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The Analysis of Factors Influence Catfish Seed *(Clarias Gariepenus)* Production in Wonogiri District

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Abstract

This research aimed to: (1) analysis the cost and income of Catfish hatchery farm in Wonogiri District. (2) analysis the influence factors of Catfish hatchery production in Wonogiri District. (3) analysis the efficiency level of feed production, natural food, and labour. The basic method of the research is description analysis method and the conduct of the research is using a census method. This research had conducted in the district of Wonogiri which consists of 45 respondents, analyzed data included hatchery income, R/C ratio, elasticity, efficiency, and multiple linier regression test. The result of the research showed that the relation between factors and hatchery of African Catfish production showed in multiple linier regression model, they are : $LnP = 7.472 - 0.047LnX_1 + 0.312LnX_2 + 0.388LnX_3 + 0.304LnX_4 + 0.136LnX_5 + 0.016LnX_6 + 0.108LnD_1 + 0.058LnD_2$. The result of the analysis showed the number of brood stock, feed, natural food, labour, hatchery technology and counseling which were significant influenced in Catfish hatchery production, meanwhile the land area and hatchery process were not really influences to the Catfish hatchery production. The result of the research had obtained the income of Catfish hatchery with the price of Per rupiahs. 2.369.533,-, value of R/C ratio was 2,67, feed production value, natural food, and labour were >1 which showed inefficient, the elasticity value of all independent variable was elastic.

Keywords: Income; efficiency production; the Factors of Hatchery Production.

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1. Introduction

African catfish (*Clarias gariepenus*) is a freshwater fish that has been grown commercially by the people of Indonesia. In addition, to maintain the species, cultivation activities need to be improved in order to meet market demand and the nutritional needs of the community, especially accompanied by high levels of domestic consumption of African catfish which make their business opportunities more open starting from hatchery operations, enlargement to the processing business.

According to Susanto in [19], to support the successful cultivation of fish, one of the decisive factors is available for qualified good seed quality, quantity, or continuity. Seeds are available in large quantities but low quality will only burden the farmers enlargement because the result is not balanced with the quantity of feed that has been given. While the seeds have good quality, a limited number will not increase business production enlargement, because there will be a shortage of seeds that quite serious.

The problems of African catfish hatchery yield in traditional way are the quality of African catfish hatchery production is not maximized and it is still lacking.

This study aims to (1) determine the costs and farm income African catfish hatchery in Wonogiri district, (2) determine the factors that influence the production of African catfish seed in Wonogiri district, (3) determine the efficiency level of production feed, natural feed and labor factors. Hatchery is the initial activity in aquaculture. Without this seeding activity, other activities such as nursery and enlargement will not materialize. It is because the seeds used from nursery activities and grown from hatchery, an outline of hatchery activities include: maintenance of the parent, the parent is ready for spawn, spawning and larval treatment [8]. Land or pool maintenance to be provided by the fish farmer, in addition to soil the land, the water conditions must also be abundant. The location to be used must meet the technical requirements, such as the discharge of water is available and it is not contaminated by waste and easily obtained [20]. Techniques can be done naturally spawning and intensive, but farmers do more spawning in natural and semi-intensive. This is done to save the production costs [20]. Feed is a factor of production whose value can reach 60% of the cost production [10]. Therefore, the feed which has been used must be taken into the quality account and the amount of usage in order to achieve optimal efficiency for the growth of catfish seeds. The terms of good natural food is to have a high nutritional value, easy to obtain, easy to process, easy to digest, non-toxic and the prices are relatively cheap. Natural feed silk worm is most preferred by freshwater fish. Silk worm is very good for the growth of freshwater fish because of its high protein content. The nutritional content of silk worms is 54.72% protein, 13.77% fat, 22.25% carbohydrate [5].

When the application technology adjusted for stage activities, so the application of appropriate technology can be applied starting from the management of the parent, eggs, larvae and seeds [18]. Costs in farming activities are intended to generate high income for the farming activity. By removing the costs, the farmers expect the highest revenue through high production level. Suratiyah in [21] states, costs and revenues are influenced by two factors: internal - external and management factors.

2. Material and Method

The research was conducted in Wonogiri Regency, Central Java Province from March until July 2016. This research method is using a description method of analysis. The research technique used is the method of census data collection method when all elements of the population investigated one by one.

In this study, a population that is taken by the researchers was all African catfish farmers in Wonogiri totaling 45 people.

Primary data used in this study consisted of:

a. Fish farmers revenue and costs production of African catfish hatchery operations consist of the feed cost, natural feed costs, labor costs and other costs that are used in one cycles production of African catfish hatchery.
b. Data socioeconomic factors in African catfish farmers consist of education, the respondent's age, education level, work's experience and hatchery technology usage.

