The Effect of Combination of Fresh Feed with Commercial Artificial Feed on Growth and Survival of Snakehead Fish (*Channa striata*)

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Abstract- This research aims to determine the combination of fresh feed of sardine fish (*Sardinella*) with artificial feed on the growth and survival of snakehead fish (*Channa striata*). This research method was carried out using a Completely Randomized Design (CRD) with 5 treatments and 4 replications. The treatments used in this research are 100% artificial feed (A), 75% artificial feed and 25% fresh feed of sardine fish (*Sardinella*) (B), 50% artificial feed with 50% fresh feed of sardine fish (*Sardinella*) (C), 25% artificial feed with 75% of fresh feed of sardine fish (*Sardinella*) (D), 100% of fresh feed of sardine fish (*Sardinella*) (E). The results showed that each treatment, namely growth, survival rate and feed consumption level, there was no significant difference in the combination of feed in snakehead fish (*Channa striata*). This shows that fresh feed (*Sardinella*) and artificial feed can be used as feed for raising snakehead fish (*Channa striata*).

Keywords: Effect, combination, fresh feed, commercial Artificial feed, Growth, Survival rate.

I. INTRODUCTION

Snakehead fish (*Channa striata*) is a type of freshwater fish that has high economic value as fresh and processed fish consumption (Mustafa *et al.*, 2012). Snakehead fish (*Channa striata*) has special competitiveness, including high levels of albumin, so it is also in demand as a raw material for health products and the pharmaceutical industry (Ndobe, 2017). The albumin content in Snakehead fish is around 62.24 g/kg (Retta, 2016). As well as being a biomedical material due to its albumin content which can accelerate the post-operative wound healing process (Wahab *et al*., 2015).

The main problem of snakehead fish (*C. striata*) is the aquaculture of snakehead fish that has been conducted is currently limited to rearing efforts (Rahman 2015). This is because the feed is incomplete and easily degenerated (Haiwen et al., 2014). Aditya et al. (2012) added that the quality of fresh feed is also influenced by several factors, namely seasonality, perishability, quality is not equal and the price is relatively expensive due to competition from humans who need fresh fish for consumption, to overcome this it needs to be combined with another type of feed that is able to complete the nutritional content of feed according to the nutritional needs of snakehead fish (*C.striata*), one of the solutions is commercially-made feed. The advantage of commercially-made feed as the main energy source, has an equal quality and a more complete nutritional content in accordance with what is needed of snakehead fish (*C.Striata*), is not easy to rot, easy to store and distribute (Rahadiyani, 2014). Feed is an important source of nutrition for the growth and development of aquatic biota. Feed with the best nutrition will encourage the growth of the biota to be more optima. In addition, feed nutrition also acquires an important role in controlling the metabolic system of the aquatic biota body and helps to protect the biota's immune system from disease infection Rusydi (2014).

Based on the above, information about the best combination of fresh feed with artificial feed needs to be published in the context of developing aquaculture of snakehead fish (*C.striata*) in the future.

II. MATERIALS AND METHODS

A. Time and Place of Research

This research was conducted at the Fish Seed Center of Maros, South Sulawesi. From March to June 2019. Proximate Analysis of fish feed, conducted at the Laboratory of Animal Food Chemistry, Faculty of Animal Husbandry, Hasanuddin University.

B. Data Collection Method

The test fish used was Snakehead fish seed originating from the Fish Seedling Center of Maros, measuring length 3-4 cm and weighing 0.08-0.10 g. Snakehead fish that are sampled first are acclimated to the maintenance environment for 1 hour then feed adaptation is carried out for 1 week before being given test feed according to the treatment both maintained in net cage and in the aquarium.

The maintenance container used consists of two types, namely: net cage used in length, width, and height of 100x100x100 cm which is installed in a pond, used as a maintenance container for observation, growth, and survival. While the aquarium used is length, width, and

height of 50x40x35 cm respectively. The side of the container is covered with black plastic, used as a maintenance container for observing feed consumption levels.

The design pattern used is a Completely Randomized Design (CRD). A Completely Randomized Design (CRD) consists of 5 treatments and 3 replications, namely:

A: 100% artificial feed & 0% fresh feed.
B: 75% artificial feed & 25% fresh feed.
C: 50% artificial feed & 50% fresh feed.
D: 25% artificial feed & 75% fresh feed.
E: 0% artificial feed & 100% fresh feed.

C. Observed Parameters

1. Survival Rate (%)

Snakehead fish survival can be calculated using the Effendie (1997) formula as follows:

$$SR = Nt/No \times 100$$

Note: **Nt** = The number of fish that lived at the end of the research (fish)

No = The number of fish at the beginning of the research (fish)

2. Growth

Specific Growth Rate

During the maintenance period calculated by the Effendi (1997) formula:

$$RG = \frac{Ln_{Wt} - Ln_{W0}}{t}$$

Note: **Wt** = Average individual weight of fish at the end of the research (gr)

W0 = Average individual weight of fish at the beginning of the research (gr)

T = Length of Maintenance (day)

3. Proximate Analysis

Proximate analysis is an analysis conducted to calculate the chemical composition of feed, including analysis of water content, ash, fat, and protein.

