Kijing Taiwan Flour Subtitution in 3-5 cm Tilapia Fish Feed Frmulation (Substusi Tepung Kijing Taiwan Dalam Formulasi Pakan Ikan Nila Ukuran 3-5 cm)

by Cyska Lumenta 8

Submission date: 29-Apr-2019 03:42PM (UTC+0700)
Submission ID: 1121194577
File name: 3_JURNAL_AMY_Ok_19-26.pdf (173.76K)
Word count: 3299
Character count: 16373

Kijing Taiwan Flour Subtitution in 3-5 cm Tilapia Fish Feed Frmulation

(Substusi Tepung Kijing Taiwan Dalam Formulasi Pakan Ikan Nila Ukuran 3-5 cm)

Nurrahmi Iriani Saiful[1], Cyska Lumenta[2], Julius Sampekalo[2]

1) Mahasiswa pada Program Studi Budidaya Perairan FPIK Unsrat Manado
Email: nurrahmi2amie@yahoo.com
2) Staf Pengajar pada Fakultas Perikanan dan Ilmu Kelautan Unsrat Manado
Email: cyskaliu@gmail.com

Abstract

The research was conducted in the Nutrition and Fish Feed Technology Laboratory. Breeding container used is 15 units of Aquarium and each container stocked with 10 fishes at size 3-5 cm. The objectives of this research is: to determine the effect of feeding with different composition of Kijing Taiwan flour to the Relative growth of tilapia fish and to determine which Kijing Taiwan feed composition that has the best feed efficiency value for tilapia. The research design used was a Completely Randomized Design (CRD) using five (5) different treatments and three (3) repetitions. Where Treatment A (0% without flour Kijing Taiwan), treatment B (10% flour Kijing Taiwan), treatment C (20% flour Kijing Taiwan), treatment D (30% flour Kijing Taiwan) and treatment E (40% flour Kijing Taiwan). The frequency of feeding was 3 times a day with a weight of 5% from the fish total weight. An observation of growth was done once a week. The analysis results of the five treatments applied, showed that the relative growth value during the research for Treatment E contribute (387.62%), followed by treatment D (268.57%), treatment C (202.86%), treatment B (182, 86%) and treatment A (131.43%). Meanwhile for the Feed Efficiency Value in treatment E contribute (48.73%) followed by treatment B (40.14%), treatment C (37.03%), treatment D (36.70%) and treatment A (28.91%). It can be concluded that the feed with additional 40% of Kijing Taiwan flour provide better relative growth and better feed efficiency value than any other feeds.

Keywords: Substitution, flour Kijing Taiwan, relative growth, feed efficiency and tilapia

INTRODUCTION

In intensive farming venture, feed cost is the biggest expense which is ranged between 60-80% from total expenses. According to Khairuman and Amri (2002), artificial feed is feed where intentionally made from several types of raw ingredients that contain specific nutrients. Raw ingredients for fish feed can be obtained from animal or vegetable material. According to Djajasewaka (1985), nutrient value from animal material is better than from vegetable material.

So far, the main ingredient of fish pellet formulation is a fish flour. Fish flour tends to be expensive and still imported. To reduce dependence on the use of fish flour, precaution step is taken by finding an alternative raw ingredient with potential to be used.

Kijing Taiwan (*Anodonta woodiana*) is a freshwater bivalves originating from Taiwan. This Kijing was accidentally infiltrated to Indonesia when Indonesia introduces tilapia in 1969 (Suwignyo, et al., 2005). Economically, this Kijing has a sizeable portion of meat to consume, so that it can be a source of protein for the people (Suwignyo, et al 2005), can be used as raw ingredient for animal feed, freshwater pearl producer, drugs ingredients and button accessories raw material. To find out how far Kijing Taiwan flour can be a substitution for a fish flour, so it needs to be tested in a pellet formulation on growth and feed efficiency values of omnivorous Tilapia feed which can consume everything to spur its growth.

