hue angle of all samples was in the yellowish and orange tone. This was due to the color of TVP after rehydrated which is pinkish-brown. The addition of TVP

resulted in an increase in the percentage of liquid separation from the sample after centrifugation. However, the percentage of liquid separation for all samples was lower than 1.6% which meant that the liquid could be absorbed by the ingredients in the formula.

The chicken meat analog with a high level of Young Jackfruit (YJ) had a higher moisture content and brightness value, whereas hardness, chewiness and shear force had lower values. The shear force and integrity index were higher with higher concentrations of Wheat Gluten (WG). Compared to mock chicken and steamed chicken, the chicken meat analogs had lower hardness, chewiness and shear force. The microstructure of the analog sample with a high level of YJ exhibited fiber-like characteristics and contained some pores between the fiber strands.

Young jackfruit improved the microstructure of chicken meat analogs and provided better texture characteristics exhibiting anisotropic (layered or fibrous) structures when used in combination with wheat gluten and soy protein isolate. Young jackfruit has a texture that is most similar to chicken meat.

4.2 Nutrition Fact

4.2.1 Nutrition Table

The nutritional value of young jackfruit as follows :

Table 4. 1 Nutrition Value of Young Jackfruit per 100 gr

Calorie (kcal)	94
Total fat (g)	0,3
Cholesterol (g)	0
Sodium (g)	3
Total Carbohydrate (g)	24,01
Protein (g)	1,47
Sugar (g)	0

Source: Hasanah, U., Ulya, M., & Purwandari, U. (2020).

Jackfruit contains vitamins, minerals, and antioxidants, making it a great addition to any diet. Since it is so versatile, jackfruit can be part of various recipes, from sweet to savoury. It has elevated levels of fibre and

vitamin C. The fruit packs more protein than other varieties and offers 4 grams per cup – higher than guava and twice as high as a banana. According to studies, unripe jackfruit has more protein and fibre and fewer carbohydrates than ripe jackfruit.

Table 4. 2 Nutrition Value of TVP per 100 gr

Calorie (kcal)	333
Carbohydrates	33,9
Sugars	16,4
Dietary fiber	17,5
Fat	1,2
Protein	51,5
Calcium (mg)	241
Iron (mg)	9,2
Magnesium (mg)	290
Phosporus (mg)	674
Potassium (mg)	2384
Sodium (mg)	20
Zinc (mg)	2,5

Source: *Pramita, V. D. (2019).*

Textured vegetable protein, dry contains 333 calories per 100 g serving. This serving contains 1.2 g of fat, 51 g of protein and 34 g of carbohydrate. The latter is 16 g sugar and 18 g of dietary fiber, the rest is complex carbohydrate. Textured vegetable protein, dry contains 0.1 g of saturated fat and 0 mg of cholesterol per serving. 100 g of Textured vegetable protein, dry contains 2.00 mcg vitamin A, 0.0 mg vitamin C, 0.00 mcg vitamin D as well as 9.24 mg of iron, 241.00 mg of calcium, 2384 mg of potassium. Textured vegetable protein, dry belong to Processed soy products' food category.

4.2.2 Nutrition Calculation

One cup of jackfruit provides about 15.7% of the daily recommended intake of potassium and 25% of vitamin C, as well as with good amounts of vitamin A, magnesium, manganese, and copper

Table 4. 3 Nutrition Value of Ingredients Used in The Recipe for Vegan Nugget

Ingredients	Calories (kcal)	Carbohydrates (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg)
TVP (100g)	333	33,9	51,5	1,2	16,4	17,5	20
Wheat gluten flour (16g)	114,7	1,7	12,8	0,3		0,6	
Nutritional yeast (8g)	30	2,5	4	0,25		1,5	15
Potato starch (16g)	40	10				7	
All purpose flour (120g)	400	88	12			4	
Dried thyme (29g)	80	18,5	2,6	2,1	0,4	10,7	15,9
Ginger powder (5g)	17,3	3,5	0,4	0,2	0,1	0,6	1,6
Paprika powder (7g)	20	3,8	1	0,9	7,2	2,5	2,3
Onion powder (10g)	34	8	1	0,1	3,5	0,5	5,4
Garlic powder (10g)	33	7,2	1,6		2,4	0,9	2,6
Blackpepper (10g)	25,5	6,4	1	0,3		2,6	4,4
Soy milk (73g)	37	3,5	3,2	1,4	0,2	0,9	40
Water (500ml)							83
Mushroom powder (25g)		12		12		12	
Salt (5g)							1937

