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Income Factors Determinant of Livestock Cattle Programs Special of Multiple Cow Funds in Malang District, East Java Province

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Abstract

Beef cattle business in Indonesia is traditional and small-scale so that its productivity is relatively low. Solutions by government include improving reproductive performance through Special Efforts for Obligatory Bovine Cattle (Upsus Siwab = upaya khusus sapi indukan wajib bunting). The aims of study were to analyze income factors for beef cattle farmers in program participants in Malang Regency. This study was conducted in nine districts (Donomulyo, Kalipare, Pagak, Bantur, Gedangan, Poncokusumo, Wajak, Turen and Singosari) by selecting ten respondents for each district. Data were analyzed using multiple regression models. Research results showed that Upsus Siwab program had an impact on beef cattle productivity with an increase in quantity of beef cattle produced by artificial insemination in 2017 by 1.21%. This program also had an impact on increasing farmers' income in program participants, amounting to IDR 206,300 per year. Determining factors for farmers' income were livestock ownership, medicines cost, and reproduction cost.

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Introduction

Current demand for livestock products continues to increase along with growth in population, as well as increasing public knowledge about the need for quality and nutritious food. Livestock sector in Indonesia is generally small scale. Nevertheless, according to Pudjiastuti (2015), small businesses in agriculture still play an important role in the national economy. On the other hand, livestock sector has not been able to provide meat products to meet consumer and industrial demand, thus resulting in greater dependence on imports. According to Pudjiastuti et al. (2013); Pudjiastuti (2014); Pudjiastuti and Kembauw (2018), import dependence on beef can have a negative impact on performance of national economy, both directly and indirectly related.

Beef self-sufficiency is an ability to supply locally produced meat of 90-95% of total domestic demand, so that imports of feeder cattle and meat are expected to be only around 5% (Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2010). In order to realize self-sufficiency of meat, government issued a policy of Special Efforts for Obligatory Cattle (Upsus Siwab) as a means of preparing and increasing production of cattle and buffalo to fullfil demand of meat in Indonesia.

Upsus Siwab program applies nationally so that participation of every farmer throughout Indonesia can contribute to supply of meat supplies as a whole. Upsus Siwab includes two main programs namely increasing population through free artificial insemination and intensification of natural marriage. Target of Upsus Siwab program is to maximize potential of domestic brooders to continue produce calves by increasing production through artificial insemination. Target of cattle production is achieved through implementation of four million acceptor and buffalo marriage services for the 2017 period and pregnancy of three million cattle/buffalo. This program has been able to increase beef cattle population in Malang Regency in 2013-2017 as shown in Table 1.

Table 1. Beef Cattle Population in Malang Regency, 2013-2017

Year	Population (cow)	Growth (%)
2013	189.145	-
2014	199.453	5,45
2015	212.821	6,70
2016	223.717	5,12
2017	234.481	4,81

Source: Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2018

In addition to government programs, there are many factors that affect to farmer income, including age, education, number of livestock ownership, number of family members, livestock experience, cost of forage, concentrate, medicine and reproduction.

Research Method

Research Location

This research was conducted in Malang Regency which consisted of nine sub-district: Donomulyo, Kalipare, Pagak, Bantur, Gedangan, Poncokusumo, Wajak, Turen and Singosari. Determination of this location was based on population of beef cattle above 10,000 unit (Annual Report of Malang Regency Animal Husbandry and Animal Health Service, 2010).

Sampling Method

Population was all farmers in Malang Regency. Sample was determined by simple random sampling (Yossie, 2012). Sample was set proportionally to 10 farmers in each district, so that the total sample was 90 farmers.

