The partnership study of Brahman cross in East Java

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ABSTRACT: This research aimed to know the revenue of beef cattle (Brahman cross) partnership system between feedlot companies and cattle farmers; observed the factors that affect the revenue from the sale of free-lactating cows and reared calves. Data collecting through the total sampling method by filling out questionnaires from 24 cattle farmers in four regions in East Java such as of Probolinggo Regency, Bojonegoro Regency, Batu City, and Malang Regency. The number of cattle (Brahman cross) raised is 155 pregnant heifers and 32 calves. The results showed that farmers suffered a loss from Probolinggo district with IDR 3,515.733, Bojonegoro Regency IDR 5,157,770, Malang Regency IDR 3,161,165 and Batu City amounted to IDR 2,247,017 in one period/animal Unit (AU). The factors that affect revenue were analyzed using multiple regression tests. The results showed that the factors such as the scale of ownership, number of family dependents, and production costs have a significant level (p value<0.05) that affect the revenue. The other factors like farmer age, education level, the experience of farming, and labor scale have no significant effect on the revenue of cattle farmers (p value>0.05).

Keywords: Partnership; Feedlot; Brahman cross; Cattle farmer; Revenue

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INTRODUCTION

The average national beef production from 2012 to 2020 is 1,86 kg/capita/year, lower than beef consumption in that year was 2.37 kg/capita/year (BPS, 2021; Ministry of Agriculture, 2020). The increasing meat consumption cause of national meat production is not sufficient. Director-General of Livestock and animal health 2014 implemented three main government program targets to increase self-sufficiency in beef continuation starting from 2005 to 2014 with Program Swasembada Daging Sapi (PSDS) by increasing the cattle population, reducing feeder cattle imports, and increasing local cattle slaughter.

However, in 2014 this program was not successful (Rusdiana, 2019). Then in 2017, the government created the UPSUS SIWAB program to increase the beef cattle population to achieve beef self-sufficiency yearly. This impact decreases the local cattle population by slaughtering and import bans of feeder cattle. The demand for beef slightly increases while the local cattle population continues to decline, and the price of meat is getting more expensive (Danasari et al., 2020).

The increasing beef cattle population is a relatively slow reduction in national meat production (Suryana, 2009). According to the Ministry of Agriculture Republic of Indonesia regulation Number:02/Permentan/PK.440/2/2017 concerning the importation of larges ruminant livestock into the territory of the Republic of Indonesia. The program fulfills the demand for beef cattle, accelerates the cattle population, and optimizes the recommendation for importing large ruminants (Ministry of Agriculture, 2017). In this regulation, the feedlot company should import the number of heifers and feeders with a ratio of 1:5.

The consequence of this program is that the feedlot should prepare the new space cages for rearing and fattening so that it will need more funds respectively. The obstacles to this feedlot with the fattening business are limiting cages and places for rearing and fattening. Tawaf (2018) showed that limiting cages dan land for fattening is a big problem. Feedlot companies must provide new land or place for imported heifers but require high operational costs, especially in the large quantities of imports. Therefore the feedlot runs a partnerships program with cattle farmers to raise imported heifer.

PT. Santosa Agrindo is a feedlot company integrated into the beef cattle fattening industry. This company imports feeder cattle from Australia through strict selection according to Australian animal health eligibility requirements and quarantine procedures. The output of the government policy above, this feedlot runs the partnership program. A socialization program for the cattle farmer introduces before partnerships run.

This company provides pregnant heifers with a gestational of 6-9 months. The cattle farmer buys this pregnant heifer via bank credit facilitated by this company via KKP-E animal husbandry credit. The partnership program with farmers can increase domestic meat production (Aziliya, 2016). The requirements to get a credit facility are at least 21 years old or married (Directorate of Agricultural Financing, 2014). Therefore, partner farmers who are above productive age can still apply for the KKP-E loan because the loan is a short period only 18 months).

Heifers used a Brahman Cross (BX) from Australia was artificial insemination using the sperm of a Brahman cow from America. According to the agreement, during the *post-breastfeeding period, the farmer raised heifers* and Calves until 14 months old, then purchased by this company. Bank credit covered the delivery of pregnant heifers to farmers. The coverage costs of feeding during raising both forages and concentrate.

Medicines to support the livestock health and cow livestock insurance program (AUTS/Asuransi Usaha Ternak Sapi)

program for calves and heifer to minimize risks during farming also support from bank credit.

