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THE EFFECT OF FEEDING TEMPEH DREGS AND MORINGA LEAF ON PROTEIN LEVELS OF CATFISH MEATBALL AS HEALTHY FOOD FOR UNDERWEIGHT TODDLERS

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THE EFFECT OF FEEDING TEMPEH DREGS AND MORINGA LEAF ON PROTEIN LEVELS OF CATFISH MEATBALL AS HEALTHY FOOD FOR UNDERWEIGHT TODDLERS

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4

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ABSTRACT

Protein is a source of amino acids that are very important. Protein deficiency will affect the growth and development process of toddlers. Provision of protein source foods can be an alternative, one of which is meatballs made from animal protein. To increase the protein levels, can add tempeh dregs and moringa. The purpose of this study was to determine the effect of giving tempeh dregs and Moringa to the protein levels of catfish meatballs. This research is experimental. The factors studied are (P0) catfish 100%, (P1) catfish 60% + tempeh dregs 30% + Moringa leaves 10%, (P2) catfish 100% + tempeh dregs 20% + leaves Moringa 20%, (P3) catfish 60% + tempeh dregs 10% + Moringa leaves 30%. Observation parameter is protein levels. To determine the difference between each treatment, the One Way Anova statistical test was used. The test results showed that the composition of catfish 150 g + 75 g tempeh dregs + 25 g Moringa leaves was significantly different from other treatments with p value 0,000 and gave the highest average protein levels in meatballs, which was 9.09% and had met the quality requirements for meatballs based on Indonesian National Standard.

4

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INTRODUCTION

Currently, Indonesia is still facing a major nutritional problem, namely Protein Energy Undernutrition (PEU). Underweight (weight for age) is below the standard reflecting both stunting and wasting, affecting 17.7% of toddlers in Indonesia (Bappenas, 2019). Based on the 2018 Riskesdas data, in East Java, toddlers with underweight status (BB/U) were 13.4% and severely underweight was 3.3%. One of the causes is food insecurity and low consumption of energy and protein in the daily diet so that it does not meet the recommended adequacy. Based on data from Bappenas in 2019, it shows that almost half of Indonesia's population (45.7%) has a very low level of energy adequacy (<70% EAR/Energy Adequacy Ratio) and 36.1% of Indonesia's population has a very low protein adequacy level (<80%). PAR/Protein Adequacy Rate), while economic access (affordability) to food is the main cause of food insecurity. Protein Energy deficiency in toddlers can cause stunted growth, susceptibility to infection, and decreased intelligence (Magdalena, 2017).

The provision of high-protein foods such as meatballs can be an alternative problem solving. Meatballs are processed products of animal protein sources from beef, chicken, and fish meat that are popular from children to adults. Making meatballs is generally boiled and shaped round (Hasniar, et al. 2019). To enrich protein and minimize production costs in meatballs, several ingredients can be added, such as sources of vegetable protein and vegetables. In a previous study conducted by Hasniar, et al (2019) regarding tempeh meatballs added with Moringa leaves had a protein content of 9.46% and from Aprilianti's research (2016) on catfish meatballs added with Moringa flour had a protein content of 15.26% which has been meet the quality requirements of meatballs.

Fish is an animal protein that is rich in nutrients. The protein content in fish is 18% and the amino acids are not easily damaged by heating (Putra, 2013). Fish that are affordable and easy to find is catfish. Catfish is able to adapt to the environment, tastes good and has a protein content of 17.7% and fat 4.8%. The advantage of catfish compared to other animal products is that it is rich in leucine and lysine. Leucine is an essential amino acid that is indispensable for the growth of children in nitrogen balance and the breakdown and formation of muscle protein, while lysine is needed for bone growth and calcium absorption (Rustaman, 2015).

Based on previous studies, showing that Moringa is a special plant, almost every part of Moringa has nutritional value. Fresh Moringa leaves contain four times more vitamin A than carrots (6.80 mg), vitamin B 423 mg/100 g of ingredients, seven times more vitamin C than oranges (220 mg), three times more potassium than bananas. 259 mg), four times more calcium than milk (without lactose) at 440 mg, twenty-five times more iron than spinach (0.7 mg) and twice as much protein as yogurt (2711.8 mg) which is easy to digest and assimilate by the human body (Krisnadi, 2013).

Tempeh dregs are soybean husks from the tempeh-making process generally still contain high nutritional value including protein, which is 12.67% and fat 9.71% (Listiyani, 2017). So far, tempeh dregs have not been used optimally, mostly only used as animal feed or fertilizer.

The author is interested in conducting research on catfish, tempeh dregs and Moringa leaves as the basic ingredients for making meatballs because they have high nutritional content, especially protein and have affordable prices and there has been no research on making meatballs with tempeh dregs before. The purpose of this study was to determine the effect of giving tempeh dregs and Moringa leaves to the protein content of catfish meatballs. It is hoped that this research can be used as a basis for diversifying high-protein foods and contributing to the reduction of malnutrition cases in East Java.

