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Variations of Stocking Density and Type of Feed for Growth and Survival of Catfish (*Clarias gariepinus*)

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ABSTRACT

The research aimed to analyze the interaction, variation of stocking densities and effect of different types of feed on growth and survival of catfish (*Clarias gariepinus*) seeds in the plastic ponds and their interaction. The research was carried out in West Kotawaringin, Pangkalan Bun of Central Kalimantan from May to July 2017. A completely randomized design with two-factor experiment (stocking density and types of feed) were applied in the study, namely 100 seeds/m^3 (treatment A1), 150 seeds/m^3 (treatment A2), 100 % commercial pellet (treatment B1), 100 % chicken intestine (treatment B2), and 50 % commercial pellet and 50 % chicken intestine (treatment B3). Catfish with initial body weight 1 g were reared in the plastic pond (1x1x1x1 m^3) for 60 days. The results showed that individual weight gain was range 35,22 to 60,12 g, the best treatment A2B3. Survival rate ranged from 40,00 – 76,66%, the best treatment A1B2.

Keywords: catfish, commercial pellet, chicken intestine, stocking density

1. Introduction

Catfish (*Clarias gariepinus*) is one type of fish that was developed as a food, this fish has several advantages including relatively resistant to disease and hold the dissolved low oxygen, it has a rapid growth and very responsive to the feed (Suyanto, 2010).

Catfish is a hybrid between the native catfish from Java (*Clarias fuscus*) with fish from African (*Clarias gariepinus*). The results of this crossing were introduced to Indonesia in 1986. The word dumbo comes from the word *jumbo*, because it has a very large size, exceeds the size of local catfish and *sangkuriang* catfish. This catfish has many advantages include the ability to adapt to high environment with nutritional value, it tastes good. This fish also contains unsaturated fatty amino acids with very low cholesterol levels, in addition, its contain minerals, vitamins are well needed by the human body (Khairuman and Amri, 2002).

Syafrudin *et al*. (2006) the high level of density was something that can affect production, high density of catfish stocking and adequate feeding can increase the growth rate and provide maximum results. Kadarini *et al*. (2010) explained that the increase in stocking density can affect growth, stocking density which is high in the amount of fish production that will be produced a lot but small individual weight, conversely if low stocking densities will produce very little production but large individual weight. Furthermore, Asaduzaman *et al.* (2008) reported that the high use of high protein artificial feed in cultivation can cause environmental pollution and provide an opportunity for disease. Yuda *et al.* (2014) reported that one alternative source of protein that was quite good as a source of protein was wasted disposal likes chicken intestines, bones, and skin from chicken farmers, these waste disposal materials have many types of amino acids. Suharyanto (2009) said that chicken intestine flour has a high protein content with relatively the same nutritional value as trash fish information about the use of

chicken intestine flour was still not widely available. So it is necessary to know the stocking density and type of feed suitable for the growth of catfish.

Formulation of the problem

The high stocking requires the farmers to provide more feed, this can made pollution, if food shortages, fish cannibalism will emerge, as well as the high price of feed causing smaller profits for it to be sought cheap alternative feed that can replace commercial feed. One of the ingredient was cheap and easy to obtain and have a fairly high content of protein was chicken intestines. Chicken intestine until now was quite a lot and has not been used optimally in the West Waringin City of Pangkalan Bun, Central Kalimantan. For this reason, research was needed, how much density is suitable for catfish? Is the chicken intestine can be used as a substitute for commercial feed? and whether the interaction between stocking density and type of feed can increase catfish growth?

Objectives

The objectives of this study are:

1. Analyzing the variation of stocking density and different types of feed on the growth and survival of African catfish seeds (*Clarias gariepinus*).
2. Analyzing the interaction of stocking density and type of feed on the growth and survival of African catfish seeds (*Clarias gariepinus*).

Hypothesis

1. Variation in stocking density and type of feed can increase the growth and survival of catfish life.
2. There is an interaction between variations in stock density and types of feed can increase the growth and survival of catfish.

2. Research Methods

Place and time

This research was conducted at the pool tarp Jl. Pangeran Antasari Gg. Sesepat, Kelurahan Baru, Kotawaringin Barat District, Central Kalimantan. The study was conducted for 3 months starting from 1-month research preparation and catfish maintenance for 2 months, May to July Analysis of water quality including temperature, pH, O2 and Ammonia dissolved oxygen.

