Increasing The Economic Value of Coconut Milk Factory Waste In Malaysia

Aris Slamet Widodo[1*], *Widodo*[2], *Syamsia*[3], *Puji* Qomariah [4], *Muhammad bin* Hashim[5] and *Barhul* Ulum[6]

[1]Agribusiness Department, 55183 Universitas Muhammadiyah Yogyakarta, Indonesia
[2]Agribusiness Department, 55183 Universitas Muhammadiyah Yogyakarta, Indonesia
[3]Agrotchnology Departement, 90221 Universitas Muhammadiyah Makassar, Indonesia
[4]Sociology Department, 55132 Universitas Widya Mataram, Indonesia
[5]Da'wah and Islamic Management Department, 71800 Universiti Sains Islam Malaysia, Malaysia
[6]Magister of Agribusiness Management, 55281 Universitas Gadjah Mada, Indonesia

Abstract. Coconut dregs are a by-product of coconut processing into coconut milk. Coconut dregs contain protein, fat and crude fiber so that they can be used as products with high economic value. One way is to process it into flour that can substitute the use of wheat in making various foods. This community service activity aims to provide education to coconut milk processing groups in utilizing coconut dregs into flour and processing it into high-fiber foods that have economic value such as coconut flour cakes. This activity uses the methods of socialization, training, and mentoring to the Kampung Parit Baru Malaysia coconut milk production group for three months from March to May 2024. The results of this activity provide knowledge and skills to partners about the potential use of coconut dregs as flour, how to make flour and process it into cakes that contain high fiber. The level of satisfaction and assessment of community service activities through the utilization of coconut dregs waste for making flour in the Kampung Parit Baru Malaysia coconut milk production group is in the very satisfactory category.

1 Introduction

The coconut tree, which gives millions of people access to food, shelter, and employment possibilities, is a symbol of prosperity in tropical places [1]. Coconut plants are one type of plant that thrives in Malaysia because coconut plants are very suitable for the climate in Malaysia. Without special care, coconut plants can thrive anywhere. This coconut plant has many benefits, starting from its leaves, tree trunks to the fruit it produces. The benefits of coconut fruit are very many, including its water to quench thirst, young coconut flesh can be made as a mixture of drinks or food, while old coconut flesh can be made as coconut milk for mixed ingredients in making food or drinks [2-3].

Coconut milk is the juice from squeezed old coconuts. Coconut milk has a fatty taste and is used as a flavoring that makes food delicious, the function of which cannot be replaced by

*Corresponding author: aris.sw@umy.ac.id

other ingredients because the image and aroma produced are very distinctive, so it will affect the image of the processed dishes [4]. According to Santoso [5], coconut milk is the most widely used processed coconut product in society. In addition to consumption, coconut milk is exported in preserved form, namely frozen coconut milk and powdered coconut milk. Coconut milk is widely used, especially for various daily household cooking ingredients, cake industry, bread, ice cream, traditional foods and so on.

Processing coconut into coconut milk uses coconut flesh called endosperm. This endosperm is taken by separating it from the shell (endocarp). After the endosperm is separated from the endocarp, it can then be put into a machine that will directly separate the coconut milk from the coconut pulp. Processing coconut into coconut milk produces waste in the form of coconut pulp. Making coconut milk with the wet method from 100 coconuts will produce 19.50 kg of coconut pulp [6].

The use of machines in processing coconut into coconut milk saves a lot of time, but causes problems in terms of the large amount of coconut pulp waste produced. However, there is a problem in the coconut milk industry group in Malaysia, namely the lack of processing of coconut milk waste or coconut pulp. Where so far the coconut pulp has only been thrown away and has not been utilized to become a product that has a selling value. This is because they do not yet know the potential of coconut milk waste or coconut pulp, do not yet have the skills to manage coconut milk waste or coconut pulp and have not been able to analyze the economic value and benefits of coconut milk waste or coconut pulp.

Coconut pulp still contains nutrients that can be utilized [7]. Coconut pulp contains 5.78% protein, 38.24% fat, 15.07% crude fiber [8]. Coconut pulp also contains 23% protein, 93% carbohydrates, 61% galactomannan, 26% mannose and 13% cellulose and, 12.2% fat, 18.2% protein, 20% crude fiber, 4.9% ash and 6.2% water content [9]. Coconut pulp can be used as animal feed containing high fiber [10], can also be used as flour for processed foods with high fiber content [6].

