The Characteristics of Cattle Farmer Households and the Income of Cattle Farming Businesses in East Java

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Abstract: East Java has lowlands and uplands with farming areas potential in producing agricultural wastes that can be utilized to improve animal production. This has created opportunity for farmers to improve their cattle farming businesses and their incomes. The aims of this study were (1) to get the characteristic description of cattle farmer households in different land types in East Java, (2) to analyze factors affecting the income of cattle farmer households. A multiple regression by using a SAS software was used for this analysis. Results showed that income of cattle farmer households was affected by number of cattle owned, cow ownership status, and farming location. Meanwhile, total household income was affected by length of education, number of cattle owned, number of working forces in household, cow ownership status, and farming location. It was implied from the study that farmers raise their cattle for longer time in order to gain higher selling prices and that government provide assistance for farmers in form of cow grant in order to improve farmers' cattle ownership and incomes.
Keywords: cattle farmer household characteristic, income, regression, beef cattle production

I. Introduction

Animal farming business is a significant part in the agricultural sector development in East Java. Animal farming-based economic activity is considered to have a promising prospect in the future. East Java is a potential province for the development of beef cattle industry as it has potential resources including land availability, feed, animal population, human resources, and demand of animal products. Demands of beef come from both local and inter-island markets.

Geographically, East Java region consists of lowlands and uplands with vast agricultural areas which are highly potential for the production of agricultural wastes that can be utilized as feeds in animal production. East Java has irrigated paddy fields in which farmers can have two to three rice planting seasons a year. In addition to irrigated areas, this province also has dry lands which are potential for the development of beef cattle production. Vast dry lands are potential source of agricultural wastes. Therefore, it can be said that East Java Province is the national source of both agricultural and animal products. This has brought positive impacts on the development of beef cattle farming in this province. Beef cattle farming business provides people in rural areas with business opportunity and additional income. Most beef cattle in Indonesia are reared traditionally in rural areas. The main problem hampering the productivity of beef cattle includes the socio-economic condition of farmers who are mostly low educated and lacking in capital. This condition was found to give significant effects on the animal rearing patterns.

The most common rearing pattern is cow-calf production and there are only few farmers who focus on beef cattle fattening as this it is considered a capital intensive business (Yusdja et al., 2003). Efforts to improve cattle production have been done through the improvement of animal population by crossbreeding local cattle with imported breeds. However, this program is done without any appropriate genetic selection process.

In an animal farming business, rearing location is one of the main things that should be considered in order for the business to operate effectively and efficiently. Cow-calf program or a cattle farming business to produce calves ready for fattening is commonly done in lowland areas with relatively insufficient grass and forage availability while cattle fattening program is usually done in upland areas with relatively plenty feed supply. Probolinggo and Pasuruan regions are lowlands with relatively insufficient feed supply but they have abundant agricultural biomass especially during harvesting season. Malang, on the other hand, is a upland with relatively sufficient feed supply. In order to produce calves with excellent body weight and health, cows need enough amount of good quality feed during their gestation period (Hadi and Ilham, 2002). Rearing location with adequate feed supply for cattle production and reproduction requirements will bring benefits to the development of cattle farming businesses and increase farmers' incomes.

Farmers' income is affected by not only input costs but also socio-economic factors including age, education, number of cattle owned, number of workforce in household, cow ownership status, and farming location. Therefore, the aims of this study were to (1) obtain the general description of cattle farmer households

in East Java based on agroecosystem regions and (2) analyze factors affecting the income of beef cattle farmer households.

II. Methodology

2.1. Site Of The Study

The study was conducted in Probolinggo and Malang Regency, East Java. Data were obtained by interviewing farmers owning cows of Peranakan Ongole (PO) breed. The interview was done by using questionnaires.

2.2. Sampling Method

Regencies, districts, and villages where samples were taken from were determined by using a purposive sampling method based on the criteria that the regions were centers of PO cattle production and had access to artificial insemination (AI) technology. Samples were beef cattle farmers who had been running their cattle farming for >2 years, had at least 1 cow which had ever been mated and had calved, and had ever sold calves. The cow reared should be of PO breed inseminated with local or imported semen of superior bulls. Farmer respondent samples were taken by using a snowball sampling (based on information from farmers) adjusted to the aims.