METHOD

This study is an experimental study with a completely randomized design (CRD) which formulated catfish, tempeh dregs, and Moringa leaves into four (4) treatments with four (4) repetitions. The details of the treatment in making meatballs used in this study included (P0) catfish 100%, (P1) catfish 60% + tempeh dregs 30% + moringa leaves 10%, (P2) catfish 60% + tempeh dregs 20% + 20% Moringa leaves, (P3) 100% catfish + 10% tempeh dregs + 30% Moringa leaves.

The tools used in this research are basin, cutting board, pan, meat grinder, stove, knife, ladle, strainer and digital scale. The test equipments are Petri Dish, Bunsen burner, 30 ml Kjeldahl flask, distillation apparatus, Erlenmeyer, and condenser. The materials used in this study were catfish meat, tempeh dregs, Moringa leaves, tapioca flour, salt, pepper, powdered mushroom broth, garlic, ice cubes. The materials for testing are K₂SO₄, HgO, H₂SO₄, 0.02 N HCl, NaOH-Na₂S₂O₃ solution, H₂BO₃ solution.

The research procedure was divided into two stages, the first stage was the making process of meatballs which consisted of preparation and processing, then the second stage was testing the protein content.

At the preparation stage, the selection of catfish and the separation of the meat from the spines and heads, the selection of tempeh dregs, and the separation of Moringa leaves from the stems, were then weighed on each ingredient according to a predetermined weight. In the process of processing the material into meatballs, a preliminary experiment was carried out to get the composition of tapioca flour that matched the texture of the meatballs, which was 70 grams. Then wash all the ingredients. For Moringa leaves and tempeh dregs, blanch for 10 seconds. In the next processing, namely:

1. Prepare the formula (P0) catfish meat as much as 250 g, (P1) catfish meat 150 g, tempeh dregs 75 g, Moringa leaves 25 g, (P2) catfish meat 150 g, tempeh dregs 50 g, Moringa leaves 50 g, (P3) catfish meat 150 g, tempeh dregs 25 g, Moringa leaves 75 g, each of which has been weighed previously.

2. Mix 2 cloves of sliced garlic, 2 tsp salt, half of tsp mushroom broth, quarter tsp pepper, ice cubes as needed then grind together using a meat grinder for each treatment.
3. Mix tapioca flour little by little until smooth in each treatment.
4. Prepare a pot that has been filled with water and bring to a boil, then turn off the stove.
5. Shape the dough into a round shape then put it in a pot of boiling water until the dough runs out in each treatment.
6. Boil the meatballs until they float and drain.

The data collection technique in this study was carried out by proximate analysis of protein content, and then the data obtained were tested for normality and homogeneity. Furthermore, the data were analyzed using the ANOVA test, and continued with the smallest significant difference test to determine the highest protein content.

RESEARCH RESULT

After the study, the protein content was measured in each formula. The average protein content can be seen in table 1 below:

Table 1. Average Protein Content (g) In All Treatments

Formula	Mean of Protein Content
Control (Catfish meat 100%)	7,05
Catfish meat 60 %, tempeh dregs 30%, Moringa leaves 10%	9,09
Catfish meat 60 %, tempeh dregs 20%, Moringa leaves 20%	7,67
Catfish meat 60 %, tempeh dregs 10%, Moringa leaves 30%	6,93

Table 1 shows the average protein content in each formula. To see the change in the average protein content, it can be seen in Figure 1.

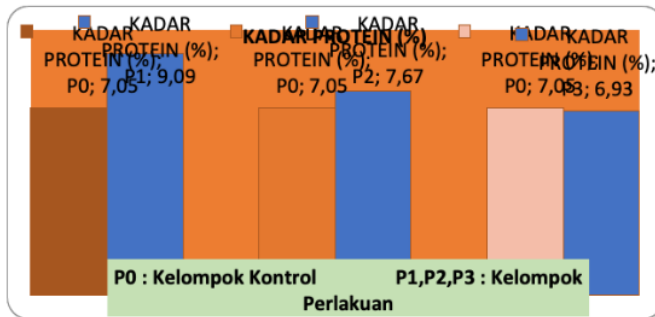


Figure 1. Changes in Average Protein Levels of Catfish Meatballs

Information:

- P0 : Catfish meat 100%
- P1 : Catfish meat 60 %, tempeh dregs 30%, Moringa leaves 10%
- P2 : Catfish meat 60 %, tempeh dregs 20%, Moringa leaves 20%

P3 : Catfish meat 60 %, tempeh dregs 10%, Moringa leaves 30%

Based on Figure 1, it is known that the highest change in the average protein content of the control was (P1) Catfish meat 60%, tempeh dregs 30%, Moringa leaves 10% which was 2.16%, while the lowest change in the average protein content of the control was (P3) Catfish meat 60%, tempeh dregs 10%, Moringa leaves 30% reduced by 0.12%.