Coconut pulp flour is flour obtained by grinding dried coconut pulp [6]. Coconut pulp flour contains 7.3% fat, 4.91% protein, 2.37% fiber, 81.75% carbohydrates, 5.70% water content [9]. The same thing was stated by Purnamasari, Zamhari, and Putri [11]. The nutritional content of VCO coconut pulp flour is: 13.26% protein, 45.37% fat. Utilization of coconut pulp into flour has a high benefit value because it contains high nutritional value crude fiber and can be used as a substitute material in food processing [12]. The dietary fiber content of coconut flour is greater than wheat flour, cassava, potatoes, rice [13]. The fiber content of coconut pulp flour is 15.06% higher than wheat flour which only contains 0.25% fiber [14].

However, so far coconut milk dregs have not been utilized and have been neglected so that they become solid waste [15-16]. Solid waste management and waste valorization are key concerns and challenges around the globe [17]. Based on these conditions, it is necessary to carry out community empowerment activities by introducing the coconut milk maker group in Kampung Parit Baru Malaysia about the potential for utilizing coconut pulp waste into products with economic value.

2 Methodology

This community service activity was carried out at the location of the coconut milk production group in Kampung Parit Baru Malaysia for three months from March to May 2024. The stages in implementing the coconut milk production group empowerment program in Kampung Parit Baru Malaysia are as follows.

2.1 Need Assessment

Need assessment is a study conducted to obtain findings of potential and problems in the community, before the facilitator team prepares a program [18]. The assessment is conducted at the beginning of each observation so that the facilitator team obtains information about the condition and readiness of the community as a whole. At this need assessment stage, the team will conduct a study of the daily life of the community, the views and responses of the community to the coconut milk production business group in Malaysia. The assessment is carried out using various techniques, including: surveys, observations, interviews, focused group discussions (FGD). The approach used is the PRA (Participatory Rural Appraisal) approach, the community is involved to see themselves and map out what their own strengths and needs are. The PRA approach allows for the full involvement of various elements and social strata in the community. The results of the need assessment will be the basis for compiling the program [19].

2.2 Socialization

Socialization activities are used to transfer knowledge about the potential of coconut milk waste or coconut pulp. The form of socialization activities can be carried out using information media offline or directly or online which is currently developing in the community. The facilitator will create campaign media designs such as digital leaflets and videos to make it easier for the community to understand the socialization material.

2.3 Training

This training aims to improve community skills related to processing coconut milk waste or coconut pulp into products that have economic value. The selection of the type of training depends on the results of the need assessment. In community empowerment, training is also carried out on the analysis of the economic value and benefits of processing coconut milk waste or coconut pulp into a product. The training uses adult education methods (andragogic learning) so that participants are more active and the material is easier to apply.

2.4 Community assistance

Community assistance is the core program of the entire program. Community assistance is carried out so that the process of change that occurs in the community runs well, and learning needs can be facilitated optimally. The content of the mentoring adjusts to the process that has occurred in the community, referring to the results of the needs assessment. The stages of the mentoring process that will be carried out are as follows: (1) Capacity building of coconut milk waste or coconut pulp management; (2) Mentoring the implementation of business development products from coconut milk waste or coconut pulp.

2.5 Evaluation

Program evaluation is conducted on communities that have participated in the entire series of activities, from socialization, training to technical assistance. Indicators and benchmarks for success are by knowing the increase in knowledge, skills, and motivation of the community. The criteria for success are by comparing the level of knowledge and skills before and after the activity takes place. Program evaluation is conducted by analyzing the

assessment of community satisfaction with the empowerment program through several indicators and statements in the form of score data.

3 Results and Discussion

The implementation of the coconut milk production group empowerment program in Kampung Parit Baru Malaysia was carried out online and offline. Offline activities were carried out directly in Malaysia on May 9-15, 2024.