2.3. Analysis Of Factors Affecting Beef Cattle Farmer Households' Income

Total income of farmer households comes from beef cattle farming business, crop farming business, other animal (goat and poultry) farming business, and non-farming business. Income in each business comes from revenue deducted by production costs. In order to analyze factors affecting beef cattle farmer households' income, the following multiple linear regression was used.

$$Y_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 D_1 + \alpha_6 D_2 + u$$

where :

Y_i	=	Household income (Rp)
X_1	=	Age of head of family (year)
X_2	=	Education length (year)
X_3	=	Number of cattle (head)
X_4	=	Number of workforce in household (person)
D_1	=	Dummy cow ownership status (1=personal ownership; 0=shared ownership)
D_2	=	Dummy land location (1=lowland; 0=upland)
i	=	sample farmer (i = 1, 2, ...,n)
α	=	parameter to be estimated

III. Result And Discussion

3.1. Characteristics Of Beef Cattle Farmer Households

Age is an indicator of success in business meaning that younger or productive age can push farmers to have optimal efforts to gain higher results and profit and to be more responsive toward changes. In Probolinggo Regency, the average age of farmers representing lowlands (48 years) was younger than that (50 years) of farmers in uplands. Age range of 41-50 years shared the highest percentage followed by the age range of 51-60 years in both lowlands and uplands (Table 1).

Farmers obtained their education through formal education and trainings or courses. In this study, only formal education was counted. Most head of farmer families had elementary school. It was found that 79.3% (lowlands) and 86.9% (uplands) farmers had 4-6 year elementary education. Only 2% farmers in lowlands and uplands had 10-12 year education. Higher education for younger farmers was expected to motivate older farmers to improve the way they run their cattle farming business by using optimal inputs. However, the change of higher educated farmers to work in agricultural sector including animal farming was getting less as many farmers preferred working outside agricultural sector and made animal farming only as their side business or a hobby.

Animal farming experience is the wisest teacher. Extensive farming experience helped them in accepting and choosing efficient technology they can use. It was found that on average farmers had 23 (uplands) and 19 (lowlands) years experience in beef cattle farming business.

3.2. Land Acquisition Sizes

On average, farmers in uplands acquired bigger size of land than their counterparts in lowlands did. The average size of land acquisition by respondent farmers is shown in Table 2. The lands acquired by these farmers included their own land and rent land in the forms of rice field, dry field, and yard. Dry fields rent by farmers in uplands consisted of land which belonged to other farmers or state land of which farmers had the

rights to use. Most dry field was used for sugarcane and woody crop plantation. In contrast, no rented dry field was found in lowlands.

Most respondents in lowlands used their land to grow cereals including rice, maize, soybean, and mung bean. Meanwhile, in addition to rice and maize, farmers in uplands used their lands to grow sugarcane, cassava, and woody crops.

3.3. Cattle Ownership And Reasons For Selling Cattle

On average, in their cow-calf farming program, respondent farmers owned 1-3 cows. It was found that in uplands most respondents (75%) had 1 cow and only a few had 2 (22%) and 3 (3%) cows. Meanwhile, in lowlands, cow ownership sizes were found to be 1 head (53%), 2 heads (41%), and 3 heads (6%). Total cattle ownership based on cattle age in the studied regions is shown in Table 3.

In general, in addition to their occupation as farm labor and seller, respondent farmers in lowlands made their cow-calf farming business as their fixed source of income. There were about 48% farmer respondents who used their rice and maize fields as source of income which was mostly used to fulfill their household needs. In uplands, there were 78% respondent farmers made their cattle farming as their side business in addition to their crop farming (rice, maize, cassava, and peanut) and plantation (sugarcane) business. About 22% respondents did not have any agricultural land to cultivate. Vast plantation land in uplands was one of the things affecting land availability that can be cultivated by farmers. Some respondent farmers in uplands also cultivated plantation land owned by the Navy.

A beef cattle farming for people in rural areas is considered as saving for the rainy days to fulfill the family needs. There were reasons found that made farmers sold their cattle as listed in Table 4. Most farmers sold their cattle for cash to fulfill the family needs for food, education, health, and also festivity cost. Some farmers even decided to sell all of their cattle for their family needs. These farmers then continued taking care of cattle belonging to others in a shared ownership scheme as they had very limited capital.