2.1 Farming Systems Analysis

The income level of catfish hatchery farming can be expressed in a mathematical equation as follows:

TR = Yi x Pi

Pd = TR - TC

Information :

TR = Total Revenue of African Catfish Farmers (Per rupiahs)

Yi = Production of Catfish Seed (per head)

Pi = Price of Catfish Seed (Per rupiahs/head)

Pd = Revenue of African Catfish Farmers (Per rupiahs)

TC = Total Cost (expense) (Per rupiahs)

2.2 Efficiency Analysis of Farming System (R/C Ratio)

Analysis of R/C ratio can be used as descriptive farming efficiency. To determine the feasibility of African catfish hatchery, the mathematical formula used as follows:

$$R/C\ rasio = \frac{TR}{TC}$$

Information :

TR = Total Revenue (receipts) African Catfish Farmers (Per rupiahs)

TC = Total Cost (incurred) African Catfish Farmers (Per rupiahs)

2.3 Factor Production Analysis

The procedure of analysis in this study is using Ordinary Least Squares (OLS) estimation regression model for catfish hatchery production factors. Estimation is using Ordinary Least Square (OLS) method that has been done by testing each parameter by calculating the value of the t statistic and the F statistic. To perform multiple linear, the analysis used computer assistance with E views program.

The model of the equation as follows:

$$Ln\ P = ln\beta_0 + \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnD_1 + \beta_8 lnD_2 + \mu$$

Where :

β0 is a constant,

β 1, β 2, β 3, β 4, β 5, and β6 is intercept / coefficient,

P : Production Of Catfish Hatchery (per head)

X1 : Land Area (m2)

X2 : Brood stock (per set)

X3 : Feed (kg)

X4 : Natural Food (per can)

X5 : Number of Labor (hours)

X6 : Farmers Experience (years)

D1 : Figures Technology (Dummy variables using Induced Breeding

Technology = 1 Do not use = 0)

D2 : Extension (Dummy variables obtain counseling = 1, not getting

counseling = 0)

μ : Error Term

1) Regression Model Test

a. The coefficient of determination (R2)
b. Test F (F-test)
c. Test t (t-test)

2) Classical Assumption Test

a. Normality Test
b. Heteroscedasticity Test
c. Multicolinearity Test
d. Autocorrelation Test

2.4 Efficiency Production Analysis

To assess whether the use of production factors has achieved economic efficiency or not, the ratio between the value of marginal production and the price of each factor of production with the following formula are using the formula as follows:

$$\frac{NPMx1}{Pxi}$$

Information :

NPMxi = Marginal Product Value for production factors xi

PXI = Price Production Factors xi

In this research, the factors of production in African catfish hatcheries has been analyzed, they are feed, the natural food and labor production factors. So that the value of their production efficiency can be seen.

2.5 Analysis of Elasticity Production

Elasticity calculations production can be obtained by the formula:

$$MPPi$$

$$Bi = \frac{\text{---------}}{APPi}$$

By transforming the function of Cobb-Douglass then the regression coefficient (bi) become the elasticity of production.

Where:

bi <1, means the proportion of input-i addition is beyond proportion addition

production.

bi =1, means the proportion of input-i addition is equal same with proportion addition production.

bi> 1, means the proportion of input-i addition will make proportion addition production more bigger

3. Result

3.1 Characteristics of Catfish Farmers

Characteristics of fish farmers is an overview of the background and circumstances which related to African catfish hatchery operations in Wonogiri that are shown in Table 1

Table 1: Characteristics of Catfish Farmers in Wonogiri District

No	Description	Survey Results
1	The number of African Catfish Farmers (people)	45
2	Education of African catfish Farmers	
	a. Not completed primary school (person)	0
	b. Junior high school (person)	1
	c. Senior high school (person)	36
	d. College (Person)	8
3	The average age of African Catfish Farmers (years)	44,87
4	Average number of family members (person)	3
5	Average experience as catfish Farmers (years)	4,7
6	Average land owned (M2)	108,47

Source: Primary Data Analysis, 2016

The number of respondents African catfish farmers as many as 45 people. Inadequate number of fish farmers in Wonogiri district due to the geography and limited water resources, it affects the level of productivity of African catfish hatchery operations. In addition, market ability and continuity production is not maximized so farmers relatively not continuous in producing African catfish seed. The average age of African catfish farmers in productive age is about average age of 44.87 years. Productive age population is the population classified by age 15-64 years. According to Rasyaf in [13], that the age between 20-55 years is an age that is still productive, while below 20 years is an age that has not been productive and can be categorized as school age while the age of 55 years productivity level has passed the optimum point and going downhill in line with age.

