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The Effect of Pressing Fish Waste Meal at Pasar II Natal on Protein, Fat, and Energy Content

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Abstract*. The purpose of this study was to determine the effect of pressing fish waste flour in the Christmas II market on protein, fat, and energy content. The research method used in this study was a completely randomized design (CRD), which consisted of 4 treatments and 5 replications. The following were performed: P0: Fish waste flour from poultry; P1: Fish waste flour is dried under the sun; P2: Fish waste flour is pressed and dried in the sun; P3: Fish waste flour is pressed in the oven with a temperature of 400C. The research parameters are the content of crude protein, crude fat, and gross energy. The results of this study showed that the effect of pressing fish waste flour on the II Natal market showed that the highest crude protein content was in the P0 treatment (fish waste flour from poultry); Crude fat and gross energy were highest in treatment P1 (fish waste flour dried under the sun). The results of analysis of crude protein in samples of fish meal treatment, it was found that the one with the highest crude protein content was treatment P0 (fish waste flour from poultry) which was 53.07% then treatment P2 (pressed fish waste flour dried under the sun) with an average 43.31% and P3 (pressed fish waste flour in the oven with a temperature of 400C) of 42.66% and the one with the lowest crude protein content was 41.81%, namely treatment P1 (waste fish flour dried under the sun). The lowest percentage of crude fat content was found in treatment P0 (fish waste flour from poultry) which was 0.16% and the highest was in treatment P1 (dried fish waste flour in the sun) which was 2.93% and the highest gross energy was 2,852.46 cal /100g in treatment P1 (fish waste flour drying under the sun), and the lowest was 2,252.63 cal/100g in treatment P0 (fish waste flour from poultry). The results of the analysis of variance for the content of crude protein, crude fat, and gross energy content showed very significant differences (P<0.01) in this study. The results of the test of variance which were very significantly different were then tested further using the honest significant difference (BNJ) follow-up test according to the respective coefficient of diversity.*

Keywords*: Fish Waste Meal, Pressing, Protein, Fat, Energy*

INTRODUCTION

The West Coast of Sumatra is an area that is part of the Natal District of North Sumatra Province which is located on the coast of Mandailing Natal Regency (Madina), the people of the West Coast of Natal, especially the market II Natal community, are

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dominant in their work as fishermen. The results of these fishermen have fish waste which is very good for animal feed.

The potential for fish waste on the west coast of Natal is quite large, but it has not been utilized optimally, especially as poultry feed. Utilization of fish waste is expected to reduce feed costs for local farmers. The need for animal feed from animal protein sources is very important because it has a relatively high protein content composed of complex essential amino acids that can affect the growth of animal body tissue cells (Purnamasari et al., 2006). Good fish meal has a crude protein content of 58-68%, water 5.5-8.5%, and salt 0.5-3.0% (Sitompul, 2004). According to Kurnia and Purwani (2008), fishmeal can be processed through two methods, namely by pressing and direct sun drying.

In the direct sun drying method, this method is less qualified because it is easily contaminated by eggs and larvae of insects and microorganisms during the drying process. So that the fishing community uses pesticides to eradicate them, the use of these pesticides causes the fish to be unhygienic or polluted by chemicals that can endanger the health of livestock, thus the quality of the fish is difficult to guarantee. In addition, the natural drying method is very dependent on the weather or environmental conditions. If the weather is good, the drying process can run quickly, on the other hand, if the weather is always cloudy or often rains, then drying takes a long time.

Based on this description, the researcher is interested in raising the title The Effect of Pressing on the Making of Fish Waste Flour in Mandailing Natal Market II Natal Against Protein, Fat, and Energy Content.

RESEARCH METHOD(S)

Place and Time of Research

The research was conducted in Natal Mandailing Natal. The research was conducted at Pasar II Natal from June 2022 to September 2022. Proximate analysis is at the Charoen Pokphand Indonesia Regional Lab on Jalan Pulau Sumbawa No KIM2 Medan.

Material

The materials used in the study were poultry fishmeal, sun-dried fishmeal, sun-dried pressed fishmeal, oven-pressed fishmeal from fish waste left over from fish that are not

suitable for sale, fish that are left over from the production of other processed fish. The main source of this material is obtained from the fish auction site (TPI). Tools used are Near Infrared Spectroscopy (NIRS) petri dish, bucket, knife, scale, shovel, hoe, basin, tray, grinder/blender, pressing and drying fish. Tools used in the nutritional chemistry test are an oven, thermometer, deconstruction tool, distillation tool, titration tool, and shoxletation tool.