3.1 Socialization of the potential of coconut pulp waste

The socialization activity of the potential of coconut pulp waste was carried out by directly visiting the coconut milk production group in Kampung Parit Baru Malaysia. This activity lasted for 2 days at the coconut milk production house and coconut milk sales outlet located in the central market. In the socialization activity, the community service team delivered several materials such as the potential of coconut pulp waste, coconut pulp content, and several processed coconut pulp waste such as flour for making cakes. In this case, partners felt that they had gained new knowledge about the potential of coconut pulp waste which had so far only been left without being utilized.

3.2 Training on processing coconut pulp waste into flour as a cake ingredient

The process of making coconut pulp flour is very simple and easy to apply on a small and medium scale, so it can be utilized by coconut-based product producers to earn additional income from processing coconut pulp into flour.

Fig. 1. The process of making coconut pulp flour [13]

Coconut pulp flour can be made through several methods including using solar heat, oven, freeze dryer, vacuum dryer. Drying by drying coconut pulp under the sun until dry takes approximately two days, depending on weather conditions. Drying coconut pulp using an oven at a temperature of 70ºC for 7 hours [20].

(a) (b)

Fig. 2. The process of drying coconut pulp with (a) sunlight and (b) oven

Freeze drying is a drying method that has the advantage of maintaining the quality of drying results for heat-sensitive products. This method can maintain product stability (avoid changes in aroma, color and other organoleptic elements) and maintain the stability of the material structure (shrinkage and changes in shape after drying are very small [6].

Vacuum freeze drying consists of three stages, namely: the product freezing stage, the primary drying stage or the ice sublimation stage from frozen materials carried out in a low-pressure chamber and the secondary drying stage or the process of transferring water vapor from the dry layer to the outside of the material which takes place after all the ice has sublimed [11].

The dried coconut pulp flour is then ground by pounding, grinding or blending and then filtered to obtain fine coconut flour. The flour is stored in a closed container and can be used as needed. One of the processed foods that can be made from coconut pulp flour is cake. The ingredients for making cake using coconut pulp flour as a substitute for wheat flour are: coconut pulp flour, wheat flour, granulated sugar, eggs, cocoa powder, butter, chocolate bars. The composition of materials and cost estimates can be seen in Table 1.

Tabel 1. Ingredients for making coconut dregs flour cake and estimated costs

No	Ingredients	Composition	Price (IDR)
1	Coconut pulp flour	100 gr	4,000
2	Chocolate bars	150 gr	10,500
3	Eggs	2 pieces	4,000
4	Sugar	140 gr	2,500
5	Chocolate powder	165 gr	7,500
6	Butter	100 gr	5,000

The process of making the cake is as follows:

1. Dry ingredients (coconut pulp flour, cocoa powder) are sieved to mix homogeneously.
2. Chocolate bars and butter are melted by steaming.
3. Eggs are beaten with a whisk.
4. Dry ingredients are mixed with melted chocolate and beaten eggs then stirred until evenly mixed.
5. The dough is poured into a pan that has been smeared with butter and
6. The dough is baked in the oven.

(a) (b)

Fig. 3. The process of (a) baking the cake and (b) the cake is ready to eat

3.3 Community assistance in processing coconut pulp flour

Community mentoring was carried out with the aim of motivating the coconut milk production group in Kampung Parit Baru Malaysia to manage coconut pulp waste independently. In the mentoring activity, several introductions were also made to processed products from coconut pulp flour, namely cakes. The community thinks that the taste of cakes made from coconut pulp flour is very delicious. Of course, this is a positive response for the coconut milk production group to make products that are worth selling.

3.4 Evaluation of community empowerment activities

Program evaluation is conducted on communities that have participated in the entire series of activities, starting from socialization, training to technical assistance. Indicators and benchmarks for success are by knowing the increase in knowledge, skills, and motivation of the community. The criteria for success are by comparing the level of knowledge and skills before and after the activity takes place. Program evaluation is conducted by analyzing the assessment of the beneficiary community towards the empowerment program through several indicators as follows.

Table 2. Evaluation score for the implementation of community service.