3.2 Farming Systems analysis

Cost of African catfish hatcheries farming in Wonogiri district includes the cost of feed, natural feed, labor, cost of electricity used and the cost of other expenses incurred by farmers African catfish farmers in the districts of Wonogiri

Table 2: The cost of production and farmers' income of African catfish farmers

Description	**Value**
- Average Total Cost of Production (Per rupiahs)	1.359.956
- Average feed cost (Per rupiahs)	698.888
- Averagenatural feed cost (Per rupiahs)	
- Average labor costs (Per rupiahs)	398.666
- Average larva production (per head)	
Prices of larva (Per rupiahs)	105.777
Average Total Revenue (Per rupiahs)	33.904
Average Revenue (Per rupiahs)	110
	3.729.489
	2.369.533

Source: Primary Data Analysis, 2016

The largest cost in African catfish hatchery business is the feed cost (both natural feed or from the manufacturer). The average feed costs incurred by farmers of African catfish is 698 888, - rupiahs for the cost of feed manufacturers, while natural feed (in the form of silk worms) is 398 666, -rupiahs. Afrianto and Liviawati in [2] the cost of feed used for intensive cultivation which may reach 60% of the total cost of production,

therefore feeding in the number, frequency and composition must be precisely and efficiently to the growth and survival of fish awake [22].

The avarege income of African catfish farmers is. 3,729,489, - rupiahs per cycle. The average production cost is 1,359,956, - rupiahs and the average of African catfish farmers income is 2,369,533, - rupiahs per period.

3.3 Farming Efficiency Analysis

Based on the research, to determine the magnitude of R / C ratio, it depends on the costs incurred and the results obtained. The following table is the result of the analysis of the costs used to determine the amount of efficiencies farming African catfish hatcheries.

Table 3: Costs and Income of African catfish hatchery farm in Wonogiri district

No	Description	Farming costs
1	Average Cost of Production (Per rupiahs)	1.359.956
2	The average seed production (per head)	33.904
3	Prices of seeds per head (Per rupiahs)	110
4	Total Revenue(Per rupiahs)	3.729.489

Source: Primary Data Analysis, 2016

The above table shows the value of R/C ratio of 2.74, it means any use of the input 1, - rupiahs with the costs ratio and revenues is 2.74 per unit and per period production.

3.4 Regression Analysis Factors of African Catfish Hatchery Production

In estimating the influence of factors production to the production of African catfish seed, this research used Ordinary Least Square (OLS) that has been done by testing each parameter by calculating the value of the t statistic and the F statistic. Regression test is done by the aid of analysis software Eviews 9.0 program. From the test results, it obtained the general equation of the model functions as follows:

$$LnP = 7.472 - 0.047LnX_1 + 0.312LnX_2 + 0.388LnX_3 + 0.304LnX_4 + 0.136LnX_5 + 0.016LnX_6 + 0.108LnD_1 + 0.058LnD_2$$

3.5 The coefficient of determination (R^2)

The coefficient of determination (R^2) essentially measures how far the ability of the model to explain variations in the dependent variable [9]. The coefficient of determination is between zero and one. R^2 value is small, it means the ability of the independent variables in explaining the variation of the dependent variable is very limited. In this research, the value of R^2 (adjusted R-square) of 0.978, which means 97.8 percent of the variation variable seed production can be explained by the variation of the independent variables included in the model,

while the remaining 2.2% is explained by the variation of other variables not included in the model.

Table 4: The Influence of Regression Analysis Factors in African Catfish Seed Production (*Clarias gariepenus*) in Wonogiri Regency.

Sample: 1 45
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
P (Production)	7.472995	0.261443	28.58368	0.0000***
LX1 (land area)	-0.047232	0.030986	-1.524310	0.1362ns
LX2 (broodstock)	0.312600	0.056922	5.491715	0.0000***
LX3 (Feed)	0.388333	0.079467	4.886747	0.0000***
LX4 (Natural Feed)	0.304969	0.089571	3.404767	0.0016**
LX5 (Labour)	0.136062	0.052426	2.595335	0.0136**
LX6 (Experience Farmers)	0.016431	0.036942	0.444794	0.6591ns
D1(Dummy Tehnologi)	0.108746	0.032308	3.365897	0.0018**
D2 (Dummy Counceling)	0.058580	0.026389	2.219910	0.0328**

R-squared	0.978462	Mean dependent var	10.34527
Adjusted R-squared	0.973676	S.D. dependent var	0.408753
S.E. of regression	0.066319	Akaike info criterion	-2.411825
Sum squared resid	0.158335	Schwarz criterion	-2.050492
Log likelihood	63.26605	Hannan-Quinn criter.	-2.277123
F-statistic	204.4342	Durbin-Watson stat	2.023207
Prob(F-statistic)	0.000000		

Source: Primary Data Analysis, 2016

Information : ns =non significant

3.6 Test F

F-test analysis tool (Table 4) obtained calculated F value of 204.43 with a significance probability of 0.000, is greater than the value of F table 1.39 at α level of 0.05. It shows that all independent variables simultaneously significantly influence the dependent variable at α level of 0.05 or 95% confidence.