4. Water Quality

During the research, several water quality parameters were measured. The parameters measured are temperature, pH, dissolved oxygen, and ammonia. Temperature is measured using a thermometer, pH is measured using a pH meter, O2 is dissolved with a DO meter, while ammonia is measured using a spectrophotometer. Temperature, pH, and O2 are measured twice a day ie mornning (08.00 am) and afternoon (05.00 pm). The ammonia was measured once a week during the research.

III. RESULTS

A. Feed Nutrition Value

The results of the proximate analysis of the combination of fresh feed with artificial feed used during the research are presented in Table 1 below:

Table 1. Proximate analysis of feed raw materials

Composition (%)	Artificial Feed	Fresh Feed
Water	9,32	79,54
Crude Protein	59,00	78,35
Crude Fat	5,90	8,27
Crude Fiber	2,73	0,39
EMWN	22,75	0,56
Ash	9,61	12,43

Description : 1. Except for water, all fractions are stated in dry matters

1. EMWN: Extract Material Without Nitrogen

The calculation results of the nutritional composition of a combination of artificial feed and fresh feed in dry material are in table 2.

Table 2. Nutritional composition of a combination of artificial feed and fresh feed

Composition (%)	A	B	C	D	E
Crude Protein	59,00	63,83	68,68	73,51	78,35
Crude Fat	5,90	6,49	7,09	7,68	8,27
Crude Fiber	2,73	2,15	1,56	0,98	0,39
EMWN	22,75	17,20	11,66	5,83	0,56
Ash	9,61	10,32	11,02	11,73	12,43

Description: in dry ingredients

The results of the calculation of the nutritional composition of fresh feed of Sardine fish *Sardinella* with artificial feed showed that in treatment E had a very high crude protein level of 78.35%, crude fat 8.27%, and Ash 12.43%. But the crude fiber and EMWN in treatment E are very low where the crude fiber is 0.39% and EMWN is 0.56%. Whereas in treatment A of crude protein 59.00%, crude fat 5.90%, and ash 9.61%. But in crude fiber and EMWN has a percentage of 2.73% and EMWN 22.75%.

B. Feed Consumption Rate

Data from the analysis of variance shows that the level of feed consumption of Snakehead fish seed (*Channa Striata*) has no effect is presented in table 3.

Table 3. Average level of feed consumption of Snakehead fish seed (*Channa striata*)

Treatment	**Feed Consumption Rate**
A	26.02 ± 3.75[a]
B	32.64 ± 22.06[a]
C	40.07 ± 22.43[a]
D	34.80 ± 15.04[a]
E	21.38 7.45[a]

The results of analysis of variance of various combinations of fresh feed of Sardine fish *Sardinella* with artificial feed did not influence (P> 0.05) on the level of feed consumption of Snakehead fish (*Channa striata*) after 60 days of maintenance.

C. Survival

Percentage data from the results of analysis of variance which show that the survival of the Snakehead fish seed *Channa Striata* has no effect is presented in table 4.

Table 4. Average survival rate (%) of Snakehead fish seeds *Channa striata*

Treatment	Feed Consumption Rate
A	43.33 ± 1.44[a]
B	40.83 ± 5.77[a]
C	53.33 ± 10.10[a]
D	57.50 ±11.45[a]
E	55.00 ± 8.66[a]

Based on the results of the analysis showed that the combination of fresh feed of Sardine fish *Sardinella* with artificial feed had no effect (P> 0.05) on the survival rate of Snakehead fish (*Channa striata*).

D. Growth

Specific Growth Rate

Percentage data from the results of analysis of variance showing that the specific growth rate of Snakehead fish seeds *Channa Striata* has no effect is presented in Table 5.

Table 5. Average specific growth rates of Snakehead fish seeds *Channa striata*

Treatment	Growth
A	0.66 ± 0.12[a]
B	0.68 ± 0.14[a]
C	0.60 ± 0.01[a]
D	0.53 ± 0.15[a]
E	0.68 ±0.10[a]

The results of analysis of variance of various combinations of fresh feed of Sardine fish *Sardinella* with artificial feed did not have an effect (P> 0.05) on the specific growth rate of Snakehead fish (*Channa striata*). This shows that each treatment on a combination of feed has no significant effect (P> 0.05).

E. Water Quality

The range of water quality parameter values obtained during the research is presented in Table 6.

Tabel 6. Range of water quality values for maintenance media during the research

Parameter	Range obtained
Temperature (^{0}C)	28-33
pH	7-8,5
DO (ppm)	3.20-6,40
Ammonia (ppm)	0,0140-0,0463

IV. DISCUSSION

Based on table 2 where the protein content ranges from 59.00 to 78.35%, it is higher when compared to the research of Chau et al. 2010 which states that snakehead fish need protein by 58%. Furthermore according to Sagada et al. (2017) states that snakehead fish need protein by 51%. Based on this opinion it can be concluded that the protein content in feed A, B, C, D, E is able to supply the protein needs of snakehead fish (*C.striata*). According to Quinitio et al. (1999) very high levels of protein feed will negatively impact snakehead fish (*C. striata*). This is because, only the excess protein will minimally be digested and absorbed by fish. Undigested protein will be wasted in maintenance media and reduced to nitrogen and sulfide compounds that can be harmful to fish health.

