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THE MANUFACTURE OF FLOUR MAGGOT (*Hermetia illucens)* WITH DIFFERENT STEAMING TIME AGAINST CRUDE PROTEIN CONTENT AND FAT CRUDE SUBSTITUTE FISH MEAL

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Abstract

This research was conducted to produce flour maggot with quality and good quality through different steaming as well as fish feed as an alternative. This research is both experimental methods RAL which consists of 4 treatments and five replicates. The main parameters are observed, namely protein content and fat. Analysis of data processed by using ANOVA and Duncan Test Double. The result of the research shows that the initial duration of the different influences there is a maggot real ($p < 0.05$) against fat and protein content in flour maggot. Based on the results of Multiple Distance Test Duncan there is a significant difference between the treatment P3 with P0, P1 and P2 on the protein content and the leak on flour maggot. The initial length of time difference on the influence on the quality of flour maggot maggot is protein content and fat. the length of time the best steamed in this study is 25 minutes with the highest protein values i.e. 38.14% and the highest fat content i.e. 15.94%.

Keywords: maggot, steaming time, rude fat, rude protein.

INTRODUCTION

Indonesia, as one of the country's importers of flour and fish oil, has also been impacted by global aquaculture circumstances, i.e., a limit on the amount of fish meal, causing prices to rise further. Indonesia presently spends roughly $200 million per year on imports and fish oil. It is becoming quite serious attention thus needs to be done efforts to address that problem, one of which is the effort of looking for substitute fish meal (fishmeal replacement) as one source of protein is important in the formulation feed the fish (IRD, 2004).

The feed is one of the most important factors that will have an effect on growth and survival of fish that will be cultivated. Maggot as a feed alternative that has different sources of protein. Maggot can be processed in the form of flour made into pellets before maggot maggot. Flour maggot *(Hermetia illucens).* nutritional maggot very potential as alternative protein sources of feed fish. Maggot has complex nutritional value content. As mineral resources Mn, Zn, Fe, Cu, Ca, P, Mg, Na and K. Insect larvae *Hermetia illucens* many find on organic wastes and are not reported as spreaders of disease agents (Newton *et al,* 2005). One of the keys to the success of the process of biokonversi by using the magot is the ability to produce large amounts of small magot and subsequently used as a perombak agent for a variety of organic wastes (Tomberlin *et al,* 2009). Steaming is a process

using heat cooking (ipayungd kk., 2014). Cooking can be done with a medium hot water with boiling or hot steam or called steaming. Thermal processes such as the initial method that is often done. Steaming or the use of steam as a heat source has the advantage that is the loss of vitamins as well as other sensitive components packed in heat that is smaller (Pratama dkk., 2013). This research was conducted to produce flour maggot with quality and good quality through different steaming as well as fish feed as an alternative.

METHOD

a. Time and place

This research was carried out on December 5-13 April 2019 in the laboratory of the Faculty of Fisheries and marine Education Airlangga University, Surabaya. Proksimat analysis of raw material feeding is done at the Hall of industry research and consultancy (BPKI) Surabaya.

b. Tools and materials

Tools are used in the study was a stove, a sink for steaming and boiling methods, trays, ovens, blenders, temperature gauges. Animal test used in the study is the maggot (hermetia illucens) taken from Puspa Agro Sidoarjo and tapioca flour.

c. Research Methods

Experimental design used in the study this a complete Random Design was (RAL) causes in the study have only one source of the diversity that is the composition of the feed material. A complete random Design has a single source diversity i.e. random influences in addition to treatment, so the difference between the results of the treatment are only caused by the influence of the treatment and random influences (Kusriningrum, 2012). This research uses 4 kinds of treatment 5 Deuteronomy. Treatment that is done is:

1. Treatment A : Steaming maggot with a time of 0 seconds
2. Treatment B : Maggot with Steaming time 15 minutes
3. Treatment C : Steaming maggot with a time of 20 minutes
4. Treatment D: maggot treatment time 25 minutes.

d. Research Procedure

1. Making Flour Maggot

Maggot (*Hermetia illucens*) cultivated during the 17 days retrieved from Puspa Agro Sidoarjo. The activity of making flour maggot is as follows: (1) the maggot that already was 17 days later harvested, cleaned and boiled with a temperature of 80 ^{o}C for 20 minutes, (2) dioven maggot with a temperature of 50 ^{o}C during the day to maggot 2-3 becomes dry, (3) maggot mashed using a blender and sifted the flour using a sieve so obtained a maggot is ready to use as feed.

2. Preparation Of Making Feed

The materials used such as commercial feed, flour and tapioca flour maggot analyzed proksimat in advance the results of which can be seen on Table 1.

Table 1. content of commercial feed nutrients, maggot and tapioca.

Feed Materials	Dry Ingrediets	Rude Protein(%)	F A T (%)	Coar se Fiber (%)	Ash (%)
Tapioca Flour	89.51810	1.7361	0.5738	0.5809	0.1596
Maggot	95.9913	30,6502	14.1667	36.9328	8.6143

Description: proksimat the laboratory analysis results food Livestock Veterinary Faculty Airlangga University.