Research Methods

The research method used in the study was a non-factorial Completely Randomised Design (CRD) with 4 treatments and 5 replicates. The treatments given are as follows:

P0: Fish waste flour from poultry

P1: Fish waste flour dried in the sun

P2: Pressed fish waste flour dried in the sun

P3: Fish waste flour pressed in the oven at 400C

Research Implementation

1. Poultry Fishmeal

Fishmeal from several poultry and mixed homogeneously and then mixed for analysis of crude protein, crude fat, and gross energy of fishmeal used is not much different from almost the same results, both aroma and color.

2. Process of Making Waste Flour by Drying in the Sun

The initial stage is the raw material, fish waste, or the rest of the fresh fish that does not pass the sorting is cleaned from impurities such as paper, twigs, hooks, and others so as not to interfere with the process of making fishmeal and reduce the quality of the fishmeal, then the fish is chopped to make the particles smaller and dried in the sun until dry. After drying the fish is ground until smooth using a blender, after which the last stage is sieving to separate coarse and fine flour. The fishmeal was then laboratory analyzed for protein, fat, and energy content.

3. Process of Making Fish Waste Flour by Pressing and Drying in the Sun

Fish waste is cleaned from objects such as industrial waste, then the fish waste is finely ground, then pressed using a jack to remove water and oil, after which it is dried in the sun to dry, then the fish flour is sieved so that the shape is uniform. The fishmeal is then analyzed in the laboratory for its protein, fat, and energy content. The process of

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making fish waste flour by pureeing, pressing, and in the oven at 400C. The fish waste raw material is cleaned from dirt and then drained for 15 minutes in an open room, then blended to reduce the particles, then pressed using a jack to remove the water and oil, after which it is put into the oven at 40˚for 8 hours. The dried fish flour is analyzed in the laboratory for protein, fat, and energy content.

Parameters Observed

1. Crude protein content
2. Crude fat content
3. Gross Energy Content.

FINDINGS AND DUSCUSSION

Recapitulation of Research Results

A recapitulation of the effect of pressing fish meal waste at the II Natal market on the content of crude protein, crude fat, and gross energy as well as all parameters is presented in Table 1.

Table 1. Recapitulation of Average Values from Pressing Fish Waste Meal at the II Natal Market for Crude Protein, Crude Fat, and Gross Energy Content

Treatment	PARAMETER		
	Crude protein (%)	Crude Fat (%)	Gross Energy (*kal/100g*)
P0	$53{,}07^{C}$	$0{,}16^{A}$	$2.252{,}63^{A}$
P1	$41{,}81^{A}$	$2{,}93^{C}$	$2.852{,}46^{D}$
P2	$43{,}31^{B}$	$2{,}62^{B}$	$2.309{,}14^{B}$
P3	$42{,}66^{AB}$	$2{,}78^{BC}$	$2.390{,}43^{C}$

Note: Different superscripts in the same column indicate very different results significant ($p<0.01$).
P0: Fish meal waste from poultry
P1: The fish waste meal is dried in the sun
P2: Pressed fish waste flour is dried in the sun
P3: Fish waste flour is pressed in the oven at 40^{0}C

The parameters observed in this study were the calculation of crude protein content, the calculation of crude fat content, and the calculation of gross energy. The results of the analysis of variance in crude protein content, crude fat, and gross energy content showed very significant differences ($P<0.01$). The results of further tests using the honest real difference (BNJ) advanced test (attachment) mean values and further test notations appear in Table 1. Based on Table 1, the content of crude protein, crude fat, and gross energy from the effect of pressing fish waste meal in market II Christmas, it was seen that the

highest crude protein content was in treatment P0 (fish waste meal from poultry); crude fat and gross energy were highest in treatment P1 (fish waste meal dried in the sun).