Sugar (5g)	19,3	4,9			4,9		
White pepper (5g)	14,8	3,4	0,5	0,1		1,3	0,2
Young jackfruit (350g)	329	84	5,1	1		5,6	10,5
Silken tofu (59g)	50	2	6	2,5		2	5
Tapioca starch (32g)	112	28					
Celery (40g)	5,6	1	0,2			0,6	32
Onion (170g)	71			0,1			
Carrot (130g)	54	130	1,17	0.26	6,11	3,64	89,7
Garlic(2cloves)	8	1,9	5,85	0,04	0,08	0,168	1,36
Ground nutmeg (8gr)	12	0,9	0,24	0,16			
Dried rosemary (24gr)	31	15,3	0,4	1,21		3,4	4
Leaks (40gr)	24,4	5	0,5	0,1	1.4	0,64	7,2
Dired oregano (24gr)	72	0,38	0,48	0.04	0,16	0,192	
TOTAL	**1.967**	**475,78**	**115,54**	**23,54**	**42,85**	**78,84**	**2.277**

4.2.3 Nutritional Label

Nutrition Facts

4 servings per container

Serving size **111g**

Amount per serving

Calories **113g**

	% Daily Value*
Total Fat 1,5g	**0,9%**
Saturated Fat	
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0,125g	**0,07%**
Total Carbohydrate 30g	**18%**
Dietary Fiber 4g	**2,5%**
Total Sugars 2,7g	
Includes Added Sugars	
Protein 7g	

Vit. D • Calcium

Iron • Potas.

* 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 Vegan Nugget

4.3 Food Safety and Packaging

4.3.1 Processing and Storage Temprature

Vegan nuggets are categorized as a snack that is very popular among all groups, from small children to adults who really like vegan nuggets, because the delicious taste makes almost everyone really like vegan nuggets. Vegan nuggets can also be stored for a long time. long, which can last 1 year if vacuumed and then frozen, vegan nuggets can also last at room temperature for 3 days stored in a closed and airtight container, the method can be very easy by frying them in hot oil then use medium to high heat, and it csb be healtier by using air fryer, for frozen vegan nuggets it takes time to wait until it's really room temperature because if it's fried / cooked while it's still frozen it will change the texture and taste it's recommended to consume nuggets in hot conditions, if the vegan nuggets have changed in taste (the taste is sour), and the texture changes (slimy texture) don't eat vegan nuggets (*Hasanah, U., Ulya, M., & Purwandari, U. (2020))*

Boiling is the most important step in making vegan nuggets because if young jackfruit is not boiled it will produce a hard and bitter vegan nugget texture. Boiling is the initial process in making vegan nuggets because if the step is wrong in the boiling process then it will not be able to proceed to the next process. Because the young jackfruit flesh must be soft and textured because the purpose is to make vegan nuggets that have a texture and taste that is almost similar to yaam nuggets in general, by adding other ingredients in making vegan nuggets, by adding tvp, silken tofu, potato strach, nutritional yeast, wheat gluten flour and all purpose flour will make the texture and taste produced from chicken nuggets almost the same as chicken nuggets sold in the market .(*Dewi Wijaya, J., Rulianto Utomo, A., & Setijawaty, E. (2021))*

TVP is soy flour that has had its fat content removed. TVP is also often used as a substitute for meat. The protein content of TVP is also equivalent and almost the same as animal protein. Using TVP is considered healthier because TVP is cholesterol-free and vegan people can also consume TVP, TVP too. very good for the body because the content and benefits contained in tvp are very good for our bodies, tvp itself also has to be soaked first in water for approximately 30 minutes to make the tvp texture soft and not hard. *Soedirga, L. C., Cornelia, M., & Fernaldo, J. (2022)*

4.3.2 Shelf life

Vegan nuggets are categorized as snacks that are very popular in various circles, from young children to adults, all really like vegan nuggets. The existing innovation by making nuggets using young jackfruit and tvp this material makes the texture of vegan nuggets which has been made taste and texture almost similar to nuggets on the outside vegan nuggets can also last a long time because they don't contain animal

protein and eggs making vegan nuggets last a little longer, namely if stored in the freezer and in a vacuum they will last one year, if stored in a chiller which is stored using an airtight container it can last 2 months and if stored at room temperature and placed in a closed and airtight container If there is air, the vegan nuggets can last 3 days. No air gets in, so the nuggets can last a long time. The best vegan lemper consumption is a maximum of 2 days because if it takes too long it will spoil the nuggets quickly, which means the taste has changed (turned sour), the texture (become slimy) , if someone get a nugget texture like that, it's better not to consume it, the way to serve nuggets is also easy, namely if its just taken out from the freezer, wait until it's room temperature, or use the deep frost feature in the microwave. Other than microwave, put it at room temperature space until the temperature drops / no longer freezes, because if the frozen nuggets are fried immediately, the texture and taste of the nuggets will become unpleasant, namely they will become wet, another option for consuming healthier nuggets is by using an air fryer to fry without using oil*(Hasbiyanti, H., Sudiarti, D., & Roudlotul Hikamah, S. (2021)).*