RESEARCH METHOD

1. Preparation Phase

a. Collecting Ingredients To Make Feed

The basic ingredients used in the study of carcass Kijing Taiwan Seed collected in Freshwater Tatelu. The basic material is washed first, then dried using a tissue and then thinly sliced dried water content in the oven with a temperature of 105 ° C for 7 hours. Once dried, milled using a flour mill. Use other materials such as fish meal, dried shrimp powder, coconut flour, soy flour, rice bran flour, tapioca flour, flour mix and top palm oil obtained from supermarkets and store fodder, can be seen in Table 1.

b. Feed Producing

Steps of feed producing are as follows:

Rough shape materials grinded into flour and then sifted, this flour shaped material weighed based on a predetermined percentage. Mixing starts from small percentage range materials, and then continue to the large percentage range of materials. After these ingredients evenly mixed, slowly pour additional water while keep stirring to form admixture that can be clenched and not easily destroyed. The amount of water used in mixing the dough about 40% from the raw ingredients used. Furthermore, the admixture is formed using a pellet maker machine with diameter of 2 mm. The small size of the pellet-shaped mold dried using an electric oven at a temperature of 105 C, for 3 hours until the pellets are dry.

Table 1. Composition of Experimental Food Formulation Ingredients

No.	Basic Ingredients	Treatment (%)				
		A	B	C	D	E
1	Fish Flour	50	40	30	20	10
2	Kijing Taiwan Flour	0	10	20	30	40
3	Ebi Flour	5	5	5	5	5
4	Soybean Flour	5	5	5	5	5
5	Copra Flour	10	10	10	10	10
6	Corn Flour	8	8	8	8	8
7	Rice Bran Flour	8	8	8	8	8
8	Tapioca Flour	10	10	10	10	10
9	Top Mix *	2	2	2	2	2
10	Palm Oil	2	2	2	2	2

Annotation: (*) Top Mix composition

c. Experimental Animal

Experimental Animal used in the study is tilapia fish (*Oreochromis niloticus*) with of 3-5 cm length, obtained from the location of tatelu Freshwater

Aquaculture of North Minahasa Regency. 10 experimental animals were put into every each of breeding containers. Prior to the study, the experimental animals acclimatized first for 1 week prior to the environment and tested feed.

d. Container

The container used in this study is 15 aquarium with dimension of 40 cm length, 30 cm width and 50 cm height. Each container filled with 10 liters of water. The conducted research, using 5 treatments, and each treatment was performed 3 repetitions in order to obtain 15 units of experiment and are randomly set up as shown in Figure 1 below.

C_1	D3	A2	B3	C2
B2	E2	B1	D2	E3
D1	E1	A3	A1	C3

Picture 1. Layout of Experimental Container

Note:
A: Feed without of Kijing Taiwan flour
B: Feed with 10% of Kijing Taiwan flour
C: Feed with 20% of Kijing Taiwan flour
D: Feed with 30% of Kijing Taiwan flour
E: Feed with 40% of Kijing Taiwan flour

2. Implementation phase

This research was conducted for 4 weeks. Experimental animals weighing performed at once or altogether. Every week the experimental animals were weighed using digital scales with the accuracy levels of 0.01 gram. From performed weighing, average weight of the experimental animals is discovered. Total weight of the experimental animals is obtained by multiplying the average weight of the experimental animals with the number of animals tested. Feeding is done 3 times a day is 7:00, 12:00, and 16:00. Dose feeding is 5% from total body weight. Furthermore, there are also the water temperature and pH measurements conducted. Temperature measurement is carried out every day in the morning, afternoon and evening by using a thermometer, while the pH was performed once in a week using pH paper.

3. Phase of Data Analysis

The parameters used in this experiment include the relative growth and feed efficiency.

a. Relative growth

Relative growth is calculated by following formula (Weatherly and Gill, 1989):

$$\mathbf{Gr\ (\%)} = \frac{\mathbf{W_t - W_o}}{\mathbf{W_o}} \mathbf{\ x\ 100}$$

Note:
Gr (%) = Relative Growth
Wt = Final weight
Wo = Initial weight

b. Feed efficiency values

Feed efficiency values using the formula by Zonneveld *et al.* (1991), as follows:

$$\mathbf{NEP\ (\%)} = \frac{\mathbf{W_t - W_o}}{\mathbf{F}} \mathbf{\ x\ 100}$$

Note:
NEP = Feed efficiency value
F = The amount of feed given during the experiment
Wo = Initial weight
Wt = Final weight

c. Experimental Design

The environmental design use in the experiment is Completely Randomized Design (CRD). It is based on the assumption that all experimental units are homogeny, so that only experimental feed as the source of diversity. The whole experimental units are randomized trials and have equal opportunity to receive a particular treatment (Steel and Torrie, 1991). RAL mathematical model is as follows:

$$Yij = \mu + \alpha i + \Sigma ij$$

Note:

Yij = Experimental value from treatment 1 on j repetition
i = treatment 1, 2, 3, 4, 5
j = repetition 1,2,3
μ = General average value
αi = Effect of treatment i
Σij = Effect of random error experiment components with treatment 1 on repetition j.

If there is a different analysis results amongst of the treatments, Duncan's multiple continue experiment can be applied to discover that different result (Gaspersz, 1991) through following formula:

$$Sy = (s^2/r)^{1/2} = (KTG/r)^{1/2}$$

Note:

s2 = KTG
KTG = Central Squares Error
r = Number of replications

RESULTS AND DISCUSSION

The results of the calculation of average initial weight and end tilapia and total feed, relative growth (%) and feed efficiency value (%) as a whole can be seen in Table 2. Added weight of tilapia, total feed and relative growth of tilapia per week can be seen in Appendix 1,2, and 3.

Table 2. Average Calculation Results of Tilapia Initial weight and Final Weight, Feed total, Relative Growth and Feed Efficiency.

Treatment	Average Weight		Total Food (gr)	Relative Growth (%)	Feed Efficiency Value (%)
	Initial (gr)	Final (gr)			
A	1,05	2,43	4,57	131,43	28,91
B	1,05	2,97	5,22	182,86	36,70
C	1,05	3,18	5,65	202,86	37,03
D	1,05	3,87	6,98	268,57	40,14
E	1,05	5,12	8,22	387,62	48,73

1. Relative growth

Tilapia fish seed which experimented with different composition of feed showed its growth was differently and significantly affected through experimental treatment. Table 3 shows the analysis results of treatment variety effect on growth.

Table 3. Analysis of Treatment Variety Effect on Relative Growth.

Variety Source	DB	JK	KT	F hit	F tabel	
					5%	1%
Treatment	4	116,882.67	29,220.67	4.76*	3.48	5.99
Error	10	61,388.65	6,138.86			
Total	14	178,271.32				

(*) significantly different

Analysis result of Relative Growth variety statically showed that treatment gives significantly different results. This is indicated by the value of F calculated > of F table at the level of 5%. Furthermore, to see the difference between each treatment which were tested can be done by Duncan's region test.

Based on Duncan test in Appendix 5, it shows that treatment E (pellets with 40% of Kijing flour) gave a significantly different result (better) than any other five treatments tested. Treatment E significantly different from Treatment B and C, while Treatment E also affects no tangible effect on D treatment in tilapia relative growth. Relative growth during the experiment results is shown in the following Figure 6.

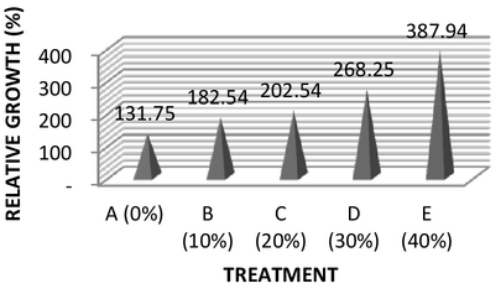

Figure 2. Hystogram of Experimented Tilapia Relative Growth

The results of relative growth as shown in Figure 2 shows that the relative growth of tilapia which given treatment E (387.94%) during four weeks of breeding is the highest when compared to treatment A (131.75%), B (182.54%) , C (202.54%), and D (268.25%). Relative growth of treatment E has never been exceeded by any other treatment since the first week until the end of the experiment (week 4). In this case, treatment with 40% of Kijing Taiwan flour composition flour achieved the highest result compared to other treatments.

This is supported by the nutritional composition of each feed which is formed from energy-producing main raw ingredient, proteins and fats. In treatment E, contribute to the relative growth 35.78% of protein value and 5.208% of fat value. According to Djajasewaka (1985), protein needed by fish to support its growth is about 20-60%. Furthermore, according to Sutisna and Sutarmanto (1995), protein levels established in the feed describe the level content of essential amino acids contained in the feed material in a good balance.