3.7 t-Test

The t-test used to test the independent variables individually to see whether the independent variables

individually significant effect on the dependent variable. The t test used is two-sided test, if the t-count value that is greater or smaller than the value of the t-table (-1.68 or 1.68) used (in α 95%), then H0 accepted which means that the independent variable are not exhibited significantly different from zero at α 5%, meaning that the independent variables did not significantly affect the dependent variable on α 95%. Conversely, if the t-count acquired smaller or larger than t-table on α 5% (-1.68 or 1.68), then H0 rejected, which shows that independent variables were significantly different from zero at α 5% means that the independent variable influence significant on the dependent variable on α 5%.

T test results of this research variable land area (X1) and experience farmers (X6) did not significantly affect the results of African catfish fish seed production as indicated by the probability value of 0.1362 and 0.6591, while for a number of parents (X2) , the amount of feed (X3), natural feed (X4), labor (X5), the use of technology (D1) and extension (D2) showed highly significant probability values, respectively X2 = 0.0000, X3 = 0.0000, X4 = 0.0016, 0.0136 X5, D1 = D2 = 0.0018 and 0.0328.

3.8 Classical Assumption Test

1. Normality Test

Normality test is done in testing by using E views application, (see the residual of the equation with the Jarque-Bera), it is said to have a normal distribution when the value of the Jarque-Bera significantly above 5% and it is not normally distributed if the value of the Jarque-Bera significantly below 5%.

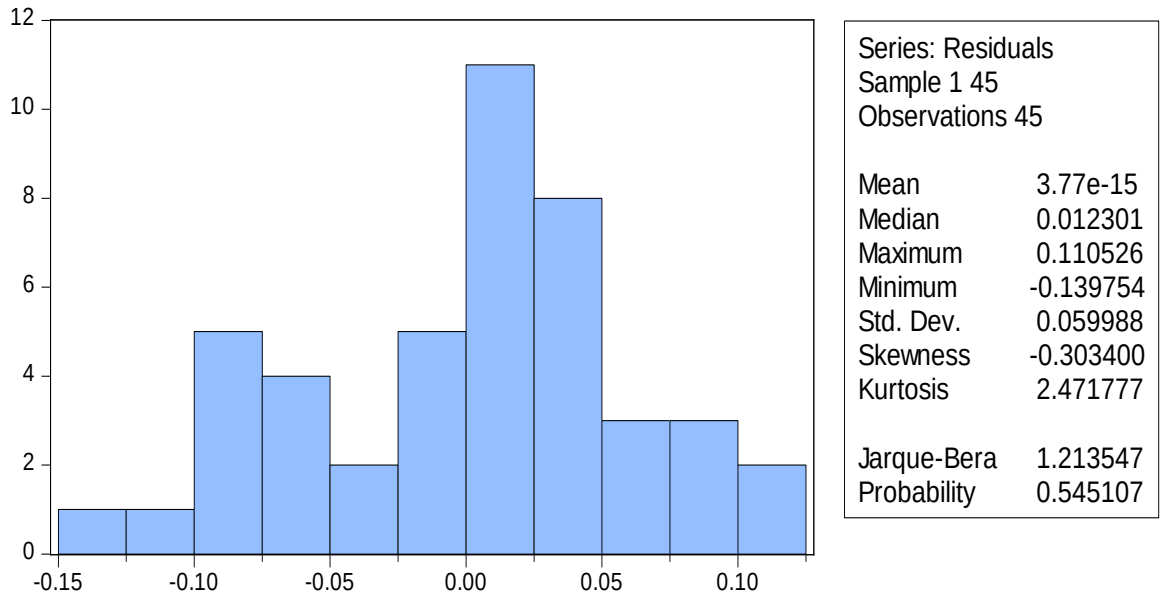

Figure 1: Graph Normality Test Results

Based on Figure 1 shows that the value of JB's equation models were observed to have significant value 1.213 above 0,05, thus, it can be concluded that the model equations were observed to have normal distribution.

2. Multicoloniarity

Multicoloniarity is a situation where one or more independent variables can be expressed as a linear combination of other free variable. As a result of this kind of relationship can be perfect or imperfect, i.e. by correlating between the explanatory variables, when the correlation is large then it showed signs of multicoloniarity.