Indicator	Score	Category
Socialization	4,26	Very satisfied
Training	4,41	Very satisfied
Mentoring activities	4,02	Very satisfied
Total score	**4,23**	**Very satisfied**

*Information:
1,00 – 1,80 = Very Dissatisfied
1,81 – 2,60 = Not satisfied
2,61 – 3,40 = Neutral
3,41 – 4,20 = Satisfied
4,21 – 5,00 = Very Satisfied

Based on Table 2, it is known that the evaluation score for the implementation of the community empowerment program is 4.23 with a very satisfied category. Assessment of community satisfaction with the empowerment program is also needed. This aims to

determine the extent to which the implementation process of the community empowerment program is felt. Based on Table 3, it is known that the community satisfaction score for the empowerment program that has been carried out is 4.50 with a very satisfied category.

Table 3. Community satisfaction score with program implementation.

Indicator	Score	Category
Program suitability	4,22	Very satisfied
Program implementation	4,50	Very satisfied
Solution to problem	4,68	Very satisfied
Accuracy of appropriate technology	4,32	Very satisfied
Process & accuracy of empowerment methods	4,45	Very satisfied
Success confidence	4,50	Very satisfied
Value-added	4,82	Very satisfied
Total score	**4,50**	**Very satisfied**

*Information:
1,00 – 1,80 = Very Dissatisfied
1,81 – 2,60 = Not satisfied
2,61 – 3,40 = Neutral
3,41 – 4,20 = Satisfied
4,21 – 5,00 = Very Satisfied

4 Conclusions

Coconut dregs have the potential to be used as flour with high fiber content. Coconut dregs flour can be used as a substitute for wheat flour in making cakes. The use of coconut dregs flour can increase the economic value of coconut dregs which have not been optimally utilized. Based on the empowerment results of the coconut milk production group in Kampung Parit Baru Malaysia, it can be concluded that:

1. Increasing public knowledge of the potential of coconut milk waste or coconut pulp into processed products
2. Increasing community skills in managing coconut milk waste or coconut pulp into flour
3. Increasing community ability in analyzing the economic value and benefits of coconut milk waste or coconut pulp into flour
4. The level of satisfaction and evaluation of community service activities through the utilization of coconut pulp waste into flour in the coconut milk production group of Kampung Parit Baru, Malaysia is in the very satisfied category.

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References

1. T. Sathish, S. Karthikeyan, A. Kumar, K. Rajaram, S.S. Kumar, A.A. Al-Kahtani, M. Ubaidullah, IJHE **8** (2024)
2. Tulashie, S. Kofi, J. Amenakpor, S. Atisey, R. Odai, E.E.A. Akpari, CSCEE, **6** (2022)
3. A., Farida, R. Rahmawati, H.S. Asnawi, A.A. Saputra, JPMK, **4**, 41-51 (2021)
4. Y.S. Rahayu, JA, **6**, 66-77 (2017)
5. U. Santoso, SNIP (2000)
6. Yulvianti, Meri, W. Ernayati, M. Alfian, JIP, **5**, 101–7 (2015)
7. Adsare, S. Ramdas, U.S. Annapure. JFE, **298** (2021)
8. Kurniawan, Heri, R. Utomo, D. Lies, M. Yusiati, BP, **40**, 26–33 (2016)
9. Rousmaliana, Septiani, JIK, **1**, 18–31 (2019)
10. S.G. Hidayati, JE, **4**, 26-36 (2017)
11. Purnamasari, Indah, M. Zamhari, S. Putri, JK, **12**, 45–50 (2021)
12. Salindri. Journal of Food Security and Agroindustry *(JFSA)* 1(1):23–37 (2023)
13. Lumoindong, Frans, F. Christine, Mamuaja. JITP, **5**, 24–28 (2017)
14. Okhtora, Ika, JT **2016,** 19–23 (2016)
15. Shakeela, Heeba, K. Mohan, P. Nisha, SFT, **2**, 497-505 (2024)
16. Talha, N. Syakirah, S. Sulaiman, WM, **78** (2018)
17. Saeed, Mohd, A. Mohammad, P. Singh, B. Lal, M. Suliman, Mohammad, Y. Alshahrani, M. Sharma, IJBM, **240** (2023)
18. Mardikanto, Totok, Poerwoko, A (2015)
19. D. Maryani, R.R.E. Nainggolan, D (2019)
20. Pratiwi, R. Alam, A.B. Senna, JT, **12**, 48–58 (2021).