Djajasewaka (1985) states that a good protein source for all types of fish are feed ingredients with amino acid content similar to the type of the breeding fish. The result showed that the feed E contributes better growth than other feeds. It is presumed that the composition of the feed material formulation of feed E have a nutrient balance each material used and can be assimilated by the tilapia because of appropriate palability to support its growth. The amount of feed for fish consumption is determined by feed's quality and quantity.

The quality of a feed is the availability of body-need's nutritional elements. In this case, a good feed composition has an appropriate nutritional comparison between one another. While the quantity indicates the number of each nutrients element to the nutritional needs of fish's body. Feed composition that produces nutritional element is an eligible composition. Tilapia consumed feed E well, because it contains 35.8% of protein. The (35.8%) of protein content strongly

support (387.94%) of the experimental fish relative growth. The tendency shows that the available protein synthesis used optimally in the body of the fish and therefore contributes directly to the growth. Moreover fish tested in the form of seeds that utilize 35-40% protein.

(5.208%) of fat content in feed E was relatively good for fish feed. According to Suyanto (1994), a good feed contains 6-8% of fat content. Sasube Research (1998), found that the addition of 5% soybean oil in feed providing the highest relative growth of 95.43% for fish weighing 2-4 grams/tail. While research from Palit (1999), informs that feed with 2% lecithin supplementation provides the highest relative growth of 105.36% for the weight of the fish size 2.5 - 3.5 grams during 2 months breeding. The presence of fat in the feed providing savory flavor, giving a high calorie content, easily digestible and is free fatty acids that are important for the growth and body protection of all water animals. Because fat is energy-dense nutrient with 9 caloric value per gram of fat. Test feed formulation formed proportions derived from material balance between animal and vegetable origin so that animal fats containing saturated fatty acids will be balanced by fats rich vegetable enriched with PUFA (Poly Unsaturated Fat Acid). Fats that exceed 10% will lead to poor growth and high mortality rate.

In treatment A (5.256%) of fat content give (131.75%) of relative growth rate, which is smaller than the relative growth of treatment B (182.54%), C (202.54%), D (268.25%), and E (387.94%). Differences of fat in the diet are actually similar in the typical interval. However, based on the total feed consumed, feed A has a smaller value (4.57%) compared to treatment B (5.22%), treatment C (5.65%), treatment D (6.98%), and treatment E (8.22%). There is a possibility that in the treatment A does not grow well in addition to (35.4%) of low protein level, as well as (5.26%) of low fat level and low total feed consumption which is only (4.57%).

Substitution by using Kijing Taiwan as a raw ingredient has the advantage of palability. Because Kijing Taiwan meat contains unsaturated fatty acids, called eicosa pentaenoic acid (EPA) and docosae hexaenoic acid (DHA), and contains animal protein enriched by amino acids (Suwignyo., Et al. 1981). Especially the highest amino acid glutamic acid.

2. Feed efficiency values

To determine the effect of treatment on feed efficiency, analysis of variance was conducted and the results of the calculations are presented in Table 4.

Table 4. Variety Analysis of Feed Efficiency Value.

Variety Source	DB	JK	KT	F hit	F tabel	
					5%	1%
Treatment	4	613.69	153.42	4.38*	3.48	5.99
Error	10	350.06	35.01			
Total	14	963.75				

Description: (*) In contrast to the real

Based on the analysis of variance showed that the effect of the treatment of fish feed efficiency were significantly different as indicated by F count is greater than the F table at the level of 5%. This means that the tested treatment gives a significantly different effect on feed efficiency. Feed Efficiency Value explicitly shown in Figure 7.