To determine whether there is multicoloniarity or not, then this research used the method which proposed by Klein L.R. Klein. This method compares r2 Xi, Xj (correlation between each independent variable) with a value R2y Xi, Xj, ..., Xn (coefficient) of the results of OLS regression models.

The provisions used to determine the presence or absence of multicoloniarity is; if R2y Xi, Xj, ..., Xn> r2 Xi, Xj then there is no problem multicoloniarity. If all the coefficient of determination from a simple regression model between the independent variable values is smaller than the coefficient of determination of the OLS model, then it means there is no problem with multicollinearity in the use of estimation OLS model. The test results multicollinearity can be seen below:

Table 5: Klein Test Results

	Nilai R-square	**Keterangan**
R^2y	0.978462	
r^2x_1	0.825918	$R^2y > r^2x_1$
r^2x_2	0.818911	$R^2y > r^2x_2$
r^2x_3	0.859422	$R^2y > r^2x_3$
r^2x_4	0.812302	$R^2y > r^2x_4$
r^2x_5	0.832219	$R^2y > r^2x_5$
r^2x_6	0.693682	$R^2y > r^2x_6$
r^2D_1	0.620775	$R^2y > r^2D_1$
r^2D_2	0.389807	$R^2y > r^2D_2$

Source: Primary Data Analysis, 2016

3. Heterokedasticity Test (White Test)

A good regression model is not going on heteroskedasticity. To determine whether there is heteroskedasticity situation or not, it can be seen in the value of the coefficient $\alpha 2$ above.

If the value of the coefficient $\alpha 2$ is not significant (t <t-table), then H0 Ha accepted or rejected in other words indicating the absence heteroskedasticity, otherwise if H0 or Ha accepted, it showed heteroskedasticity.

Table 6: Heteroskedasticity Method Test Results: White Test

Heteroskedasticity Test: White			
F-statistic	2.845834	Prob. F(42,2)	0.2942
Obs*R-squared	44.25941	Prob. Chi-Square(42)	0.3765
Scaled explained SS	20.84479	Prob. Chi-Square(42)	0.9974
Test Equation:			
Dependent Variable: RESID^2			
Method: Least Squares			
Date: 09/24/16 Time: 14:06			
Sample: 1 45			
Included observations: 45			
Collinear test regressors dropped from specification			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
P (Production)	-2.108785	0.722630	-2.918210	0.1001
LX1(Land area)	-0.617268	0.138238	-4.465260	0.0467
LX2 (Parents)	0.551361	0.407896	1.351719	0.3090
LX3 (Feed)	1.900035	0.411682	4.615303	0.0439
LX4 (Natural Feed)	0.361192	0.347608	1.039078	0.4079
LX5 (Labor)	-0.915684	0.388350	-2.357885	0.1424
LX6 (Experience Farmers)	0.452132	0.161361	2.801989	0.1073
D1^2 (Dummy Tehnologi)	-0.172269	0.169349	-1.017246	0.4161
D2^2 (Dummy Councelling)	-0.157284	0.078146	-2.012707	0.1818

R-squared	0.983542	Mean dependent var	0.003519
Adjusted R-squared	0.637935	S.D. dependent var	0.004317
S.E. of regression	0.002598	Akaike info criterion	-10.27092
Sum squared resid	1.35E-05	Schwarz criterion	-8.544552
Log likelihood	274.0957	Hannan-Quinn criter.	-9.627346
F-statistic	2.845834	Durbin-Watson stat	2.548327
Prob(F-statistic)	0.294242		

Source: Primary Data Analysis, 2016

According to the Table 6, it shows that the value prob. (Chi-square) to the model equations was observed to have significant value above 0:05 (0.3765) thus can be concluded that the model equations were observed to walk away from heterokedasticity.

4. Autocorrelation Test

Autocorrelation is the correlation between the variables error with another error variables. Autocorrelation often occurs in time series data and it can occur in cross section, but rarely. For the impact of their autocorrelation in the regression model is same as the impact of heteroskedasticity described above, the OLS estimators although still linear and unbiased, but it no longer has the minimum variance and standard error calculation methods that leads OLS truth cannot be trusted. Autocorrelation test results with E views device obtained the following results:

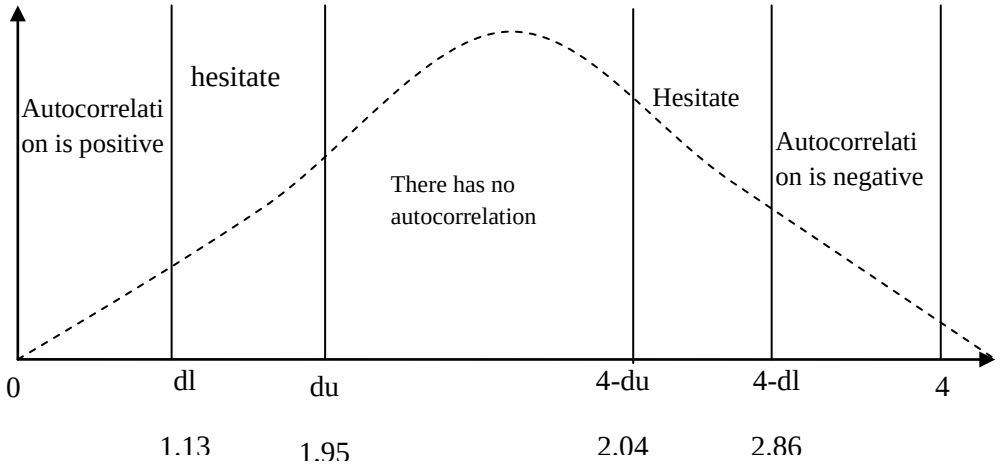

Figure 2: The test results obtained value of D-W test amounted to 2.023207 in the area du <d <4 - du, the empirical models are not affected by autocorrelation.

5. Discusion

The use of factors of production in African catfish hatcheries farming in Wonogiri greatly affects the African catfish seed production. As for the use of each production factors has very important role in increasing production. In the aquaculture business, the goal is to maximize profits. Gains in farming are closely related to production inputs and production factors. Factors of production known as inputs, production factors and costs production. Soekartawi in [17] showed that the factors of production as land, capital, feed, labor and management aspects are the most important factors of production among other factors.

5.1 Effect of Land against Fish Seed Production

The land area or pond is one of the critical success factors of the production of African catfish hatcheries in Wonogiri, there are several types of land owned by African catfish farmers, there are earthen, concrete or plastic taper rupiahs, and the extent of each land or the pool depends on the size of the land that used by each African catfish farmers. The smallest land area African catfish fish hatchery in Wonogiri district is 24 m2, while the largest land is 700 M2. In addition, to differ extents types of ponds used is also different, some a pool taper rupiahs or some concrete pool. Surely each catfish farmers deem themselves against this type of pond that used for African catfish hatcheries. Most pools are used by African catfish farmers in the districts of Wonogiri is a pool taper rupiahs.

Each type has advantages and disadvantages pools that very depending on the type of use. In this research, after using regression analysis of land (X1, it does not significantly affect African catfish seed production, the results of regression analysis showed a probability value of 0.1362.

Non Significant of land area factor is influenced by several factors including the use of more intensive farming systems, appropriate parent management and technical management of production which has been controlled by catfish farmers. Helfrich and Libey in [7] the use of the system hatchery closed with a recirculation system that has several advantages, namely: water use per unit of time that is relatively low, in the flexibility cultivation location, cultivation system that is controlled and more hygienic, it needs for space / land which is relatively small, easily control, maintain, and for maintaining the temperature and water quality.

The use of mating injection system (induced breeding) is very helpful in increasing the fertility of fish eggs on African catfish. Parent fish were injected with pituitary hormones, LH-RH hormone injections can increase or enhance the gonadotropin hormone concentrations in the blood so as to induce the development of eggs in spawning. This proves that the intra muscular injection ova prim on African catfish parent in that mature gonads can stimulate ovulation. Some African catfish farmers in Wonogiri district have implemented intensive management in order to produce high quality seed. So that the effect of land area may be omitted if the fish farmers have mastered the technical management to produce seeds in quantity and quality maintained.

5.2 The number of Broodstock

Each African catfish fish farmers in Wonogiri district has a number of different aircraft, resulting in an activity seeding aircraft used is also different. The regression analysis using mains (X2) indicates that the use of the mother affects the African catfish fish seed production with a probability value of 0.0000 and coefisien value of 0.3126. This means if there are additional parent as much as 1% will boost seed production as much as 0.3126%. Besides the quality factor of the parent and the season also affects the increase in seed production. One of the major limiting factor in the development of catfish on a mass scale is the parent spawning frequency is low, the quality and quantity of the parent mature gonads are limited so that the seeds produced are not sustainable. Main frequency of low spawning catfish, generally spawn in the rainy season so that the outside of the spawning season (dry season), this fish is difficult spawn, (Adebayo and Fagbenro, 2004). In addition to the number of parent breeders should be noted, Bramasta in [4] that the parent catfish mature gonads have a bulging stomach conditions, they will feel soft when they touched, the parent will look slow movement, body color a bit darker (females). Ideal posture between the length and weight, agile movement, and the body tends to bright colors or bright. Treatment of broodstock catfish also affect the quality of seeds produced.