The fat content of feed used ranges from 5.90 to 8.27%. The feed A, B, C, D, E are still in accordance with the needs of snakehead fish according to Nasution, 2006 the need for fat content of snakehead fish is 6.01. In addition, the results of research by Li et al. (2018) stated that the fat requirement for fish is 6.84. According to Munir et al. (2016) states that snakehead fish requires 12% fat. Meanwhile, according to Mujiman (2004), the need of fat for freshwater fish ranges from 4-18%. Pratoomchat et al. (2002) and Satphaty et al. (2003) in Aslamyah and Fujaya (2009) state that fat is one of the most important feed components for growth, which serves to maintain the structure and integrity of cell membranes in the form of phospholipids and as a source of energy.

Carbohydrates are in the form of crude fiber and Extract Material Without Nitrogen (ENWN). The result of crude fiber and low ENWN in treatment E is 0.39% crude fiber and 0.56% ENWN while the ENWN value in treatments A 22.75, B 17.20, C 11.66, D 5.83 and for crude fiber in treatments A 2.73, B 2.15, C 1.56, D 0.98, the results of this study indicate that treatment E has a lower carbohydrate value than treatments A, B, C, D. At treatment E means energy for all fish activity is mostly protein. As for treatments A, B, C, D, supply the carbohydrate requirements for snakehead fish. The results of Dayal et al. (2016) stated that snakehead fish need carbohydrates as much as 24.74, according to the research results of Arockiaraj et al. (1999), Striped Murrel fish (*Channa striatus*) (Bloch) requires carbohydrates of 34.4%. The use of carbohydrates if excessive will cause fat accumulation and reduce the level of feed consumption, while the level of carbohydrates that are too low causing some protein to be used for energy (Wang et al, 2005).

The level of feed consumption, growth, and survival of snakehead fish (*C. striata*) did not show any significant effect (P> 0.05) on the combination of fresh feed of sardine fish (*Sardinella*) with commercially-made feed. What causes the level of feed consumption has no real effect is suspected that the fresh feed of sardine fish (*Sardinella*) with commercially-made feed does not change the taste and odor of fish feed. If the taste of feed is in accordance with the wishes of the fish, then the feed will be consumed. Conversely, if the feed do not taste good, then the feed will be left or not eaten. According to Khasani (2013), the attraction of fish to feed to eat is very important in the formulation of fish feed. According to Samsudin et al. (2008), good feed for fish are determined by its nutritional value.

The growth of snakehead fish (*C. striata*) from the results of the research showed no significant effect. The growth is determined by the rate of feed consumption and the feed quality of snakehead fish (*C. striata*). Judging from the quality of snakehead fish feed (*C. striata*) from table 5 shows the protein content in accordance with snakehead fish needs. These results are compared with the results of the

Sagada research (2017) that examined the effect of protein levels in feed on fish growth and found optimal growth in protein 51% and not much different in the research of Chau et al. (2010) which states snakehead fish need protein by 58% it can be concluded that the use of a combination of feed can meet the needs of fish protein used for growth. In proximate analysis of carbohydrates shows that carbohydrates in feed in treatments A, B, C, D have carbohydrate content that can support fish growth. This is in accordance with what was stated by Das and Tripathi (1991) carbohydrates can increase fish growth with carbohydrate content by 5, 23-10,16%. While in treatment E has a low carbohydrate content, the protein content is used in part for the growth of snakehead fish (*C.striata*), where the results of research Erfanullah et al. (1995) stated that the lowest use of carbohydrates in feed was 5.04%.

The survival of snakehead fish (*C. striata*) in this research had no significant effect, because seen from the quality of feed and feed consumption levels in tables 2 and 3, the protein and fat content were sufficient to maintain the survival of snakehead fish (*C. striata*). in accordance with the statement of Hien et al. (2015) that the suitable protein content for the needs of snakehead fish can support the survival of snakehead fish while for carbohydrates in treatment E is still low. Then the protein in treatment E is used mostly for energy on the survival of snakehead fish. The level of feed consumption is a determining parameter on the use of feed in order to support good survival.

Water quality is an external factor that can affect the success of aquaculture. The results of water quality research during the study were within the range that can be tolerated by snakehead fish seeds. During the research, water temperature ranged from 28 to 33^{0}C, pH ranged from 7 to 8.5, dissolved oxygen ranged from 3.20 to6.40 ppm, while the ammonia content ranged from 0.0140 to 0.0463 ppm.

V. CONCLUSIONS

Based on the results of research various combinations of fresh feed with commercial artificial feed showed growth, survival, feed consumption levels and albumin content gave the same response.

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