Differences in Protein Levels between the Treatment Group and the Control Group

To test the difference in protein levels between the treatment group and the control group, a One Way ANOVA test was performed and the results were $p < 0.05$ ($p = 0.000$). Furthermore, the Least Significant Difference test was carried out for each variable which can be seen in Table 2.

Table 2. Results of the Smallest Significant Difference in Protein Levels in the Treatment Group and the Control Group

No	Treatment	P Value
1	Catfish meat 60 %, tempeh dregs 30%, Moringa leaves 10%	0,000
2	Catfish meat 60 %, tempeh dregs 20%, Moringa leaves 20%	0,026
3	Catfish meat 60 %, tempeh dregs 10%, Moringa leaves 30%	0,623

From Table 2. above, it can be concluded that between the treatment group and the control group there was a significant difference, namely $p < 0.05$, except for the P3 group there was no significant difference $p > 0.05$ ($p = 0.623$). So it can be said that P1 and P2 influence the protein content of catfish meatballs, while P3 had no effect on the protein content of catfish meatballs.

DISCUSSION

Energy and protein deficiency is a state of malnutrition caused by low consumption of energy and protein in daily food so that it does not meet the recommended adequacy (Andriani and Wirjatmadi, 2012). Malnutrition in toddlers can cause a decrease in body resistance, so that it can cause the loss of a toddler's healthy life span, and a more serious impact is the emergence of disability, high morbidity and accelerated death (Mardisantosa, et al 2018). A variety of high-protein foods is needed as one solution.

Meatballs are a food source of animal protein that is very popular with people of all ages. Meatballs are easy to accept with good taste and easy to process. Various kinds of meatball variations have developed, one of which is made from fish. Based on the Total Diet Study (SDT) in 2014 showed that the consumption of animal protein for the majority of Indonesian people came from fish, which was an average of 78.4 g/person/day, while vegetable protein was consumed more by Indonesians, namely 56.7g/person/day derived from soybeans (Siswanto, et al., 2014). So that

researchers are interested in examining the dregs of tempeh, Moringa leaves and catfish to increase the protein value of meatballs.

The results showed that the provision of tempeh and Moringa leaves affected the protein content of catfish meatballs. There are differences in protein levels between P0 with P1 and P2. In formula P0 there is only catfish meat. While in formulas P1 and P2 there is catfish with tempeh dregs and Moringa leaves. Catfish is a source of animal protein that is rich in the amino acids leucine and lysine with a total protein of 17.7%. Tempe dregs are soybean husks which still have a fairly high protein content, namely 12.67% (Listiyani, 2017) and other studies mention that the protein content of dry tempeh dregs is 14.53% (Setyorini, 2007), while Moringa leaves have a protein content of 28,66% using the blanching method (Irwan, 2020). Mixing catfish, tempeh dregs and Moringa in the making of meatballs can increase the protein value; this is in line with the results of research by Ikawati, et al in 2016 which stated that the addition of 10% and 20% tempeh could increase the protein content of catfish skewers. In the study of Jannah et al, 2018 also stated that the substitution of catfish and Moringa leaves had a significant effect on the protein value of mackerel dumplings.

At P0 and P3 there was no significant difference, this could be because the P3 formula consisted of 30% Moringa leaves while only 10% of tempeh dregs and 60% catfish. Differences in the use of materials affect the protein retention process in boiling. This is in line with Suhandari's research, 2015 which states that there is no significant difference between animal and vegetable proteins in the boiling process, but there is a difference in protein retention (resistance of a material to various types of treatment) between boiling and frying, where retention in boiling is higher than frying.

This study showed that the higher the use of tempeh dregs, the higher the protein content. This is a new discovery because so far tempeh dregs have not been widely used as a protein source for humans. Tempe dregs are only used as animal feed. Many research journals support an increase in the nutritional status of farm animals by giving tempeh dregs, as mentioned in the Listyani study, 2017, namely that there is a significant difference in the effect of feeding added with tempeh dregs on the growth of weight and body length of sangkuriang catfish. As well as in Evavianto's research, 2018 which states that the addition of soybean skin (tempeh dregs) and fermented cassava *Rhizopus* sp can increase the body weight of merino sheep.

The results of this study indicate that the formula P1 has the most significant difference with P0 with value $p < \alpha$ ($p = 0.000$) and the highest average protein content (9.09%) and this has met the quality requirements of meatball protein content based on the Indonesian National Standard (SNI) 2891-1992.