5.3 Feed

Feed is a factor of production whose value reached 60% of total production costs [10]. Therefore, the use of feed on larval rearing must be considered in the quantity and quality feed. Regression analysis feed use (X3) shows very influential on African catfish seed production, with a probability value of 0.000 with a coefficient of 0.3883, this means each additional 1% independent variable feed will increase African catfish seed production

as much as 0 , 3883%. Feed also determine the costs to be incurred by the African catfish farmers, feed efficiency also showed a value above 1, it means approximately 2,070 use of feed is inefficient. Anggraini and Abdulgani in [3] growth is closely related to the availability of fish protein in the diet, because protein is a source of energy for fish and protein is a nutrient that is needed for growing fish. The level of protein in the diet is influenced by the content of non-protein energy is derived from carbohydrates and fats. Feed here is food made from a mixture of natural materials and processed materials that are subsequently be processed and prepared in a particular form so to create the appeal (stimulate) the fish to eat with ease and gusto. Feed pellets used flour containing 40% protein, 5% fat, and 30% carbohydrate.

5.4 Feed Natural

The use of natural feed silk worms in this case is one of the factors of production which are very important because natural food is the beginning of the larvae after egg yolk content of larvae have been exhausted. Usually the use of natural feed (silk worm) is given after the larvae 4-7 days old. The regression analysis showed the use of natural feed (X4) greatly affects the production of African catfish seed with a probability value of 0.0016 and the regression coefficient value of 0.3049. This means if there is additional 1% of natural feed will increase seed production of catfish as much as 0.3049%. Natural feed silk worms are most preferred by freshwater fish. Silk worms are very good for the growth of freshwater fish because of its high protein content. The nutritional content of silk worms is 54.725% protein, fat 13.770%, and 22.250% carbohydrate [5].

5.5 Labor

The use of the labor factor in African catfish hatchery operations is not as much as in other farming, use of labor is only a certain time so that the costs used are also not great. The regression results labor (X5) indicates very influential on African catfish seed production, with a probability value coefficient of 0.0136 and 0.1360. This means each additional 1% of the workforce will increase 0.1360% African catfish seed production. The labor need in African catfish hatchery operations in Wonogiri district heavily influenced by the extensive effort catfish farmer. Labor requirements need for fish hatchery operations is much needed at the time of sorting seeds at harvest catfish because it requires a rapid handling the needs of the labor is needed.

5.6 Farmers' Experience

Each farmers have a different experience, the average experience of African catfish farmers in Wonogiri district for 4.7 years, statistically experience farmer (X6) has no positive effect on the production of African catfish seed with a probability value of 0, 6591. The development of information technology makes fish farmers African catfish in the district of Wonogiri getting smarter in absorbing knowledge hatchery fish, especially with the internet, so that farmers can absorb available information directly, other than that their catfish fellow farmers communication make farmers more intelligent in exchanging experiences with fellow farmers horizontally. Munir in [11] describes these developments as a revolution that is taking the place in three waves, namely, the first wave with the advent of technology in agriculture, the second wave with the emergence of the technology industry and the third wave with the advent of information technology that encourage communication.

5.7 Technology Usage

Parameters the use of technology (D1) turned out to be statistically significant variable affecting the African catfish larva production in Wonogiri with a probability value of 0.0018 and the coefficient value of 0.1087. This means the input technology (induced breeding) by African catfish farmers are very influential on larva production. In this study of 45 African catfish fish farmers 20 people are already utilizing injection technology to stimulate spawning broodstock African catfish. This is in accordance with the opinion of Woynarofic and Horvard in [23] African catfish fish farming activities, availability of seed in sufficient quality and quantity is an essential factor that determines the success of a business. To obtain good quality seed in sufficient quantities and sustainable, through the hatchery must be controlled by performing the artificial spawning (induced breeding), followed by artificial insemination (artificial fertilization). Spawning fish can be accelerated by manipulating existing conditions, for example by providing stimulation of the pituitary gland or hormone can use ovaprim which is injected in the body.

5.8 Counseling

Counseling is an activity undertaken by government agencies and private (non-extension) which aims to improve the quality and quantity of fish farmers to produce fish seeds of African catfish in Wonogiri. Counseling is done routinely and periodically, but with the number and spacing varying not all fish farmers African catfish get counseling. From the regression results are statistically counseling (D2) that affect the production of African catfish seed in Wonogiri with a probability value of 0.0328 and a coefficient of 0.0585. The extension factors is very real impact on the increased production of fish fingerlings of African catfish. Besides almost half over African catfish farmers in Wonogiri district are already getting counseling from relevant agencies especially the Animal Husbandry, Fisheries and Marine Department in Wonogiri. The principles of counseling and related concepts are generally applicable in the fisheries extension. However, differences in how farmers and fishermen to manage natural resources, demanding difference extension approaches for both the community groups [11]. Participatory implications approach in extension activities which based on the specific conditions of the region. Benchmark for the success of fisheries extension include capacity building of individuals/groups /communities managing fishing activities in the utilization of fishery resources; entrepreneurial skills, household income increases; social structure and social capital gained; and management and it is used appropriately and responsibly.