Feed Preparation

The feed used commercial food and feed of chicken's intestine. The way to make a feed from the chicken intestine as follows: boiling the chicken intestine until it is slightly soft, then drying it further chopped to adjust the opening of the mouth of the catfish. Protein levels chicken intestine proximate 56.48%, ash content of 4.52%, coarse Fat 20.43%, 4.72% Mineral.

Design of Experiments Research

In this experiment, the design used was a completely randomized design (CRD) factorial pattern with two factors namely A solid stocking of two levels (A1 stocking 100 tail / m2 and A2 stocking 150 heads / m2) and treatment B type feed 3 levels (B1 pellet commercial, B2 chicken intestines, and B3 mixed pellets and chicken intestines in a ratio of 1: 1). Design research container as shown in Figure 1.

1 (A3 B1)2	2 (A1 B1)3	3 (A3 B1)1
4 (A2 B2)2	5 (A3 B2)1	6 (A1 B1)2
7 (A2 B2)1	8 (A1 B1)1	9 (A3 B2)3
10 (A2 B1)2	11 (A1 B2)2	12 (A2 B2)2
13 (A2 B2)1	14 (A3 B2)2	15 (A1 B2)3
16 (A3 B1)3	17 (A1 B2)1	18 (A3 B2)3

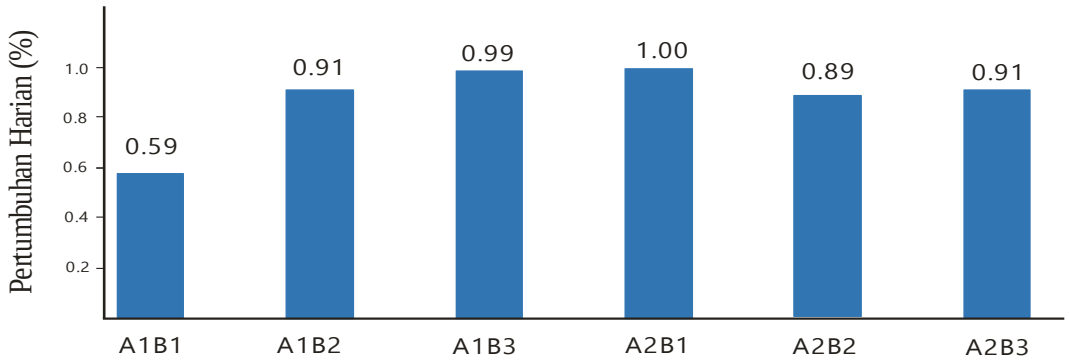
Figure 1. Research Pond Layout Design

3. Results And Discussion

Daily growth

Table 1. Mean Value of Daily Growth Rate of Catfish (*Clarias gariepinus*) During Research

Repitition	Daily Growth Rate (%)					
	A1B1	A1B2	A1B3	A2B1	A2B2	A2B3
1	0,64	1,03	1,04	0,91	0,91	0,94
2	0,70	0,68	0,91	0,87	0,88	0,90
3	0,45	1,04	1,04	1,22	0,90	0,90
Total	1,79	2,75	2,99	3	2,69	2,74
Average	0,59	0,91	0,99	1	0,89	0,91



Description:
Stocked solid A1B1 50 tails / m2, 100% commercial pellet feed
Spread solid A1B2 50 heads / m2, 100% chicken intestine feed
Spread solid A1B3 50 tails / m2, 50% commercial pellet feed and 50% chicken intestine
Stocked A2B1 75 tails / m2, 100% commercial pellet feed
Stocked A2B2 75 tails / m2, 100% chicken intestine feed
Stocked solid A2B3 75 / m2, 50% commercial pellet feed and 50% chicken intestine

Figure 2. Daily Growth Chart (%)

Based on the Normality Test on the daily growth of individuals spread normally, then, on the Homogeneity Test showed that the daily growth data of SGR catfish was not homogeneous, then data transformation was carried out. Based on the results of the Variety Analysis on individual daily growth there was not real influence.