4.3.3 Product Packaging

Food packaging has many functions, namely to keep food clean and food free from animals and also to keep food clean. Food packaging is used to protect food along the supply chain. Otherwise, the handling of food products can be costly and inefficient. In addition, food packaging is to protect food from possible harm; such as physical, chemical, or even microbiological; which can have an impact on the quality and safety of the food itself. The selection of food packaging materials must consider costs, product quality, and their ability to protect food (Alamri & Qasem, 2021)

Vegan nuggets are foods that are often categorized as vegan nuggets themselves and are loved by everyone of all ages, from young to adults, everyone likes nuggets. The inovation to make vegan nugget healthier and vegan friendly and also lower in cholesterol. The selling of vegan nugget isnin frozen condition . The selling of vegan nuggets using vacuum plastic which is vacuum removed, which makes vegan nuggets last a long time. Vegan nuggets that have become frozen food can also last 1 year, 3 hari in room temprature and 3 months in chiller .(Husniah Sofi, N., Su'i, M., & Sumaryati, E. (2021)). Plastick vakum pack are 25cm high and 16,7cm long (350gr) , this packaging is very suitable for vegan nugget

Figure 4. 2 Frozen Vacuum Plastic 350gr

Figure 4. 3 Logo

4.4 Financial Aspects

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

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 10 recipes per day or 250 recipes per month, which are 40 packs per day or 1000 packs per month.

1. Start-up capital

Table 4. 4 Start-up Capital

Total and equipment	Quantity	Price (/unit)	Sub total
Big bowl	1	Rp30.000/pcs	Rp30.000
Blender	1	Rp250.000/pcs	Rp250.000
Spatula	1	Rp20.000/pcs	Rp20.000
Small container	2	Rp15.000/pcs	Rp30.000
Sauce pan	1	Rp125.000/pcs	Rp125.000
Peeler	1	Rp12.000/pcs	Rp12.000
Knife	1	Rp70.000/pcs	Rp70.000
Scale	1	Rp85.000/pcs	Rp85.000
TOTAL			**Rp622.000**

2. Packaging cost

Table 4. 5 Packaging Cost

Packaging	Quanitity	Price (/unit)	Sub total
Plastick vacum pack	1000	Rp800/pcs	Rp800.000
Logo sticker	1000	Rp25/pcs	Rp25.000
Total/month			**Rp825.000**

3. Utility cost

Table 4. 6 Unitility Cost

Facility	Quantity	Price(/unit)	Sub total
Water	750	Rp2.000(/m3)	Rp1.500
Electricity	5 kwh	Rp1.500(kwh)	Rp7.500
Gas	3kg	Rp18.000/3kg	Rp18.000
Total(/day)			**Rp27.000**
Total(/month)			**Rp675.000**

4. Raw material cost

Table 4. 7 Raw Material Cost

Raw materials	Quantity	Price (/unit)	Sub total
Tvp	20kg	Rp80.000/340gr	Rp470.000
Wheat gluten flour	320gr	Rp48.000/500gr	Rp32.000
Nutritional yeast	160gr	Rp30.000/250gr	Rp19.200
Potato strach	320gr	Rp10.000/kg	Rp320.000
All purpose flour	24kg	Rp20.000/100gr	Rp480.000
Dried thyme	580g	Rp17.000/100gr	Rp98.600
Ginger powder	100gr	Rp18.000/100gr	Rp18.000
Paprika powder	140gr	Rp22.000/100gr	Rp30.800
Onion powder	200gr	Rp22.000/100gr	Rp44.000
Garlic powder	200gr	Rp23.000/100gr	Rp46.000
Blackpepper	200gr	Rp17.000/100gr	Rp34.000
Soy milk	1460gr	Rp9.000/250ml	Rp52.560
Water	100.000ml	Rp5.500/500ml	Rp110.000
Mushroom powder	500gr	Rp7.000/250gr	Rp14.000
		Total(/day)	**Rp1.769.160**
		Total(/month)	**Rp 44.229.000**

5. Total cost

Variable cost = raw material cost, packaging cost, and utility cost

Total cost (/month) = raw material + packaging + utility

= Rp44.229.000 + Rp825.000 + Rp675.000

= Rp45.729.000

4.4.2 Selling Price

$$\text{Product price} = \frac{\text{Total cost (per month)}}{\text{Total products unit (per month)}}$$

$$= \frac{45.279.000}{1000\ packs}$$

$$= \textit{Rp45.279/pack}$$

$$\text{Product selling price} = \text{product price} + \frac{product\ price\ X}{Profit\ precentage}$$

= Rp 45.279+ (Rp45.279 x 100%)

= Rp45.279 + 45.279

= Rp90.558 ~ Rp91.000