CONCLUSION

The most effective treatment for the protein content of catfish meatballs was formula P1 (60% catfish, 30% tempeh dregs and 10% Moringa leaves) with the highest average protein content of 9.09% and this met the quality requirements of the meatballs based on the Indonesian National Standard. There was a significant difference in protein content of catfish meatballs between the control group and the treatment group, except for the treatment catfish 60%, 10% tempeh dregs, 30% Moringa leaves.

This research can be used as a medium of information to the public to utilize the dregs of tempeh and Moringa leaves and catfish as a basis for diversifying high-protein food ingredients and can be developed in further studies for the use of tempeh dregs.

REFERENCE

- Andriani, M dan Wirjatmadi, B. 2012. *Pengantar Gizi Masyarakat*. Jakarta : Kencana.
- Aprilianti, Faidatun Nisak. 2016. *Pengaruh Penambahan Tepung Daun Kelor Terhadap Kadar Protein, Kadar Air, Kadar Betakaroten, dan Daya Terima Pada Bakso Ikan Lele*. Skripsi. Bagian Gizi Kesehatan Masyarakat. Universitas Jember.
- Badan Penelitian dan Pengembangan. 2018. *Laporan Nasional Riskesdas 2018*. Jakarta : Kementerian Kesehatan RI.
- Evavianto, D. F., Hadiyani, D. P. A., Susanto., W. E. 2018. *Pengaruh Pemanfaatan Ampas Kedelai Dan Onggok Terfermentasi Rhizopus Sp Dalam Konsentrat Domba Merino Terhadap Pertambahan Bobot Badan Dan Konsumsi Pakan*. Jurnal Sains Peternakan. Vol 6 no 2.
- Hasniar, Rais, M., Fadilah, Ratnawaty. 2019. *Analisis Kandungan Gizi Dan Uji Organoleptik Pada Bakso Tempe Dengan Penambahan Daun Kelor (Moringa Oleifera)*. Jurnal Pendidikan Teknologi Pertanian. Vol 5 No 6.
- Ikawati, Retty., dkk. 2016. *Pengembangan Produk Bakso Tusuk Ikan Lele (Clarias Batrachus) Dengan Penambahan Tempe Sebagai Alternatif Pangan Jajanan Anak Sekolah (PJAS) Di Kota Yogyakarta*. Tesis. S2 Teknologi Industri Pertanian. Universitas Gajah Mada.
- Irwan, Zaki. 2020. *Kandungan Zat Gizi Daun Kelor (Moringa Oleifera) Berdasarkan Metode Pengeringan*. Jurnal Kesehatan Manarang. Vol 6 No 1. pp 69-77.
- Jannah, R. M., Sulistiastutik, Suwita I. K. 2018. *Substitusi Ikan Lele (Clarias Sp.) Dan Daun Kelor (Moringa Oleifera) Pada Siomay Ikan Tenggiri Sebagai Pemberian Makanan Tambahan (PMT) Balita Gizi Kurang*. Jurnal Ilmiah Vidya. Vol 26 No 2.
- Krisnadi, A. D. 2013. *Kelor Super Nutrisi Edisi Revisi*. Blora: Kelorina. com. Pusat Informasi dan Pengembangan Tanaman Kelor Indonesia.
- Listiyani. 2017. *Pengaruh Pemberian Ampas Tempe Pada Pakan Terhadap Pertumbuhan Ikan Lele Sangkuriang (Clarias Gariepinus)*. Skripsi. Fakultas Tarbiyah dan Keguruan. UIN Raden Intan Lampung.
- Magdalena, A. 2017. *Teori Ilmu Gizi & Aplikasi*. Jakarta: EGC.
- Mardisantosa, B., Huri, D., Edmaningsih, Y. 2018. *Faktor-Faktor Kejadian Kurang Energi Protein (KEP) Pada Anak Balita*. Jurnal Kesehatan. Vol 6 No 2.
- Putra, S. R. 2013. *Pengantar Ilmu Gizi dan Diet*. Yogyakarta: D-Medika.
- Rustaman. 2015. *Lele Ikan Favorit*. Jakarta: Putra Amanah Murni.

- Siswanto, dkk. 2014. *Buku Studi Diet Total: Survey Konsumsi Makanan Individu Indonesia 2014*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.
- Suhandari, A. D., Astuti., L. 2015. *Effect of Cooking Process of Composition Nutritional Substances Some Food Ingredient Protein Sources*. Media Litbangkes. Vol 25 No 4. pp 235-242.
- Watson, Fiona, dkk. 2019. *Pembangunan Gizi Di Indonesia*. Jakarta: Direktorat Kesehatan dan Gizi Masyarakat Kedepuitan Pembangunan Manusia, Masyarakat, dan Kebudayaan, Kementrian PPN/Bappenas.

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