5.9 Elasticity Production

Elasticity of production is the degree sensitivity production which is mirrored by their percentage of the product for additional input additional one percent. From the results of the regression analysis, the use of factors production in African catfish hatcheries in Wonogiri shown multiple linear regression model with a logarithmic function as follows:

$$\mathbf{Ln\ P = 7.472 - 0.047LnX_1 + 0.312LnX_2 + 0.388LnX_3 + 0.304LnX_4 + 0.136LnX_5 + 0.016LnX_6 + 0.108LnD_1 + 0.058LnD_2}$$

Analysis of Cobb-Douglass production function used to determine the effect of factors production usage, through the process of transformation into a natural logarithm in a multiple linear regression equation.

In the calculation of the production function, this study has defined as the dependent variable seed productions while the factors of production as independent variables. Efficient use of production factors is approached with the elasticity indicated by the exponent (rank) of a factor of production in the Cobb-Douglass. All factors of production in catfish farmers (food, natural food, hours of work, farmer experience, technology of cultivation and extension) is positive except for the input area of land that is negative, this means production factors is elastic. Factors of production land area is negative (-0.0472) not elastic.

The elasticity of each factor of production as follows: The land area (-0.0472), breeders (0,312) feed (0,388), natural feed (0.304), working hours (0.136), farmers experience (0,016), technology (0.108) and extension (.058). Therefore, it can further state that the other factors of production equipment (ceteris paribus) are:

1. If the average feed increased 1% (0.411), then the seed production increased by 0,388% (131.55).
2. If the average natural food increased 1% (0.45) then the seed production increased by 0.304% (103.068).
3. If the average hours of work plus 1% (0.1036) then the seed production increased by 0.136% (46.10).

5.10 Efficiency Production Analysis

Conditions of price efficiency is achieved when the marginal product value equal to the purchase price Xi Xi. Analysis of efficiency production economically performed using the indicator ratio value of marginal product (NPM) with respective prices of factors of production equally. If the ratio is not as great value (equal to one), the farming takes place is not efficient. Measurement of the efficiency of production by using the production function is a measure which produces an absolute value (absolute) either greater than or less than the worth of production efficiency is not economical. From the results of the regression analysis Cobb-Douglas and Marginal Product Value calculation can be obtained from the data in Table as follows:

Table 7: Marginal Product Value Ratio (NPM) with Factor Prices (HFP) on African catfish Hatchery in Wonogiri

Production Factors	*HFP*	*NPM*	*NPM/HFP*	*Information*
Feed	698.889	1.447.023	2,070	yet efficient
Natural Feed	408.867	1.133.750	2,772	yet efficient
Labor	101.556	507.204	4,992	yet efficient

Source: Primary Data Analysis, 2016

The results of calculation of price efficiency (allocative) in Table 5 all factors of production (feed, natural feed, labor) indicate inefficient greater than 1 means the use of the three factors above is less then it needs to be added so that the product can be optimized. Based on the results of the condition assessment of the level of production

efficiency yet achieved the above it can be concluded that the circumstances of the production efficiency of African catfish hatchery operations in Wonogiri district is not reached the maximum profit. This is similar to the research conducted in [6] that the level of efficiency production costs (efficiency prices) on the business of enlarging catfish has not reached the maximum, it is indicated on the ratio of the value of the marginal product of each factor of production (NPMXi) with the value of each input prices (PXI) nothing is equal to one.

6. Conclusion

Based on the research, the factors that influence African catfish seed productions in Wonogiri and after doing the analysis, it can be concluded as follows:

a. Revenue of African catfish farmers in Wonogiri district in the research was an average of 2,369,533, - rupiahs per cycle.
b. R / C ratio of 2.67 was obtained, this means African catfish hatcheries feasible to be developed due to the value of R / C ratio greater than 1.
c. Almost all independent variables is elastic, except for the variable area of land is inelastic. It is shown that positive regression coefficients were negative except the land.
d. Production efficiency variable feed, natural feed and labor has a value above 1 each variable feed = 2.07, 2.77 variable natural feed and variable workforce of 4.999 indicates that the variable is not efficient so it needs to be added in order to optimize production.
e. Regression analysis showed that variable land area (X1) and farmers' experience (X6) did not significantly affect seed production of catfish while the other variable number of sires (X2), feed (X3), natural feed (X4), labor (X5) , hatchery technology (D1) and extension (D2) significantly affect the African catfish seed production with a probability value of less than 0.05 at α 5%.

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