Data analysis

Primary data collected through interviews with respondents and qualitative in nature are directly described (Yumiati, 2012). Primary data that are quantitative in nature are used to analyze determinants of farmer income using multiple regression analysis models. The regression model is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_{9\,+}e \qquad (1)$$

Where:
Y = Revenue
$X1$ = Age of farmers (years)
$X2$ = Education
$X3$ = Livestock ownership (unit)
$X4$ = Family members (person)
$X5$ = Farmer experience (years)
$X6$ = Concentrate feed cost
$X7$ = Forage cost
$X8$ = Medicine cost
$X9$ = Reproduction cost
a = Regression constant
b = Regression coefficient
e = Standard error

Before data was collected, a validity and reliability test was performed so that questionnaire was feasible to use to obtain valid and reliable data. The next step was to test the classic assumptions of normality, multicollinearity and heteroscedasticity. If the model is BLUE, then it is followed by multiple linear regression analysis. Regression models are considered appropriate when the coefficient of determination approaches one,

the greater the value, the more appropriate the model. Furthermore, an F test or a simultaneous test of determinants (X_1-X_9) on farmers' income (Y) is carried out. If this test results in conclusion that determinants have simultaneous effects on farmers' income, then it is continued with t test. The last test will identify determinants that have a partially significant effect on farmers' income and what can be suggested to related parties (farmers, the government, and other parties).

Results and Discussions

Characteristics of Beef Cattle Farmers in Malang Regency

Beef cattle farmers in Malang Regency have different characteristics according to age, education, livestock ownership, family members and breeding experience (Table 2). This parameter will determine how farmer adopts innovation and implements it so that his business can continue for welfare of his family.

Most of farmers (94%) were in productive age (15-64 years). However, no farmer has ever gone to college. All of farmers (100%) have elementary - high school education. Most of farmers (70%) have more than seven beef cattle. This is caused by the amount of family responsibility of each farmer who generally (94%) more than three people. Experience of raising livestock for almost ten years has made them understand how to raise beef cattle properly. It is a social capital for farmers for implementation Upsus Siwab policy, making it easier for government to implement the program.

Table 2. Characteristics of Beef Cattle Farmers in Malang Regency

Characteristics	Quantity (person)	Percentage (%)
Age (year)		
0 - 14	0	0
15 - 64	85	94.4
> 65	5	5.56
Education		
No Education	4	4.44
Elementary School	48	53.33
Junior High School	26	28.89
Senior High School	12	13.33
Livestock Ownership (cows)		
1 – 3	15	16.70
4 – 6	12	13.30
> 7	63	70.00
Family members		
1 – 2	5	5.60
3 – 4	52	57.80
> 5	33	36.70
Farmers' experience		
1 – 5	54	60.00
6 – 10	29	32.20
> 11	7	7.78

Source: Primary Data 2018, processed

Education can influence knowledge of farmers, therefore it was necessary for field technical personnel, especially extension workers from related agencies in the area to socialize benefits of a new program or policy, with the aim of increasing knowledge and insights of farmers about the program in relation to increase productivity of their livestock businesses which in turn can increase their income.

The long experience of farmer gives an indication that knowledge and skills of farmers on beef cattle farm management is quite good.

Implementation of Siwab Upsus Program in Malang Regency

Government attention to beef cattle farming tends to increase along with in demand for beef. Various policies and programs related to development of beef cattle business have been launched and implemented, both nationally and at regional level.

During 2017 there were 79,665 acceptors of artificial insemination services, 12,217 pregnancy checkers and 61,947 births. Pregnancy testing is carried out by veterinary technical officers on animals with reproductive disorders. Reproductive disorders generally occur in cattle after parturition or insemination or mating repeatedly without conception.

Results of the study showed number of recurrent mating events in Malang Regency were 12,217 cases with 9.98% of productive totaling 122,397 female cows. The results were lower than a study by Yusuf et al., (2012), that incidence of repeated marriages in the tropics could reach 62%.

Current government policy and program is UPSUS SIWAB. This program aims to accelerate beef cattle populations by providing free artificial insemination (IB = inseminasi buatan) services, by distributing frozen semen to local governments. In addition, IB inseminators are given incentives by central government, so inseminators are not justified in asking wages to farmers for IB services provided.

In addition to free IB services, government also provides assistance: feed and medicines as a support for accelerating population of cattle. It is expected that increase in cattle population, farmers will have no difficulty in meeting their animal feed. Medicine and vaccine support is also very much needed for the success of Upsus Siwab program. Given these medicines, mortality rate of cows and calves can be reduced.