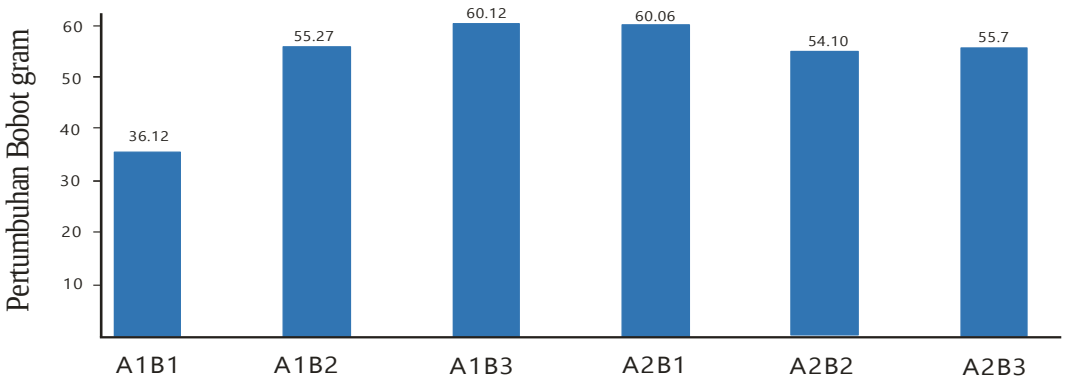
Absolute Growth

Absolute Growth Weight

The observation of the absolute growth of catfish obtained continuously occurs in the body of an individual. In general, individual growth was defined as a change in the size of a particular period, from a physical angle an increase in the size of the weight of the fish.

Table 2. Average Value of Absolute Weight Growth of Catfish During Research.

Repetition	Growth (Weight; g)					
	A1B1	A1B2	A1B3	A2B1	A2B2	A2B3
1	38,50	62,23	62,70	54,70	55,17	58,70
2	42,30	40,83	55,17	52,70	52,97	54,50
3	27,57	62,76	62,50	72,77	54,17	54,17
Total	108,37	165,82	180,37	180,17	162,31	167,37
Average	36,12	55,27	60,12	60,06	54,10	55,79



Description: A1 = 100 tail / m3, A2 = 150 tail / m3, B1 = 100% Commercial Pellet, B2 = 100% Chicken Intestine, B3 50% Commercial Pellet and 50% Chicken Intestine.

Figure 3. Absolute Weight Growth Graph for Absolute Catfish during Maintenance

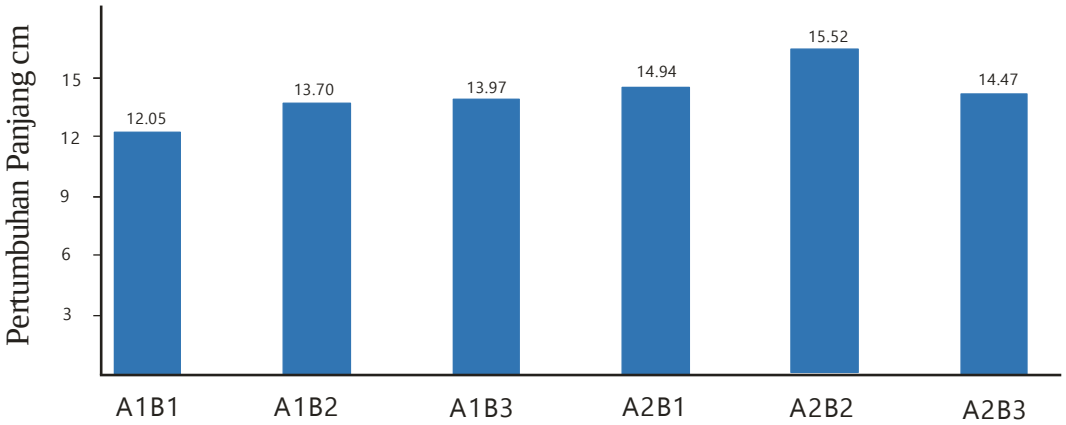
Based on the Normality Test on the growth of data weights spread normally. Furthermore, the homogeneity test that the data growth of catfish weight was not homogenous, further transformation of the data. Based on the results of fingerprint analysis Variety of data growth rate average individual weight of fish stocking density influential catfish is not real, that means stocking densities impact no significant on the growth of catfish weight. In the type of feed has a very significant effect, the type of feed given has a very significant effect on the growth of catfish.

Absolute Growth Length

The results of observations of the absolute long growth of catfish obtained continuously occur in the body of an individual. In general, individual growth is differentiated as a change in the size of a particular period, where as from a physical angle there is an increase in the length of the period during the study (60 days) can be seen in Table 3 Figure 4.

