Performance of Perkasa Pangasiid (*Pangasianodon hypophthalmus*) from family selection results

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ARTICLE INFO	ABSTRACT
	Perkasa Pangasiid (*Pangasianodon hypophthalmus*) is a superior catfish selected by the family that has been released by the Minister of Marine and Fisheries as aquaculture fish which has a selection response of 38.86 %. Genetic quality improvement to accelerate growth can be done through selection activities. The performance test of the Siamese catfish from the selection (Perkasa strain) compared to the non-selection strain (local strain) originating from the farmer. The purpose of this study was to compare the productivity of selection and non-selection Siamese catfish cultivation maintained in a net pond. The initial seeds of the test fish were 3.76 g to 3.79 g with a total length of 2 inches to 3 inches kept in a net pond measuring $3 \times 5 \times 1.25$ m. The water level was around 100 cm with a density of 175 fish/net. Maintenance was carried out for six months. Test parameters observed included: weight gain, specific growth rate, biomass harvest, productivity and cost of production. The results showed that Siamese catfish which were selected for six months of maintenance had a final weight of 698.40 ± 164.54 g and non-selection strains of 595.77 ± 103.41 g. As well as having a higher specific growth rate (3.51 %), higher harvest biomass (11.44 %), and higher productivity (18.71 %) than non-selection Siamese catfish. Based on the bioeconomic analysis, the selection of enlarged Siamese catfish cultivation can reduce production costs up to Rp 390 /kg. The use of Perkasa Pangasiid superior seeds can increase harvest biomass higher than the non-selection seeds.
How to cite:	

1. Introduction

In 2014, aquaculture fish production has reached 14.52 million tons and was targeted to increase its number to be 31.32 million tons in 2019 (Minister of Maritime Affairs and Fisheries Regulation No.45, 2015). The escalation of Siamese Catfish aquaculture fishery production in

Indonesia is to be proceed in an instant for fulfilling the demand of consumption needs which has been increasing continuously. Siamese catfish is highly in demand in Indonesia and becoming one of the priority production in cultivation productivity enhancement. For such data could be proven by the escalation of Siamese catfish production in 2015 with the weight amount of 339 069 t and had been increased to be 437.11 t in 2016, Siamese catfish production has been increasing continuously until now as in 2019, national Siamese catfish production's target is estimated to be 1 149 400 t (KKP, 2016). The escalation of fish production could be achieved through the cultivation process, as production enhancement through fish capturing would interfere the sustainability of fishery resources.

The escalation of fishery production should be supported among other availability of superior seeds in order to achieve production target. Superior seed could be produced in some other way through the usage of superior broodstock which resulted from the selection program. Selection is one of a technic to improve quantitative trait. The basic principle of selection is to exploit the trait of additive from the alleles in all of the locus which controls the quantitative trait for improving some population (Gjedrem, 2005). The selection program in fish cultivation is directed, among others, in order to improve the character growth, disease resistance, poor environment resistance, fish quality and so forth. And the result of selection program is to produce the population with improved genetic quality in order to be capable of increasing its productivity. The usage of superior seeds resulted from the selection program is proven to increase productivity and advantages from some of the fish cultivation species such as Nile Tilapia Fish (Nugroho et al., 2013), Siamese catfish (Dewi et al., 2016, Dewi et al., 2017), and Silve barb fish (Khan & Huda 2012).

One of the fish cultivation species which its productivity is targeted to be increased is Siamese catfish. In 2018, Minister of Maritime Affairs and Fisheries had released the new strain of Siamese catfish *(Pangasianodon hypophthalmus)* under the name of Perkasa Pangasiid. Perkasa Pangasiid is the only strain of new superior Siamese catfish which is resulted from the breeding process in Indonesia that is formed through the selective breeding program. Possessing the rapid growth character with the response value of cumulative selection in the second generation in the amount of 38,86 % (Tahapari et al., 2018).

In this research, the usage testing of superior seed of Perkasa Pangasiid from famili selection results was proceeded in a broad scale to gain information regarding the selection effects towards some of the parameters such as weight gain, specific growth rate, harvest biomass, productivity, benefit cost ratio (BCR) and the cost of goods production. The testing was proceeded in the ground pool by using the net cage for six months in Sukamandi, West Java. The objective of this research is to gain information regarding the selection effect towards the performance of Siamese catfish cultivation. Through the usage of superior Siamese catfish selection results, the process is expected to be capable of increasing the cultivators' productivity and prosperity.