Farmers in lowlands sold their cattle in order to gain cash to buy rice field and pay their farming business costs including fertilizer and labor costs. This was the second most common reason (17%). There was only 3% farmers said that they used the money they got from selling their cattle to buy better cows as replacement. Meanwhile, in uplands, only 7.2% farmers sold their cattle in order to finance their plantation (sugarcane) business. The second most common reason (15.5%) they had for selling their cattle was to build and renovate their houses.

Buying motorcycles was found to be the third most common reason farmers in lowlands had for selling their cattle. Motorcycles were needed for the transport of their farm products and straws as their animal feed. The third most common reasons farmers in uplands had for selling their cattle were insufficient manpower to collect feed and take care of the animals, pay for their children' wedding, capital to start their children business, pay debts, and avoiding the death risk of their cattle which had ever been sick.

3.4. Description Of Occupation And Income Of Beef Cattle Farmer Households

Being farm labors was the main occupation farmers in lowlands had (52%) while for those in uplands selling their farm, crop, and animal products was their main occupation. The reason why being farm labors was found to be the most common occupation farmers in lowlands had was the fact that agricultural land acquisition by lowland farmers was smaller than that by upland farmers.

Household income is an important economic source to fulfill the needs. Income came from on farm activities (beef cattle farming, other animal farming, food crop farming, and plantation businesses), off farm activities (farm labor, agricultural land and equipment rent), and nonfarm activities (industrial- including home industrial-labor, seller, transport service, carpentry, trading, government/private employee, and transfer from family member). The structure of cattle farmer household income is shown in Table 5.

In both lowlands and uplands, 67-68% total farmer household income came from on farm activities. Off farm activities and nonfarm activities were found to give the smallest shares to total household income of farmers in lowlands and uplands, respectively. This finding was related to the notion that, in lowlands, work opportunity in agricultural sector was lower than in non agricultural sector. In contrast, vast agricultural and plantation areas in uplands had given more opportunity for farmers to work as labor in agricultural sector.

3.5. Factors Determining Income of Beef Cattle Farmer Households

It was shown in Table 6 that the age of the head of family did not affect the income level whether it was a beef cattle farmer household income, a farming business income, off farm business income, or total household income. This was not in line with what was stated by Shi et al. (2010) that age was an important variable affecting the income of poor households in rural areas. In this study, age was only found to give a significant effect on the adoption of technological practice. This finding was in line with the work of Ward et al. (2008) who found that younger age and higher education ensured more effective use of technology.

Length of education was found to give significant positive effects on non agricultural income (including incomes from being agricultural labor, construction worker, seller, fisherman, and driver) ($\alpha=0.01$) and on total household income ($\alpha=0.05$). These findings supported Aekaeili (2010) and Schwarze (2004) who found that the education level of household head played an important role on the improvement of household income. However, no effect of age was found on income of beef cattle farming and other animal farming. This indicated that cattle rearing did not need high education level. With the hope to get better income, educated people tended to seek for jobs outside the agricultural and animal husbandry sectors. It was found in the study site that most heads of family only had elementary school (SD) education.

Number of cattle owned was found to give highly significant effects ($\alpha=0.01$) on income of cattle farming business. This finding was in accordance with what was found in previous study in other animal by Triastono et al. (2013) who found that income increased as farmers had more animals.

In his study Aikaeli (2010) concluded that an increase in number of workforce resulted in increased household income. In this study, workforce in family was also found to give significant effects on farming business income, non farming business income, and total income but not on beef cattle farming business income. These findings showed that there was an increasing workforce outside beef cattle farming business. This had pushed households in rural areas to make the available labors more efficient. Then, it could be assumed that low beef cattle farming income had made households maximize their income by doing work activities in other sectors.

Cow ownership status significantly affected total household income ($\alpha=0.01$), beef cattle farming income, farming business income, and other animal farming business income ($\alpha=0.05$). However, the shared ownership system could still be done as a source of extra capital for people in rural areas as the system had been found to give significant contribution to the improvement of people prosperity.

Households in uplands had higher income level than those in lowlands. This was related to the higher labor wages in uplands. Vast agricultural areas needed more labors. When demands for labors were higher than labor supply, wages would become higher. This condition had become one of the factors that made different level of income in both upland and lowland areas. In addition, ages of cattle when it is sold and rearing and mating systems in both locations gave significant effects on the income of beef cattle farmer households.