The number of livestock owned affects the income earned by the farmer. They raise livestock in large numbers to get greater profits. It depends on the ability of the cattle farmer to manage and maintain livestock and then regulate their marketing (Suherman, 2006; Maryam et al., 2016)). The livestock mindset is influenced by developing technology. The old farmers were hard to implement new technology. Farmers like this are apathetic to new technologies (Soekartawi, 2002).

Education and training can increase work productivity (Kaufman, 2000). Since the 1940s, the relationship between education and training a crucial to economic growth. Higher education can change attitudes and behaviors to act more rationally.

The number of family members will affect the decision of farmers in farming (Daniel, 2002). The workforce comprises male, female, and child workers from within and outside the family. In a previous study, the number of cattle, the farmer's age, the level of education, the experience of raising livestock, the number of dependents, labor, and production costs affect the revenue. The number of beef cattle greatly influences the revenues (Indrayani and Andri, 2018). Based on the background above, this study's purpose is to identify factors that affect the cattle farmer income of the partnership. Then calculate production costs, revenues, revenue, and factors that affect the incomes of cattle farmers.

MATERIALS AND METHODS

This research is a case study of the beef cattle (Brahman cross) partnership between the feedlot (PT. Santosa Agrindo) and the cattle farmer. In this program, many are interested in participating in partnerships. The feedlot farmers often carry out the socialization of this program. Many cattle farmers are interested in applying for credit, but only 24 are eligible. The 24 farmers took credit from the bank for the purchase of a pregnant heifer from the feedlot. The pregnant heifers are imported from Australia. The core feedlot provides the feedlot facilitated pregnant heifer that can be purchased by cattle farmers with Bank credit through the KKP-E Peternakan loan facility (Food and Energy Security Credit). The number of cattle partnerships is 155 pregnant heifers and 32 added calves to compensate for the farmer's loss due to the born calves' death.

This credit is an investment credit and working capital provided to support the implementation of the Food Security Program and the Plant Development Program for Biofuel Raw Materials. The technical guidance provided includes cage and feed management. The cage system suggested by the feedlot is a sling cage system with an area requirement of 5-6 m2 for each heifer. Feeding using a complete feed consisting of 75% forage and 25% additional feed in dry weight. The feedlot provides additional cattle feed in the form of concentrate for weaning calves and calf starter for lactating calves. They monitored the health and growth of body weight and the number of calves produced regularly.

The pregnant heifer from the feedlot was distributed to the cattle farmer in four East Java regions: Malang regency, Batu regency, Probolinggo regency, and Bojonegoro regency. The cattle farmer gets 5, 10, or 15 pregnant heifers maintain for 18 months. Data were collected with a total sampling method of filling out questionnaires from 24 cattle farmers. The characteristics of the farmer were collected and descriptively analyzed. Farmer revenue analysis uses the difference between total revenue and total production costs in one production period. This company will purchase pregnant heifers and calves for farmers.

Calculate the farmer's revenue from the sale of free lactating cow and heifer or feeder. The total cost of production comes from the sum of fixed and variable costs (Soekartawi, 2016).

Revenue (y) = total receive-total production costs

Return/cost ratio calculating by comparing the total revenue and production costs of farming. Total revenues are obtained from the total sales of reared calves and added calves from feedlot to replace calves who were dead. The total production cost consists of the sum of fixed costs and variable costs. Fixed costs include pen depreciation, water costs, electricity costs, pen depreciation, chopper machine depreciation, plastic barrel depreciation, The AUTS (Cattle Livestock Business Insurance) premium, cargo insurance premiums, and bank interest. Variable costs consist of many variables such as the purchase of a pregnant heifer, calf added by feedlot, forage feed cost, concentrate feed for cows, calf concentrate feed, calf starter, transportation, and another cost.

R/C ratio = total revenue/total production cost

Calculation factors influenced cattle farmer revenue analysis by multiple linear regression analysis using IBM statistic 21 with a significant level (p value<0.05).

Variable analysis such as production costs, the scale of ownership, ages, numbers of family dependents, education level, and workforce scale on farmer revenue with the following regression model :

$$Y = \alpha + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \epsilon i$$

With :
X1 = a scale of ownership
X2 = ages
X3 = education level
X4 = Farming experiences
X5 = number of family dependents
X6 = labour scale
X7 = production costs
εi = other variables not examined

RESULT AND DISCUSSION
Total revenue

The beef cattle partnership program is generally in breeding or fattening. A new type of partnership program was conducted for breeding and fattening together in four regions in East Java at 18 months. Calculations of production cost tabulated in the table have the same pattern for cattle farmers in four regencies. Table 1 shows the production cost of farmers at four regencies.