2. Material and methods

This research is conducted and started from February to December 2017. The research itself is proceeded in the trial pond of Research Institute for Fish Breeding Sukamandi, Subang city, West Java.

Test Fish and Treatment

In this research, the tested treatment is the performance comparison between the Siamese catfish test results (Perkasa strain) and non-selection (Local strain). The obtained local Siamese

catfish was produced by local public hatchery unit (UPR). The size of the fish seeds which has been used was 3.76 to 3.79 g with the total length of 2 to 3 inches.

Preparation of the Breeding Containers

The used container in the tested fish breeding is the netcages with the size of 3×5×1.25 m, water level of 100 cm approximated with the stoking density of 175 ind/cage. The total amount of pond nets which have been used are four netcages.

Breeding Maintenance

The breeding maintenance was proceeded for six months. The feed which had been used was the commercial artificial feed in the form of floating pellet containing of 28 to 30 % crude protein, with the particles size of approximately 3 mm until harvesting. The proceeded sampling is to find at once the growth and calculating the daily amount of feed adjustment which had been given for once a month. Sampling was proceeded by the method of random taking of 30 ind. The amount of daily feed which had been given (FR = feeding rate) was 5 % from the weight of the biomass fishes at the first semination and afterward decreasing 1 % approximately each a month until it reached to 3 % right before the harvesting (5 % at the first one month, 4 % at the second one month, 3 % at the third one month until the harvesting). The feed was given at the frequency of twice a day.

Parameter

The observed test parameter was covering: weight gain, specific growth rate, harvest biomass, productivity and the cost of goods production. Fish biomass was calculated at the beginning and end of the research. Fish biomass was measured by the method of scaling the whole fishes. Feed conversion ratio was calculated to compare the amount of feed which had been used with the weight gain of the fish biomass. Feed conversion ratio (FCR) was calculated based on the following formula:

$$FCR = \frac{F}{((Wt + D - W0))}$$

FCR = Feed conversion ratio
Wt   = Total weight of fishes in the end of breeding (g)
W0   = Total weight of fishes in the beginning of breeding (g)
D   = Total weight of the dead fishes throughout breeding (g)
F   = Total amount of feed given (g)

Survival rate would be calculated in the beginning and the end of the research. Survival rate would be measured also by calculating the number of fishes during the stocking and harvesting. The used formula to calculate the survival rate is:

$$SR = \frac{Nt}{No} \times 100\ \%$$

SR   = Survival rate (%)
Nt   = Number of individuals in the end of breeding (per ind)
N0   = Number of individuals in the beginning of breeding (per ind)

Value of the cost of production is the production cost per Kilogram. Value of the cost of production is calculated by comparing the total cost of operational and harvest biomass.

Data Analysis

The data of growth, survival rate, feed conversion, specific growth rate, harvest biomass and cost of goods production would be shown in the table. The data comparison of growth, survival rate and feed conversion between two treatments were analyzed statistically using independent sample t-test at the level of 95 % (P<0,05) trust.

3.   Results and Discussion

Growth test results of Perkasa pangasiid and local strain Siamese catfish in netcages sized 3×5×1.25 m showed that Perkasa pangasiid growth is better compared to the local strain Siamese catfish (Table 1). Perkasa pangasiid showed higher final weight and harvest biomass significantly (P<0,05) compared to the local strain. This research resulted was in accordance with the other test results that used the selection results fishes. The research which had been conducted by Dewi et al., (2016) and Dewi et al., (2017) showed that Mutiara strain catfish which had been produced by the selection program had grown faster and more efficient in utilizing feed compared to the Sangkuriang and Paiton strain catfish. In the case of Nile Tilapian fish, the usage of the superior seed from the selection results could be increasing its productivity up to double (Nugroho et al., 2013). As for in the case of Silver barb fish, the harvest weight of the selection results fish is significantly higher compared to the non-selection one. As for the survival rate is not significantly different, yet the harvest biomass is significantly higher at the selection results fish (Khan & Huda, 2012).