Discussion

1. Crude protein

Protein is a very important food substance for the body which functions for maintenance, formation of body tissue, replacement of damaged body tissue, and growth (Almatsier, 2009). Protein content is one of the most determining nutritional factors in preparing feed ration formulas, in addition to fat content, ash content, vitamins, minerals, and total energy in feed (Gross Energy = GE) (Dirjennak, 2010). Based on the average results of crude protein content from research on the effect of pressing fish waste flour in the second Christmas market, values ranging from 53.07% to 41.81% were obtained (in Table 1).

Based on the results of the Diversity Analysis, the calculated F result was greater than the F table of 1%, this means that the effect of pressing treatment for fish waste meal at the II Natal market had a very significant effect on the crude protein content of fish meal. To find out which treatment levels are different, a further BNJ test analysis was carried out. From the results of the BNJ Advanced Test, it was found that the level of treatment P1 (fish waste meal dried in the sun) and P3 (fish waste meal pressed in an oven at a temperature of 400C) was statistically significantly different and P3 was significantly different from treatment P2 (pressed fish waste meal dried in the sun. under the sun). However, the crude protein content of treatment P0 (fish waste meal from poultry) was statistically very significantly different from treatment levels P1 (fish waste meal dried in the sun), P2 (pressed fish waste meal dried in the sun) and P3 (fish waste meal pressed in the oven at 400C).

Based on the results of crude protein analysis on fish meal treatment samples, it is known that the one with the highest crude protein content is the P0 treatment (fish waste meal from poultry) which is 53.07%, followed by the P2 treatment (pressed fish waste meal dried in the sun) with the average was 43.31% and P3 (fish waste meal pressed in an oven at a temperature of 400C) was 42.66% and the one with the lowest crude protein content was 41.81%, namely treatment P1 (fish waste meal dried in the sun). This is because P0 comes from fish meal waste from poultry which has been selected for quality

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and is processed by the manufacturer rather than other treatments which are made independently. The quality and quality of the manufacturer's products have been highly tested and certified according to usual standards. This is by the opinion of Ali, (2009) that good quality fishmeal according to FAO quality standards must meet the following requirements:

1) Fishmeal is particles that can pass through Tyler number 8 sieve;

2) Fishmeal has a light, whitish, gray to dark brown color;

3) Fish meal has a fat content of 2.5-5%;

4) Fish meal has a protein content of more than 50%;

5) Fish meal has a water content of around 8%.

The quality of a fish meal is greatly influenced by the amount of protein it contains. Based on the Indonesian National Standard (SNI), Mutu I contains 65% protein, Mutu II 55 - 50% protein and Mutu III contains 45 - 40% protein (Haris and Nafsiyah, 2019). According to Windi AS and Setiawan (2010), the nutritional content of fish meal can be increased by reintroducing the liquid from pressing the raw material into the raw material mass, thereby increasing the nutritional content of the fish meal produced. Furthermore, according to Tugiyanti and Iriyanti (2012), increasing the nutritional value of fish meal can also be done by adding fermented fish meal using antihistamine producer isolate.

Treatments P2 (pressed fish waste meal dried in the sun) and P3 (pressed fish waste meal in an oven at 400C) had higher levels of crude protein than treatment P1 (fish waste meal dried in the sun) because pressing had been carried out during processing. before drying. Pressing is carried out to reduce water content and separate fish oil from raw materials that have undergone a boiling process and to make each raw material into smaller pieces according to a predetermined size. This process is useful so that the resulting flour is drier so it lasts longer. At this stage, some of the oil and water are removed. By reducing the oil portion by pressing processing, it results in an increase in the amount of crude protein in the material.

2. Crude Fat

Fat is an organic compound that contains the elements carbon (C), hydrogen (H), and oxygen (O) as the main elements. In general, fat is the highest source of energy in

feed. The difference with oil is that fat has a higher melting point than oil, its molecular weight is heavier, and it has a longer molecular chain (Afrianto and Liviawaty, 2005). The function of fat in fish and shrimp feed is as the main energy source, forming cell structures, and maintaining the integrity of biomembranes which play a role in the intercellular transport of fat-soluble nutrients, such as sterols and vitamins. Fat has a much greater ability to produce energy compared to carbohydrates and protein. This role is visible in carnivorous fish because the amount of carbohydrates is low (Afrianto and Liviawaty, 2005).