Table 1. The average revenue of farmers

	Component	Unit	Probolinggo regency	Bojonegoro regency	Malang Regency	Batu city
A.	Fixed cost	Periode/au	2.607.181	2.543.983	2.313.665	2.489.424
B.	Variable cost	Periode/au	21.923.187	22.532.474	19.221.639	19.552.492
C.	Total Production cost	Periode/au	24.530.367	25.076.457	21.535.304	22.041.915
D.	Receive	Periode/au	21.014.635	19.918.687	18.374.139	19.794.898
E.	Revenue	Periode/au	-3.515.733	-5.157.770	-3.161.165	-2.247.017

Source: Primary data analysis, au: animal unit

The source receives from cattle farmers by calculating from selling heifer post-breastfeeding and calf fattening at one-period production/animal unit. Table 3 shows that the cattle farmer's highest average receive is IDR 21.014.635 from the Probolinggo regency and the total average production cost was IDR 24.530.367. The

production cost highest for the farmer in Bojonegoro regencies was IDR 25.076.457. The lowest production cost in Malang regency is IDR 18.374.139. Data show that all the farmers lost revenue in this program. The factor influencing this program is the calf bodyweight below the target of 300-350 kg so that the feedlot does not buy these

calves. Then cattle farmer sells the calf fattening to cattle traders at varying prices depending on the farmer's ability to sell them. Therefore, the revenue from each cattle farmer is different depending on the selling value of the calves. If the price is higher than another can cover the losses. Table 2 shows the average of a heifer of feeder fattening body weight under the body weight target.

Table 2. Body weight of calf fattening

Location	Body weight (kg)
Malang	166±15.02
Batu	232±33.5
Probolinggo	128±7.37
Bojonegoro	138±26.44

Source: Primary data analysis

The AUTS (Cattle Livestock Business Insurance) premium protects cattle farmers from losses due to dead cattle due to non-epidemic diseases, deaths of mothers due to childbirth, accidents of cattle in pens, and cattle losses due to theft marked by violence. Transportation insurance protects farmers from losses due to the death of cattle during the transportation process from the company to the farmer locations. Calf added from feedlot intends to cover losses caused by the calf dead in farmers at Probolinggo regency and Bojonegoro Regency.

The calf bodyweight did not reach the target because of the availability of forage feed. The complete feeding consists of 75% forage and 25% additional feed in dry weight. Forage is hard to obtain at Bojonegoro Regency and is inadequate for the cattle needed, especially in the dry season. A farmer prepares forage land to support their farming along with the partnership. However, this land is insufficient to support the beef cattle needed to meet the body weight target.

The calves are covered by insurance if they are more than four months old. The death of the calves occurred during rearing due to difficulties in labor not covered by insurance. Average calve mortality on Probolinggo during partnership is 33.3% higher than the other regency. Farmer found assisting the Brahman cross with the calving process challenging because these cows are still wild.

In Australia, this cow rearing is a large area of the grazing system. In this partnership program, these cows are used to being wild when kept in captivity called Umbaran cage. A narrow cage causes a lack an exercise and labor dificulty called Dystocia (Hickson et al., 2006).

Table 3. Calves mortality

Location	Number of calves	Number of dead calves	Mortality (%)
Probolinggo	30	10	33.3
Bojonegoro	35	7	20.0
Batu	25	7	28.0
Malang	65	8	12.3

The rights and obligations of the feedlot company with cattle farmers are stated in the sale and purchase agreement. The company facilitates cattle farmers who meet the requirements to obtain KKP-E Animal Husbandry credit. The credit facilities from cooperating banks. The company provides pregnant heifers with healthy conditions, buyback heifers after calving and reared calves, and provide technical assistance and guidance related to rearing. The company has the right to get a heifer of feeder cattle with mutually agreed standards, namely bodyweight of 300-350

kg and in good health and without physical disabilities. Credit financing from banks also financed the delivery of cattle from the company to farmers, the cost of feed during maintenance forage and concentrate, medicines to support livestock health, and cattle insurance premiums to minimize risks during maintenance.

The farmer characteristics observed in table 4 consist of the scale of ownership, age, education level, farming experience, the number of family dependents, and labor scale. The scale of ownership is related to risk factors. The risk factor depends on the cost of raising maintenance and animal health.

Indonesia is between 15 to 64 years. Farmers' age categorizes as the productive age. Increasing age influences decreasing work productivity and impacts farmers' revenue. The education level will affect the mindset and insight of the farmer. The distribution of education of farmers is dominant at the basic education level. the education level results in higher work productivity. Farmer education was able to absorb appropriate technology in running a business.