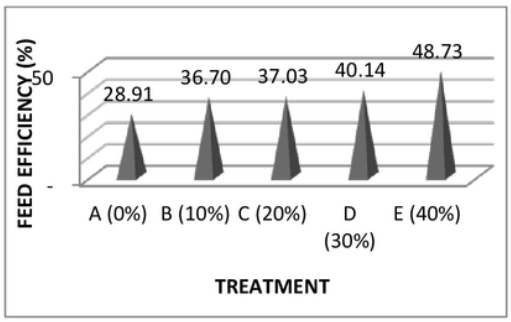

Figure 3. Histogram of Each Feed Efficiency Value Test

From Figure 3, it showed that all treatments give positive efficiency more than 25%. Feed efficiency value aims to determine whether the feed tested efficient or not, in other words whether feed given is well used and generate growth for the fish or not. The efficiency of best feed shown by E treatment, with 40% of Kijing Taiwan flour addition produced (48.73%) of feed efficiency value. This is quite reasonable because this feed is higher in protein rather than any other tested feed.

Sutisna and Sutarmanto (1995) stated that the nutritional value of a protein is determined by its availability of essential amino acids (digested and absorbed by fish, larvae, and seeds). It can be observed from the quality and quantity of consumed feed during the observation. It was obvious that feed's protein with complete amino acid content were synthesized by the body, significantly affected growth and the feed efficiency value were getting better. According to Djajasewaka (1985), feed efficiency will be high if it has enough protein content in good quality.

CONCLUSIONS AND RECOMENDATION

a. Conclusion

Observation results of Kijing Taiwan flour substitution in tilapia fish feed can be concluded as follows:

- Treatment E provides (387.94%) of relative growth, better than treatment D, C, B, and A.
- Treatment E shows the highest value of feed efficiency at (48.73%) compared to D, C, B, and A treatment.

b. Recomendation

- From the observation, it was revealed that the use of 10-40% Kijing Taiwan flour provide good growth. Therefore, Kijing Taiwan flour usage as one of feed material formulation need to be considered.
- Utilization of Kijing Taiwan flour needs to be tested on enlargement size fish.

REFERENCES

Djajasewaka H. 1985. Pakan Ikan. Penerbit CV. Jasaguna. Jakarta. 47 hal.

Gaspersz V. 1991. Metode Perancangan Percobaan. Penerbit CV. Armico. Bandung. 472 hal.

Khairuman, Amri. K, 2002. Membuat Pakan Ikan Konsumsi. Agro Media Pustaka. Jakarta.

Palit SM. 1999. Efektifitas Suplementasi Lecitin Dalam Pakan Nila Merah (*Oreochromis* sp). Skripsi. Fakultas Perikanan Dan Ilmu Kelautan. 41 hal.

Sasube AM. 1998. Pertmbuhan Benih Ikan Nila (Oreochromis niloticus) Yang Diberikan Pakan Buatan Dengan 5% Bahan Tambahan Yang Berbeda. Skripsi. Fakultas Perikanan dan Ilmu Kelautan. 40 hal.

Steel RGD, Torrie JH. 1993. Prinsip dan Prosedur Statistika. PT. Gramedia. Jakarta. 747 hal.

Sutisna DH, Sutarmanto R. 1995. Pembenihan Ikan Air Tawar. Penerbit Kansius Yogyakarta. 152 hal.

Suyanto SR. 1994. Nila. Penerbit Swadaya Jakarta. 103 hal.

Suwignyo P, Basmie JJ., Babu DTF, Affandi R. 1981. Studi Biologi Kerang Taiwan (*Anodonta woodiana*). Fakultas Perikanan Institut Pertanian Bogor.

Suwignyo S, Widigdo B, Wardiatno Y, Krisanti M. 2005. Avertebrata Air. Penebar Swadaya. Depok.

Weatherly AN, Gill HS. 1989. The Biology of Fish Growth. Academic Press. P. 678-719.

Zonneveld NE, Huismann A., Boon JH. 1991. Prinsip-prinsip Budidaya Ikan. Penerbit PT. Gramedia Jakarta. 318 hal.

Kijing Taiwan Flour Subtitution in 3-5 cm Tilapia Fish Feed Frmulation (Substusi Tepung Kijing Taiwan Dalam Formulasi Pakan Ikan Nila Ukuran 3-5 cm)

ORIGINALITY REPORT

14%	14%	2%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	ejournal.unsrat.ac.id Internet Source	11%
2	ebookmarket.org Internet Source	3%
3	www.jesc.ac.cn Internet Source	<1%
4	www.researchgate.net Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		