Determinants of Beef Cattle Farmer Income in Malang Regency

Data analysis was started by validity and reliability test so that data collected using a questionnaire was also valid and reliable. Next step was to test classical assumptions, F test and t test. Stages were carried out to find out what factors determine farmer' income in Malang Regency.

Test Validity and Reliability

Validity test is used to measure validity of a questionnaire. A questionnaire is said to be valid if it is able to express something that will be measured by the instrument. Validity

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test uses product moment correlation statistics. Given confidence level of 90% ($\alpha = 0.05$) and 90 respondents, so r table at df = 90 is 0.2050. The results of validity test are presented in Table 3.

Based on Table 3, it can be seen that all variable were valid (r statistic > r table). Thus, factors affecting farmer' income in Malang Regency were valid. The implication is, all questions in questionnaire were able to measure farmers' income in Malang Regency.

Table 3. Results of Validity Test

No	Variable	r $_{statistic}$	r $_{table}$	Justify
1	Age	0,209		Valid
2	Education	0,218		Valid
3	Cow quantity	0,520		Valid
4	Family member	0,272		Valid
5	Farmer' experience	0,458	0,2050	Valid
6	Concentrate feed cost	0,230		Valid
7	Forage cost	0,230		Valid
8	Medicinecost	0,337		Valid
9	Reproduction cost	0,520		Valid

Source: Primary Data 2018, processed

Variable X has a Cronbach alpha of 0.642 meaning that all questions presented in indicator (X) were reliable.

Classic assumption test

Multiple linear regression model used satisfies classical assumption that is data normality, does not occur multicollinearity and heteroscedasticity (Table 4). Data were normally distributed because Asymp Sig value was 0.873 (greater than 0.05), multicollinearity does not occur because tolerance value greater than 0.10 and VIF value smaller than 10. In addition, heteroscedasticity also does not occur because Sig value greater than 0.05.

Table 4. Classic Assumption Test

Variable	Tolerance	VIF	Sig
Age	0.791	1.265	0,509
Education	0.545	1.836	0,975
Cow quantity	0.266	3.766	0,348
Family members	0.386	2.594	0,073
Farmer' experience	0.366	2.730	0,643
Consentrate feed cost	0.102	8.362	0,566
Forage cost	0.201	9.705	0,352
Medicine cost	0.101	6.075	0,755
Reproduction cost	0.087	1.553	0,113
Asymp. Sig. (2-tailed) : 0.873			

Source: Primary Data 2018, processed

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Regression Analysis

Analysis of empirical data, starts from identifying the suitability of established regression model, testing simultaneous effect of determinants of farmers' income (F test) and continuing partial test (t test). The last test is intended to determine the variables that significantly influence business income.

Farmer' income in Malang Regency as dependent variable (Y), conceptually, was determined by age (X_1), education (X_2), farmer' experience (X_3), family member (X_4), livestock ownership (X_5), concentrate cost (X_6), forage costs (X_7), drug costs (X8) and reproduction costs (X9). Multiple linear regression model used was appropriate to analyze the determinants of beef cattle farmers' income in Malang Regency because determination coefficient obtained was 0.73 (Table 5). This means that age, education level, duration of breeding, number of family dependents, number of livestock, concentrate costs, forage costs, medicine costs and reproductive costs contribute 73% to farmers' income in Malang Regency.

Simultaneously, age, education, farmer experience, family members, livestock ownership, concentrate feed costs, forage cost, medicine costs and reproduction costs have an effect on farmer' income. The indicator was sig. F = 0,000 (Table 5). Therefore, test can be continued with a partial test (t-test) to find out which variables significantly influence farmer' income.