Table 3. The Average Value of Absolute Growth of Absolute Catfish During Research.

Repetition	**Growth (Length; cm)**					
	A1B1	**A1B2**	**A1B3**	**A2B1**	**A2B2**	**A2B3**
1	12,07	15,07	15,08	14,73	14,57	14,07
2	13,2	13,86	14,57	14,23	14,27	14,6
3	10,89	12,17	12,25	15,87	17,73	14,73
Total	36,16	41,10	41,90	44,83	46,57	43,40
Average	12,05	13,70	13,97	14,94	15,52	14,47



Description: A1 = 100 tail / m3, A2 = 150 tail / m3, B1 = 100% Commercial Pellet, B2 = 100% Chicken Intestine, B3 50% Commercial Pellet and 50% Chicken Intestine.

Figure 4. Graph of Average Length of Dumbo Catfish during Maintenance

Based on the Normality Test of the growth of individual lengths the average data spread normally, then the Homogeneity Test shows that data on the growth of catfish length was Homogeneous.

Based on the results of fingerprint Variety Analysis against individual lengths growth mean real effect catfish stocking density means having a significant effect on the growth of catfish length, the type of feed very significant effect on the growth of catfish length.

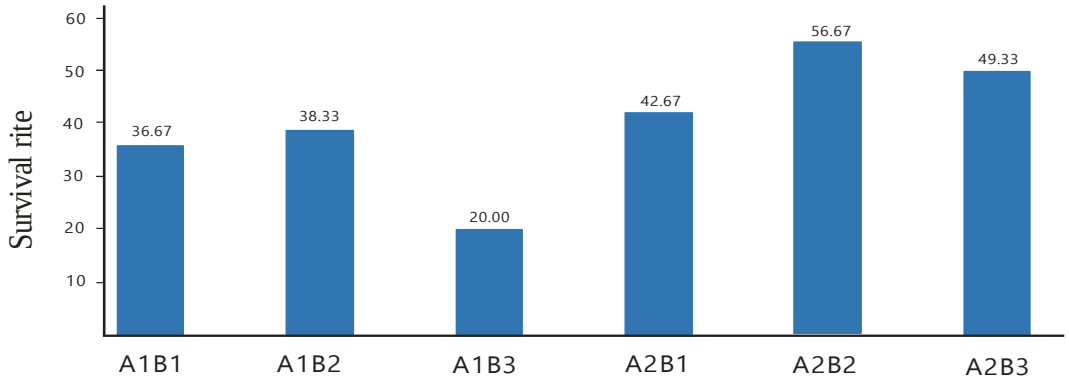
Survival Rite

The observation of the survival rate of catfish that continues to occur in the body of an individual.

Table 4. Value Average Degree of Survival Catfish During the study.

Repetition	**Fish Survival (%)**					
	A1B1	**A1B2**	**A1B3**	**A2B1**	**A2B2**	**A2B3**
1	45	48	20	20	61	45
2	45	47	20	48	61	43
3	20	20	20	60	48	60
Total	**110**	**115**	**60**	**128**	**170**	**148**
Average	**36,67**	**38,33**	**20,00**	**42,67**	**56,67**	**49,33**

Name of the pool	Number of Seeds	Life sustainability	Percentage
A1	50	31,7	6,34%
A2	75	49,5	66%



Description: A1 = 100 tail / m3, A2 = 150 tail / m3, B1 = 100% Commercial Pellet, B2 = 100% Chicken Intestine, B3 50% Commercial Pellet and 50% Chicken Intestine.

Figure 5. Mean Graph of Survival of Catfish during Maintenance

Normality Test based on the survival of catfish normal distribution of data. Furthermore, the Homogeneity Test shows that the data was homogeneous. Based on the results of the Variety of fingerprint Analysis the data on the survival of individuals has a significant effect, it means that there was a real effect of stocking density on survival.

Average Mortality (mortality) for 60 days.

Table 5. Average Mortality (mortality) for 60 days

Repetition	**A1B1**	**A2B3**	**A1B2**	**A1B3**	**A2B1**	**A2B2**
1	5	2	30	55	14	30
2	5	3	30	27	14	32
3	30	30	30	15	27	15
Total	40	35	90	97	55	77
Average	13,3	11,7	30,0	32,3	18,3	25,7

Repetition	The number of early	Mortality	Percentage
A1	50 ekor	18,3	36,6%
A2	75 ekor	25,4	49,6%

Based on the results of the Normality Test of catfish, homogeneous data were obtained. Fingerprint analysis Variety individual mortality data were not significant, for this type of feed was not significant, it means that there was no real influence the type of feed given to the fish mortality catfish.