IV. Tables

Table1. Number of Beef Cattle Farmers (Respondents) based on Age, Education, and Beef Cattle Farming Experience in East Java Province in 2013

Remark	Lowland		Upland	
	Number (persons)	(%)	Number (persons)	(%)
Age of Farmers (Years)				
20 – 30	7	7.6	7	7.1
31 – 40	15	16.3	19	19.2
41 – 50	37	40.2	34	34.3
51 – 60	19	20.7	19	19.2
> 60	14	15.2	20	20.2
Average age	92 (48)		99 (50)	
Education (Years)				
0 – 3	14	15.2	2	2.0
4 – 6	73	79.3	86	86.9
7 – 9	3	3.3	9	9.1
10-12	2	2.2	2	2.0
> 12	0	0	0	0.0
Average education	92 (5)		99 (6)	
Farming Business Experience (Years)				
2 – 10	27	29.3	25	25.3
11 – 20	28	30.4	21	21.2
21 – 30	21	22.8	23	23.2
31 – 40	11	12.0	20	20.2
> 40	5	5.4	10	10.1
Average experience	92 (19)		99 (23)	

Table2. Sizes of Rice Field, Dry Field, and Yard Land Acquisition by Beef Cattle Farmer Respondents

Land Acquisition	Lowland		Upland	
	Size (m2)	Average	Size (m2)	Average
Owned rice field	90 400	1 016	55 300	576
Rented rice field	16 700	190	3 125	33
Owned dry field	1 100	13	528 338	5 447
Rented dry field	0	0	153 100	1 612
Yard	5 497	62	185 433	1 912
Total rice field	107 100	1 203	58 425	602
Total dry field	1 100	12	681 438	7 025

Total owned land	96 997	1 090	769 071	7 929
Total rented land	16 700	188	156 225	1 611

Table3. Number of Beef Cattle Owned by Beef Cattle Farmer Respondents in 2013

Cattle Age	Lowland	%	Upland	%
Female calves	17	7.94	30	14.08
Male calves	24	11.21	17	7.98
Young female	17	7.94	22	10.33
Young male	6	2.80	13	6.10
Cows	145	67.76	127	59.62
Bulls	5	2.34	4	1.88

Table 4. Reasons for Beef Cattle Selling by Beef Cattle Farmer Respondents in East Java

	Lowland		Upland	
Reasons	Number of Respondents	%	Number of Respondents	%
Family needs of food, education, and health	52	58.4	54	55.7
Capital for production facilities and cattle regeneration	15	16.9	7	7.2
House building and renovation	6	6.7	15	15.5
Motorcycle buying	9	10.1	6	6.2
Unproductive/sick cattle	3	3.4	6	6.2
Others	4	4.5	9	9.3

Table5. Structure of Beef Cattle Farmer Household Income in East Java

	Lowland		Upland	
Sources of Income	Average (Rp/Year)	%	Average (Rp/Year)	%
On farm activities	7 812 762	67	11 392 334	68
Off farm activities	965 543	8	3 751 010	22
Nonfarm activities	2 885 109	25	1 719 798	10
Household (Rp/Year)	11 663 414		16 863 142	

Table 6. Estimate of factors affecting income of beef cattle farmer households in East Java Province

Remark	Beef cattle farmer income	
	Cattle farming business	Household
Intercept	885539	-1590171
	(0.45)	(0.24)
Age of family head	6717	-5756
	(0.30)[1]	(0.08)
Length of education	-8775	1009072[b]
	(0.06)	(2.00)
Number of cattle	1571665[a]	1280582[d]
	(6.08)	(1.48)
Workforces in family	-55656	2566279[a]
	(0.21)	(2.91)
Dummy cow status	1171427[b]	5153090[a]
	(2.14)	(2.81)
Dummy land location	-2203302[a]	-7628467[a]
	(3.98)	(4.11)

Notes: [1] figures in brackets show statistical test. [a]significant at α=0.01; [b]significant at α=0.05; [c]significant at α=0.1; and [d]significant at α=0.2

V. Conclusions And Recommendations

Conclusions: Cattle farmer household characteristics including the size of land acquisition and reasons for selling the cattle determined the amount of income gained by beef cattle farmers in East Java. Household income from beef cattle farming business was affected by number of cattle owned, cow ownership status, and cattle rearing location. Meanwhile, total household income was affected by length of education, number of cattle owned, number of workforces in family, cow ownership status, and cattle rearing location.

Recommendations: (1) Farmers should sell their cattle at older age for higher selling price. (2) Government capital assistance in form of cow grant should be done in order to increase number of cattle ownership and farmer household income.

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