Table 5. Regression Analysis Results of Determinants Farmer Income in Malang Regency

Model	Unstandardized Coefficients		Sig.	Justify
	B	Std. Error		
(Constant)	52435537	237094710.55	.030	
Age (X_1)	-682811	259454.47	.070	Significant (*)
Education (X_2)	5679426	3347051.97	.093	Significant (*)
Family members (X_3)	-273661	1981529.85	.890	No significant
Farmer' experience (X_4)	8377	197273.50	.966	No significant
Livestock ownership (X_5)	10679426	3347051.97	.010	Highly significant (**)
Consentrate feed cost (X_6)	-2100	2.79	.900	No significant
Forage cost (X_7)	9426	51.97	.893	No significant
Medicine cost (X_8)	1722811	259454.47	.030	Highly significant (**)
Reproduction cost (X_9)	1503661	1981529.85	.000	Sangat signifikan (**)
R^2 : 0.730				
F Statistik : 10.434				
Sig. F : 0.000				
Dependen Variable : Farmer' income (Y)				

Source: Primary Data 2018, processed

Based on the analysis of multiple linear regression models, influence of age (X_1), education (X_2), farmer experience (X_3), family members (X_4), livestock ownership (X_5),

concentrate feed costs (X_6), forage costs (X_7), medicine costs (X_8) and reproduction costs (X_9) towards farmer income (Y) are formulated as follows:

$$Y = 52435537 - 682811X_1^* + 5679426X_2^* - 273661X_3 + 8377X_4 + 10679426X_5^{**} - 2100X_6 + 9426X_7 + 1722811X_8^{**} + 1503661X_9^{**} \quad (2)$$

Partially, there are three variables, which were highly significant (sig. <5%) determining income of farmers in Malang Regency: livestock ownership (X_5), medicine costs (X_8) and reproduction costs (X_9). Farmers' incomes will increase if farmers are willing to increase the number of livestock, medicine use and reproductive costs. The indicators were: regression coefficients of variables were positive, respectively 10679426, 1722811 and 1503661. These findings are consistent with the results of Indrayani and Andri's research (2018) where business costs of beef cattle, livestock ownership, and the system raising cattle has a significant effect on farmer's income.

While the other variables: age (X_1) and education level (X_2) have a significant effect (sig. <10%) on farmers' income. Interestingly, this variable gives a different effect, which was indicated by negative regression coefficient for the first, while positive for the second. The higher age of farmers, the lower their income. This shows that there was an age limit for productive farmers in managing this business in order to maximize their income. Education has a positive effect, meaning that the higher education, the higher their income. This finding shows importance of farmer education in managing the business. This condition is different from the results of previous studies which found that education is not required in the business of agriculture, including animal husbandry. Along with development of science and technology, especially towards industrial era 4.0, education for all human resources is very important for businesses in all sectors without exception. This finding was different from research results by Aiba et al. (2018) that age and education had no significant effect on farmers' income in South Weda District, South Central Halmahera Regency.

Four factors: family members, farmers' experience, concentrate feed cost and forage costs did not significantly influence to farmers' income. This is different from research findings by Antwi et al. (2017). Although not significant, concentrate feed cost indicates excessive use of the concentrate because costs addition of this factor will actually reduce farmer's income.

Conclusion

Implementation of Upsus Siwab in Malang Regency has succeeded in increasing the incidence of recurrent marriage by 9.98%. In addition to free IB services, government also provides assistance in feed and medicines as a support for accelerating population of cattle. It is expected that increasing population of cattle, farmers will not be difficult in meeting animal feed. Medicine and vaccine support was also very much needed for the success of Upsus Siwab program. This medical aid will reduce mortality rate of cows and calves.

Simultaneously, age, education, farmer experience, family members, livestock ownership, concentrate feed costs, forage cost, medicine costs and reproduction costs have an effect on farmers' income.

Partially, there were highly significant variables (sig. < 5%) determining farmer income in Malang Regency: livestock ownership, medicine costs and reproduction costs. While variables: age and education have a significant effect (sig. < 10%) on farmers' income. Other factors: family members, farmer experience, concentrate feed cost and forage costs did not significantly influence income of farmers.

Government can continue to implement Upsus Siwab policy because it will be able to increase beef cattle population. The low percentage of research results because of the program is relatively new. Therefore, it is necessary to re-evaluate this program in the future, maybe every five years.

Farmers in Malang Regency need to pay attention to five determinants of their income from the business: livestock ownership, medicine costs, reproductive costs, age and education. All factors that have significant influence need to be increased so that their income increases, except for age which has a certain limit to be able to optimize income.

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