Testing method of Protein Kjedahl (SNI 01-2354.3 -2006)

Weigh 0.51 gram of the sample, put in 100 ml Kjedahl flask. add 2 grams of selen mixture and 25 ml of concentrated H2SO4. Heat it on an electric heater until it boils and the solution becomes clear greenish at 420oC then let it cool, dilute and put in a 100 ml measuring flask right up to the mark line. Pipette 5 ml of solution and put into the distillers add 5 ml of 30% NaOH and a few drops of PP indicator. Distill for 10 minutes, as a container use 10 ml of 2% asamborate solution that has mixed the indicator. Rinse the ends of the cooler with distilled water then titar with 0.01 N HCl.

Information :

$$\% \text{ Protein} = \frac{(V1 - V2)}{\text{x N x0,014 x f.k x f.p}w}$$

W = the weight of the trailer
V1 = HCL volume 0.01 N, used in sample sampling
V2 = HCL volume, blank calculation
N = HCL normality
f.k = protein from food in general 6.25
f.p = dilution factor

Description:

$$\% Fat = \frac{w - w1}{w2\ x\ 100\%}$$

W = weight of sample (g)
W1 = weight of fat before extraction (g)
W2 = weight of the pumpkin after extraction grease (grams)

Data Analysis

The data were analyzed using a variety of prints or ANOVA (*analysis of variance*) to know the influence of each treatment and continued trials of Duncan. Having obtained the results, the data of the main parameters and supporters will be presented in the form of a graph using Microsoft Excel program

The Result

Table 2. Average Fat Maggot Flour test results.

Treatment	Fat Content (%) ± SD P0
	11.64^{c}± 0.594
P1	12.89^{b}± 0.738
P2	13.42^{b}± 1.252
P3	15.94^{a}± 0.620

Different superscript on the same column shows there is a real difference ($p < 0.05$).

Fat test results using the different steaming time for 0 minutes, 15 minutes, 20 minutes, 25 minutes i.e. 11.64%, 12.89%, 13.42%, 15.94%. Analysis of the multiform prints or test result ANAVA (Attachment 3) shows different results manifest (< p 0.05) on any moderate. The value of the highest fat content found in the treatment of the P3 i.e. of 15.94%, while the value of the lowest fat content there is on treatment P0 (control) that is 11.64%.

Table 3. The average test results of Protein Flour Maggot.

Treatment	Protein Content (%) ± SD P0
	33.00^{c}± 0.707
P1	33.46^{c}± 1.118
P2	35.60^{b}± 0.832
P3	$38,14^{a}$± 0,653

Different superscript on the same column shows there is a real difference ($p < 0.05$).

Protein test results using different steaming times for 0 minutes, 15 minutes, 20 minutes, 25 minutes are 33%, 33.46%, 35.60%, 38.14%. Based on ANAVA test results (Appendix 2) with different treatments showed significantly different results ($p<0.05$) in each treatment. The highest value of protein content was in the P3 treatment that was 38.14 %%, while the lowest value of the protein content was in the P0 (control) treatment that was 33%.

Table 4. The average test results of Protein Flour Maggot.

Treatment	Protein Content (%) ± SD P0
	33.00^{c}± 0.707
P1	33.46^{c}± 1.118
P2	35.60^{b}± 0.832
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DISCUSSION

FAT Based on the results of the fat test using different steaming times for 0 minutes, 15 minutes, 20 minutes, 25 minutes is 11.64%, 12.89%, 13.42%, 15.94%. Based on ANAVA test results showed significantly different results in each treatment. Fat is a source of energy in fish. Aside from being a source of fat energy and a storage medium for vitamins dissolved in fat (Utami et al, 2013). From the test results the highest fat content was in the P3 treatment of 15.94% while the lowest fat content was in the P0 treatment which was 11.64%. This shows the difference in fat content between maggot which is not done steaming with maggot which is done steaming with different time. The steaming method causes slow penetration of heat in the ingredients and unlike the boiling method which is in direct contact with hot water so the steaming method requires time for heat penetration in food (Estiasih et al., 2009). Permissible levels of fat in fish feed range between 4-18% (Utami et al, 2013). The high level of fat in the P3 treatment (25 minutes steaming time) due to the drying process is influenced by the temperature and drying time given, so that the drying causes the water content of the material to decrease and the material fat content to increase (Riansyah et al., 2013).

Protein Based on the results of the analysis of the multiform prints showed different results for real at any moderate < p 0.05. P3 differ markedly with P0, P1 and P2. While real are no different with P0 P1. Highest protein content results obtained on treatment of P3 (initial 25 minutes) is 38.14%. While the lowest protein content results in P0 treatment (control). The initial duration of 0 seconds/not steamed long and 15 minutes of steaming on treatment of P0 and P1 is too seingkat to be able to achieve penetration and evenly on the feed material, resulting in a value of protein did not differ markedly between the treatment and low protein level than the initial time of 20 minutes and 25 seconds on the treatment of the P2 and P3. The high protein in the treatment of the P3 (initial duration 25 minutes) because of steaming with longer periods of time can increase the uptake of water, with increasing moisture content, then the dry weight will

progressively decrease. This causes the content of nutrients and nutrition on the feed material as if rising (Diana, 2017).

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Conflict Of Interest

The authors state that there is no conflict of interest.

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