Feed Conversion

Table 6. Average Value Conversion Feed Catfish During the study.

Repetition	Feed Conversion					
	A1B1	**A1B2**	**A1B3**	**A2B1**	**A2B2**	**A2B3**
1	2,01	3,67	3,77	2,67	2,18	2,28
2	3,04	2,52	2,78	2,78	2,78	3,29
3	2,48	2,96	2,81	3,17	3,02	2,78
Total	**7,53**	**9,15**	**9,36**	**8,62**	**7,98**	**8,35**
Average	**2,51**	**3,05**	**3,12**	**2,87**	**2,66**	**2,78**

Based on the Normality Test of catfish feeding, the data value spreads normally, the homogeneity test of the data was homogeneous.

Based on the results of Analysis of Variety of data on conversion of catfish feed did not have a significant effect, it means that there was not real effect of stocking density on catfish FCR, whereas in the type of feed there was no significant effect.

Quality of Water

The water quality was observed for 2 months maintenance underway include temperature, pH, DO and Ammonia.

Table 7. Water Quality Parameters

Repetition	Water Quality Parameters	
	First Spread	**Final Harvest**
temperature (C^{o})	28	27-28
pH	6,6	6,6-7,1
Ammonia (ppm)	1,21mg/L	3,20mg/L
DO	6,40	5,42 – 6,51

4. Conclusions And Suggestions

Conclusion

The results of the scattered solid research with different types of feed were concluded that the average percentage of daily growth for each treatment ranged from 0.60 to 1.00%. There were not have interaction between the type of feedstock density on the growth of catfish fish daily. The mean absolute weight growth has an interaction between stocking density and type of feed on the growth of catfish weight. The average absolute length growth has no interaction between stock density and feed type to absolute length growth.

The average percentage of survival (SR) did not have interaction between stock density and type of feed on the survival of catfish. The mean feed conversion (FCR) did not have interaction between stock density and feed type given to catfish feed conversion. Water quality during the studied temperature between 27-28 0C. pH 6.6 -7.1. Ammonia 1.21 - 3.20 DO 5.42 - 6.51.

Suggestion

100% chicken intestine or 50% Commercial Pellet and 50% Chicken Intestine can be made as an alternative feed for the avoidance of cannibalism if lack of food. For the next researcher to be able to process and utilize waste agriculture and livestock industry in our neighborhood, easily accessible in terms of material as well as material used easily obtained. Furthermore, the increase in stocking density is more than 75 tails / m2 accompanied by an increase in water quality and feeding of more than 3% or until full.

References

Asaduzzaman, M., Wahab, M. A., Verdegem, M. C. J., Huque, S., Salam, M. A., & Azim, M. E. (2008). C/N Ratio Control and Substrate Addition for Periphyton Development Jointly Enhance Freshwater Prawn *Macrobrachium rosenbergii* Production in Ponds. *Aquaculture*, 280(1-4), 117-123.

Kadarini, T., Sholichah, L., & Gladiyakti, M. (2010). Pengaruh Padat Penebaran terhadap Sintasan dan Pertumbuhan Benih Ikan Hias Silver Dolar (*Metynnis hypsauchen*) dalam Sistem Resirkulasi. *Jurnal Universitas Diponegoro, Semarang*.

Khairuman dan Amri, K. (2002). *Budidaya Ikan Lele Dumbo Secara Intensif Jakarta*. Agromedia Pustaka. 76 hal

Suharyanto, M. T. Andi, M. P. 2009. *Pemanfaatan Limbah Usus Ayam Sebagai Pakan Pembesaran Rajungan (Portunus pelagius).* Pusat Riset Perikanan Budidaya.

Suyanto, S. R. (2010). *Budidaya Ikan Lele*. Penebar Swadaya. Jakarta.

Syafrudin, D., Yuniarti dan Setiawati, M. (2006). Pengaruh Kepadatan Benih Ikan Lele Dumbo*(Clarias griepinus)* Terhadap Nitrogen Melalui Penambahan Tepung Terigu. *Jurnal Akuakultur Indonesia.* 5(2): 137- 147