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OPTIMIZATION OF THE UTILIZATION OF SHRIMP HEAD WASTE INTO POWDER BROTH

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ABSTRACT

Utilization of the regional economy can be done through the maximum utilization of local resources where this can be done by increasing the economic value of local resources that have not been used optimally. Therefore, in this study the local water resources of Papua were used which were abundant but not utilized. The shrimp heads are currently only a waste of fishermen and the people in Sorong and West Papua. Although some use shrimp heads, this is done outside Papua and only as animal feed. The nutritional content of shrimp heads is very high and good for health. Therefore, researchers will conduct research in the form of experiments on the process of making spices from shrimp heads. This study will apply the taguchi method, where the researcher must make a simulation to determine the number of trials and the level that must be carried out. In this study, two processing processes were carried out, namely by way of in the oven and by way of frying. The experimental results tested using the organoleptic test showed that the experiment with the fried method had the highest score at level 3 with a score of 565. Meanwhile the process using the oven got the highest score at level 4 with a score of 595. Comparison of the values of the two processes is quite low, namely the oven process is 5% higher than the fried process. Therefore, it can be concluded that the oven process with level 4 is the best.

Keywords: Shrimp, Taguchi, Organoleptic

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1. INTRODUCTION

Improving the economy of a region is an effort to improve people's welfare. This effort can be conducted by increasing public awareness as customers who have an assessment of local resources (Paramita et al., 2018; Iriansyah et al., 2023). Communities that can see opportunities and take advantage of local resources will be able to have economic independence (Kurisini et al., 2017). In this effort, academics have a significant role in the process of developing and enhancing local resources. This can be seen with various programs from the Ministry of Education and Culture. One of the government's strategies or efforts to encourage the involvement of academics is to provide funding to academics. This funding includes research programs and community service by utilizing opportunities from resources effectively (Maniagasi et al, 2022). Various attempts have been made to overcome the economy, one of which is the effort to process waste so that it has economic value and becomes a product that has a sale value (Masniar et al, 2022). In addition to having a positive impact on the environment, good waste management can increase economic value. There have been many attempts to process waste into valuable products, one of which is by processing household waste into compost (Aminu et al., 2020). In addition to household waste, factory waste is also used. One example is shrimp head waste, most people do not know the value and nutritional content of shrimp heads, so they are considered waste and thrown away (Setia., 2020). Currently, for some people, shrimp head waste is only used as an ingredient in making animal feed. The use of shrimp head meal as animal feed can increase the amount of livestock production (Ella et al. 2017). This shows that the nutritional content of shrimp is very high. The amount of protein in freshwater shrimp is 12.2814%, while the protein content in seawater shrimp is 12.2791% (Saputri & Febriyanti., 2019). In addition to the high protein value, shrimp also has a high astaxanthin content. Astaxanthin is a good antioxidant for maintaining healthy eyes, skin, heart, and can relieve inflammation (Setia., 2020).

Indonesia is a country that exports marine products, one of which is shrimp. Based on the results of interviews with shrimp export entrepreneurs, to maintain quality and buyer demand, only the body parts of shrimp are exported, while the heads of shrimp are considered waste. This is very unfortunate because the levels of astaxanthins in shrimp are also quite a lot in the heads of the shrimp. The shrimp heads which are considered waste should still be processed into products or processed so that these products will be proposed for use because they have added economic value, as well as an increase in other economic supporting factors (Sundalian et al., 2021; Ahistasari et al, 2023).

West Papua is a province that has abundant aquatic products. In addition, water products in West Papua also have export quality. This can be seen in one of the companies domiciled and operating in the city of Sorong, West Papua. PT. Irian Marine Product Development is a shrimp exporting company located in the city of Sorong. According to information owned by the owner of the company, PT. IMPD produces export shrimp of 1800 – 2000 tons of shrimp/year. As explained above that the shrimp being exported are headless, PT. IMPD also produces shrimp head waste every production period. Until now, PT. IMPD's shrimp head waste has not been utilized and wasted. Therefore, researchers will conduct research that utilizes shrimp head waste to be used as a high-value product. This research will use a trial method by applying the Taguchi method. The Taguchi method was chosen because it was considered in accordance with the research plan to be conducted. In addition, by applying the Taguchi method, it is hoped that research results or products can be more optimal (Zayendra et al., 2016). Apart from that, the background of this research is the passion of the people of Papua in consuming fish and seafood. So, we wanted to make a seafood-flavored seasoning made from shrimp heads. Researchers will process shrimp heads with several compositions which are then used as samples to be assessed. The method of assessing the experimental results is to perform an organoleptic test. Samples will be given to housewives and then given a value indicating which sample they prefer. Assessment will be made in the form of a score. In addition to creating a product, this research is also expected

to provide benefits and insights for readers and the people of Papua about the beneficial value of shrimp heads which have been considered waste. The aims of this study were to find out the following: (1) Know the good process for producing good seasoning products made from shrimp heads (2) Know the factors that influence the quality of seasoning products made from shrimp heads (3) Know the optimal process for producing shrimp head seasoning products using the Taguchi method.