Farming experience relates to the skills and knowledge of farmers in running their businesses. Innovations during breeding can motivate them to develop and increase their business scale. The longer the experience of raising livestock, the more open to information and developing technology. The number of family dependents is closely related to the burden of living borne (Aplunggi et al., 2017). The big family influences the consumption of needs and also requires the head of the family to increase an effort to increase family revenue.

2. Factors affecting revenue

The age of farmers ranged from 23-75 years, and an average age of 45.29 Factors affecting cattle farmers' revenue with PT. Santosa Agrindo carried out two tests. These namely the normality test and the classical assumption test. The normality test used the Kolmogorov-Smirnov test. The classical assumption is a test carrying on regressions with two or more independent variables. The test includes a normality test, multicollinearity test, and heteroscedasticity test.

The symptoms of multicollinearity showed that a regression model is done by 1) looking at the correlation value between the independent variables, 2) looking at the condition index, and 3) Eigenvalues also looking at the tolerance value and Variance Inflating Factor (VIF). VIF value of the independent variable on the ownership scale (X1) is 46,823; age (X2) is 2,778; education level (X3) is 1.306; farming experience (X4) of 3,572; the number of family dependents (X5) is 1.525; the scale of labor (X6) is 1.579 and production costs (X7) is 50.790. The data above show that the VIF value of less than 10 means no multicollinearity in the regression model, while the ownership scale and production costs have a VIF value above 10. The two variables indicate the presence of multicollinearity.

Heteroscedasticity test through the Glejser test and the White test. Glejser test calculated by regression of the absolute residual value (AbsUi) against other independent variables. If the significance value is p> 0.05, there is no heteroscedasticity. White test calculating multiplying R Square by the number of test samples. The value of the Chi-square test sample count is 7.824 then the Chi-square table value with =0.05 is 12.591. The Chi-square value of the test sample count is smaller than the Chi-square value of the table means there is no heteroscedasticity.

The autocorrelation test on the value of = 0.05 using the independent variables of ownership scale (X1), age (X2), education level (X3), farming experience (X4), number of family dependents (X5), workforce scale (X6) and the production cost (X7) is 2.191 using seven variables (k=7) with 24 (n) number of samples.

Table 4. Characteristics of a cattle farme

1.	Scale of ownership		
	5.75	1	4.17
	6	5	20.83
	6.25	4	16.67
	6.75	6	25.00
	7	2	8.33
	11.5	1	4.17
	11.75	1	4.17
	12.25	2	8.33
	12.5	1	4.17
	18.5	1	4.17
	Total	24	100
2.	Age (year)		
	20-29	1	4.17
	30-39	8	33.33
	40-49	8	33.33
	50-59	3	12.50
	60-69	2	8.33
	≥70	2	8.33
	Total	24	100
3	Education level		
	Elementary school	9	37.50
	Yunior high school	6	25.00
	Senior high school	5	20.83
	College	4	16.67
	Total	24	100
4	Labour scale		
	0	12	50.00
	0.8	3	12.50
	1	9	37.50
	Total	24	100
5	Number of family dependent		
	2	2	8.33
	3	8	33.33
	4	9	37.50
	5	3	12.50
	6	1	4.17
	10	1	4.17
	Total	24	100
6	Farming experience (years)		
	0	2	0.833
	1-9	3	12.50
	10-19	5	20.83
	20-29	8	33.33
	30-39	3	12.50
	40-49	2	8.33
	≥50	1	4.17
	Total	24	

Source: Primary data analysis

The Durbin-Watson table value has a dL (Lower bound) value of 0.750 and a dU (upper bound) value of 2.174. The 4-dL value is 3.250 and the 4-dU value is 1.826 then sequential values of dL, dU, 4-dU and 4-dL are 0.750; 2,174; 1,826 and 3,250. The new value of 2.191 is between 4-dU and 4-dL means no autocorrelation between residuals.

Factors affecting partner farmers' revenue (Y) analysis using multiple linear regression. The independent variables consist of ownership scale (X1), age (X2), an education level (X3), experience in raising livestock (X4), number of family dependents (X5), labor scale (X6), and production costs (X7) and the dependent variable in the form of revenue (Y).

The value of the correlation coefficient (R) in the summary model is 0.759 means 75.9% of independent variables such as ownership scale (X1), age (X2), an education level (X3), farming experience (X4), number of family dependents (X5), labor scale (X6) and production costs (X7) are related to farmer's revenue. The coefficient of determination (R Square) value is 0.576 means about 57.6% of independent variables simultaneously affect revenue (Y).