In this study, the highest value of crude fat content of fish meal was obtained from treatment P1 (fish waste meal dried in the sun), namely 2.93%. The lowest value of crude fat content in fish meal was in the P0 treatment (fish waste meal from poultry), namely 0.16% (table 2). The results of this research are lower than research by Susanto and Nurhikmah (2008), the crude fat content was 5.11%. The difference in fat content is influenced by the use of the pressing method, where the oil portion is reduced so that the crude fat content of the treatment process by pressing has a lower crude fat content than that which is not processed. Fishmeal that comes from poultry is also the lowest compared to other treatments because the company standard also goes through a boiling and pressing process to make it last longer. Reducing the fat content greatly affects the durability of the material, if the fat content of the material is high it will accelerate rancidity due to fat oxidation (Ketaren, 2005). This is also the opinion of Widyasari et al, (2013) that this pressing process is useful so that the fishmeal produced is drier it lasts longer and at this stage, some of the oil and water is removed and the water content decreases from 70% to 50%. % and oil decreased by around 4%.

3. Gross Energy

Energy is released during the metabolic oxidation of carbohydrates, fats, and amino acids. Gross energy, also called gross energy, is the energy consumed by livestock contained in feed (Sumadi, 2017).

The exact energy requirements of animals can be seen quantitatively by measuring oxygen consumption or heat production (Rejeki et al., 2022). Quantitatively, energy is a very important component in feed, because the amount of feed supplied ad libitum is largely regulated by the energy concentration of the feed. However, if the energy content

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of the feed is excessive, the feed intake may result in a reduction in the intake of essential nutrients (Tucker and Hargreaves, 2004). Protein and energy must remain in balance. If there is a lack of energy in the feed, this means that protein is used to meet maintenance energy needs before being used for growth. On the contrary, if the feed contains too much energy, it will reduce feed consumption and then reduce the amount of protein and other essential nutrients for maximum growth.

The results of this research, namely the effect of pressing fish waste meal in the second Christmas market, obtained the highest average gross energy content of fish meal, namely 2,852.46 cal/100g in treatment P1 (fish waste meal dried in the sun), and the lowest was 2,252.63 cal/ 100g in treatment P0 (fish waste meal from poultry). The highest treatment results in treatment P1 and the lowest in treatment P0 are the same as the results obtained for crude fat content in the previous parameter. In the opinion of Afrianto and Liviawaty (2005) in general fat is the highest source of energy in feed. Hasibuan (2007) states that fat plays an important role as an energy source in fish feed, especially for carnivorous fish where the availability of carbohydrates in feed is low. Both opinions support that the amount of crude fat contained in an ingredient can influence its energy content as well. So in this study, the higher the crude fat content, the higher the gross energy content in the fish meal, and vice versa.

Analysis of variance on the gross energy parameter shows that the effect of pressing fish waste meal at the second Christmas market along with repetitions has a very significant effect ($p<0.01$) on several treatments on the gross energy content. To find out which treatment levels are different, a further BNJ test analysis is carried out according to the percentage of diversity coefficient. From the results of further tests by BNJ (attachment 3), it is known that fish waste meal from poultry (treatment P0) is very significantly different when compared with P1 (fish waste meal dried in the sun), P2 (pressed fish waste meal dried in the sun) and P3 (The fish waste meal was pressed in an oven at a temperature of 400C) and vice versa, that is, each treatment after the BNJ further test produced very significant differences.

CONCLUSION AND RECOMMENDATION

Conclusion

1. The effect of pressing fish waste meal at the II Natal market on increasing the crude

protein content with treatment P2 (pressed fish waste meal dried in the sun) by 42.66% and P3 (pressed fish waste meal in an oven at a temperature of 400C) by 43 .31% compared to the treatment without pressing P1 (waste fish meal dried in the sun), but the results are lower than the crude protein of fish meal purchased from poultry because the quality is at company standards.

2. The lowest percentage of crude fat content was found in the P0 treatment (fish waste meal from poultry) namely 0.16% and the highest was in the P1 treatment (fish waste meal dried in the sun) namely 2.93% and the highest gross energy was 2,852, 46 cal/100g in treatment P1 (fish waste meal dried in the sun), and the lowest was 2,252.63 cal/100g in treatment P0 (fish waste meal from poultry).

Recommendation

To improve the quality of crude protein in fish meal, further research needs to be carried out, namely by extracting the fat to separate the fat contained in the fish meal.

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