The performance escalation of the selection results fish was expected to be caused by the improving genes inside of its body organs which controlled the growth and the feed conversion rate from the fish itself. According to Iswanto et al., (2015), the daily growth rate performance of the third generation rapid growth catfish seed (Mutiara strain) which was constantly in the higher state showed that the individual selection program which had been proceeded for three generations had been producing some seed with high genetic quality, with the result that it had the higher performance growth rate compared to the other strains of the cultivated catfish seeds. The utilization of the superior Mutiara strain catfish seeds which had been produced from the selection program had been producing higher weight gain, survival rate and harvest biomass (P<0,1) compared to the local strain. Mutiara strain was more efficient at utilizing the feed compared to the local strain which had been showed by the lower FCR value. The faster growth of Mutiara strain was supported by higher RNA/DNA ratio escalation compared to the local strain. The analysis of bioeconomic value in Mutiara strain cultivated catfish was capable of reducing production costs, increasing profits, and shortening the breeding maintenance time.

Dewi et al. (2017) said performance escalation of the selection result fish was expected to be caused by the improving genes inside of its body organs which controlled the growth and the feed conversion rate from the fish itself. Parenrengi et al. (2013) showed that the RNA/DNA ratio value which had been gained from the selection results giant tiger prawn at the higher growth character compared to the control shrimp. Although it is still precisely unknown which genes that was responsible for the growth of the giant tiger prawn, the selection results were expected for possessing higher capability at forming the protein synthesis which is related to the increased growth rate of the giant tiger prawn itself. The research results which had been obtained by Pamungkas et al. (2015) that showed the selection results Siamese catfish RNA/DNA ration value at the higher growth character (23,75) compared to the control one (16,87).

Table 1. Productivity of the Perkasa strain catfish and the local strain catfish (UPR) which had been bred in the netcages.

Size of netcage	3×5×1.25 m	
Type of feed	Commercial; Sinking; Crude Protein 28 to 30 %	
Stocking density	12 ind per m^2	
Amount of semination seeds	175 ind per net	
Size of semination seeds	2 to3 inches	
Variable	**Selection**	**UPR**
Breeding maintenance (mount)	6	6
Initial weight (g)	3.76 ± 1.48	3.79 ± 0.83
Final weight (g)	698.4 ± 164.54	595.77 ± 103.41
Initial standard length (cm)	6.05 ± 0.71	6.31 ± 0.51
Final standard length (cm)	32.64 ± 2.36	31.97 ± 1.7
Initial total length (cm)	7.25 ± 0.88	7.6 ± 0.65
Final total length (cm)	40.2 ± 2.83	39.76 ± 2.01
LPS weight (% per day)	2.95	2.85
LPS length (% per day)	0.96	0.9
Survival rate (%)	88	92.6
Feed convertion ratio	1.37	1.41
Harvest biomass (kg)	107.55	96.51
Productivity (kg per m^2)	7.17	6.04
Cost of goods manufactured (IDR kg^{-1})	13.34	13.73
Benefit cost ratio (BC^{-1})	1.2	1.17
Superiority growth per ΔG (%)	17.23	

Bioeconomic value analysist which had been conducted in this research described feasibility attempt from the Siamese catfish cultivation attempt by using Perkasa strain and local strain. Based on the Bioeconomic value data comparison at the Table 1, it showed that based on the cost of goods manufactured value per kg unit, the cost incurred for producing 1nKg Perkasa Siamese catfish is cheaper (Rp 13 342) compared to the local train (Rp 13 732). Based on the Benefit Cost Ratio (BCR) value, both of the Perkasa strain cultivation and Local strain Siamese catfish are profitable for the BCR value is >1. The utilization of selection results Siamese catfish seeds is proven to be capable of increasing profit. In the case of Nile Tilapian fish cultivation, the utilization of selection results is capable of increasing profit up to four times (Nugroho et al., 2013).

4. Conclusion.

The utilization of Perkasa strain superior seed which has been produced by the selection program is producing the higher weight gain and harvest biomass significantly compared to the local strain. Perkasa strain is proven to be more efficient at utilizing the feed compared to the local strain as showed by the lower FCR value that it gave. Bioeconomic value analysist of Perkasa strain Siamese catfish cultivation is capable of reducing production cost and increasing profit if it is compared to the utilization of the local strain.

Acknolegment

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