2. METHODS

Research that applies the Taguchi method will be conducted by making experimental stages. Experiments or trials were conducted using equipment in the form of a shrimp head drying machine, a milling machine, and grammatical scales. Experiments were conducted with a predetermined amount and a predetermined composition in the factor determination process. Organoleptic test is the last process. This organoleptic test is a testing process that uses the human senses of taste and smell (Lamusu., 2018). Through this test, it will be known which process has the most influence on the quality of ingredients made from shrimp heads (Gusnadi et al., 2021). Before conducting the research, it is necessary to make an orthogonal matrix, to compose an orthogonal matrix, it is necessary to determine the degrees of freedom as follows:

VA = (sum of factor A levels) – 1 = kA-1 (1)
VB = (sum of factor B levels) - 1 = kB-1 (2)
For interactions, for example the interaction of A and B
VAxB=(kA.1) (kB.1) total degrees of freedom = (kA.1) + (kB.1) + (kA.1) (kB.1) (3)

3. FINDINGS AND DISCUSSION

3.1. Findings

This research was conducted with two different experiments namely; (1) Fried prawn heads (2) Baked prawn heads. The application of the Taguchi method in this study is to find out which factors influence product quality (Ningsih., 2020). The control factors in this study were the temperature and heating time factors. The experiment was conducted with two repetitions.

The following is the calculation that determines the Orthogonal matrix:

F (Number of Factors) = 2
Runs = 10
Signal/Replay = 2
Columns of L4 (23)
Db (Level) = 3-1=2
Db (OAW) = F x db (level)
= 2x2 = 4n = db (AO) + 1= 5

Table 1. Matrix of Orthogonal (Fry)

Exp. No	CONTROL FACTORS		Frayer					
	TEMPERATURE	TIME	Exp.1			Exp.2		
			Taste	Aroma	Texture	Taste	Aroma	Texture
1	100	50						
2	150	75						
3	200	100						
4	100	125						
5	200	150						

Table 2. Matrix of Orthogonal (Oven)

Exp. No	CONTROL FACTORS		Oven					
	TIME	Exp.1 Taste	TIME			Exp.1		
			Rasa	Taste	Texture	Taste	Aroma	Texture
1	100 o	50						
2	150 o	75						
3	200 o	100						
4	100 o	125						
5	200 o	150						

After the experiment was conducted two process methods and each had 5 levels, then the product was tested on respondents.

3.2. Discussion

Organoleptic
Organoleptic tests are used to determine color, taste, aroma, and texture through the five human senses (Budaraga., 2017). The selection of respondents is determined based on the type of object studied. Because in this study were spices, the selected respondents were housewives. This is because housewives are the main consumers in

the distribution of food additives. Therefore, the selection of respondents in this study does not limit age, but the status of women who are married and work at home. The number of respondents themselves was 30 respondents. Where each respondent was asked to use the sense of taste, touch, and smell. This is in line with the parameters that have been determined by the researcher. In practice, respondents will try 20 samples at the same time. The experimental sample consists of 5 levels that use fry with 2 repetitions of the experiment, and 5 levels that use the oven with the same number of repetitions. Technically, the respondents tried all the samples in turn and assigned a rating value to each sample. The ratings used were (1) dislike, (2) quite like, (3) like, and (4) very like.

A. Normality Analysis

After the sample is evaluated on the respondent and gets answers from the respondent, then its normality will be analyzed. This Normality Test is conducted to find out whether the observed frequencies are normally distributed or not. In this analysis using the chi-square distribution. The normality test in this study used SPSS software. The results of the normality test that has been conducted are as follows:

Table 3. Data Normality Test Results

Name	Experiment 1 (Fry)			Experiment 1 (Fry)		
	Taste	Aroma	Texture	Taste	Aroma	Texture
Kolmogorov-Smirnov	0,804	0,834	0,667	0,478	0,776	0,654
Asymp.Sig.(2-tailed)	0,538	0,49	0,766	0,496	0,583	0,786
Name	**Experiment 1 (Oven)**			**Experiment 2 (Oven)**		
	Taste	Aroma	Texture	Taste	Aroma	Texture
Kolmogorov-Smirnov	0,570	0,837	0,426	0,746	0,659	0,477
Asymp.Sig.(2-tailed)	0,901	0,485	0,993	0,635	0,778	0,977

Based on table 3 above which shows that the results of the normality test in the two experimental processes, which have different data are stated to be normally distributed. This is because the significant value is ≥0.05.

B. Ranking

Once it is known that all the data are normally distributed, the next step is to conduct an experiment that produces a product with a positive response value. This stage is conducted by conducting a ranking test. This ranking test was conducted to determine the properties of all samples. In this method, the researcher applies a rating level of 1-5. Where value 1 is the basic value and value 5 is the best value, so if the sample gets a low cumulative value, it will be considered a bad experimental product. So, if the sample gets a high score, then the sample is considered the best. The following table ranks the trials in this study:

Table 4. Frying Processes Ranking

Level	Fryer		Total
	Expt1	Texture	
1	242	229	471
2	262	251	513
3	249	236	485
4	285	280	565
5	232	220	452

Table 4 shows the experimental results that have the greatest value are experiments at level 4. Where the cumulative value obtained is 565. The following is a ranking table of experiments with the oven process:

Table 5. Oven Processes Ranking

Level	Oven		Total
	Expt1	Texture	
1	254	263	517
2	263	264	527
3	291	304	595
4	269	267	536
5	195	185	380

4.CONCLUSION AND SUGGESTION

The results of the orthogonal matrix arrangement show that the research was conducted 20 times. This total consists of 5 levels with 2 different processes and 2 reps. This study uses housewives as respondents with a total of 30 people. Organoleptic test results data were normally distributed, namely ≥ 0.05. So that it can be

directly ranked on all samples that have been assessed. The results of this study indicate that the highest score is found in the frying process, namely at level 4 with a value of 565. Meanwhile, in the oven process, it has a score of 595 at level 3. Based on these results it can be interpreted that the process using the oven has better results with a 5% difference in comparison. However, this process still requires more in-depth research, because it is not yet known how many or what levels of nutrients are contained in samples from each level of the experiment.

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