It means independent variables, about 42.4%, are influenced by other variables outside the regression equation or variables not examined. Based on the value of the summary model, the calculated F value was obtained in the test.

Table 5. Multiple linear regression of factors that influence farmer revenue

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-26362907	22917274		-1.150	0.267
	Scale of ownership	16790065	7618780	2.456	2.204	0.043*
	Age (X2)	114734	450312	0.069	0.255	0.802
	Education level (X3)	-2069578	3572749	-0.108	-0.579	0.570
1	Farming experience (X4)	-227274	467053	-0.150	-0.487	0.633
	Number of family dependent (X5)	7400238	2782817	0.535	2.659	0.017*
	Labour scale (X6)	6314796	9265498	0.139	0.682	0.505
	Production cost (X7)	-0.882	0.325	-3.144	-2.709	0.015*

Source: Primary data analysis
*) Significant level at 0.05

Table 5 shows that the calculated F test value is 2.744, and the significance value is 0.29 (p value>0.05). The independent variables tested are ownership scale (X1), age (X2), level of education (X3), Farming experience (X4), number of family dependents (X5), and labor scale (X6), and production costs (X7) affected revenue. The regression equation obtained is

$$Y=-26.362.907+16.790.065X1 + 114.734X2-2069578X3-227.274X4 + 7.400.238X5 + 6314796X6 -8.82X7+\epsilon i.$$

The t-test was used to determine the effect of each independent variable on the dependent variable in the form of revenue (Y). The ownership scale variable affects revenue with a significance value of 0.043 (p-value <0.05). The large scale of ownership will further increase the farmer's revenue. The scale of livestock ownership is related to risk factors (White et al., 2007). The risk factors borne by farmers include the purchase price, performance, and health of livestock. In this study, the scale of cattle

ownership is very influential on the farmer revenue, but the death of calves causes a decrease in farmer acceptance. There are additional calves from the PT. Santosa Agrindo cannot cover the losses suffered by farmers.

Age variable has no effect on revenue at a significance value of 0.802 (p-value>0.05). The age of farmers ranged from 23-75 years. Age shows the physical ability of farmers and affects work productivity. Besides that, age affects the ability to think and determine the plans which apply to the beef cattle business. However, in this study age of the farmer had no effect because Brahman's cross-breeding and rearing of calves was a new challenge for the farmer. Beef cattle farming was different from the cattle farming pattern in Indonesia. Brahman cross cattle require a special treatment called "umbaran" cages offer cattle welfare like the wild nature. Therefore, the maintenance of beef cattle requires special planning to reduce losses in the maintenance process (Tauer, 2017; Tumober et al., 2014).

The education level does not affect the revenue at a significance value of 0.570 (p-value>0.05). The farmer of education levels ranged from elementary school to bachelors. In this partnership, farmer education does not affect revenue. Education affects thinking and the adoption of technology and skills (Asraf and Qasim, 2019). Farmer education can improve planning skills and performance in Brahman cross farming. Farmers get experience in modifying special cages to avoid the death of calves. However, in this partnership, the farmer still needs technology and skill in breeding and rearing together. This difference pattern in the beef cattle farming pattern will cause changes in the attitude and readiness of farmers to the challenge.

The farming experience has no effect on the revenue at a significance value of 0.633 (p-value>0.05). The farmer has experience at 20-29 years with a percentage value of 33.33%. It was related to the skills and management of beef cattle farming.

However, the farmer experience effect on revenue because the type of cattle raised comes from the ranch farmers need to adapt to new farming. Therefore, this experience is very beneficial for beef cattle farming which is different from the conventional pattern. The farmer is better prepared and able to make better plans.

The number of family dependents affected revenue at a significance value of 0.017 (p-value<0.05). It is related to the cost of living. The number of dependent families also describes the number of families involved in cattle farming. Increasing the number of dependents in the family will make farmers try their best to fulfill the needs of their families through this beef cattle business.

The labor scale variable has no effect on the revenue at a significance value of 0.505 (p-value>0.05). The scale of labor is related to the wages issued. When farmers add workers from outside, more costs increase in cattle farming. The farmer works on their own however some farmers take labor from outside.

Variable production costs affected revenue with a significance value of 0.015 (p <0.05). Production costs consist of fixed and variable costs incurred by farmers in one period. Production costs were higher than the revenue, and most farmers suffered losses. This production cost is related to the scale of cattle ownership.The value of the correlation coefficient (R) in the summary model is 0.759 showed that so that it is 75.9% of ownership scale variables (X1), age (X2), education level (X3), farming experience (X4), number of family dependents (X5), labor scale (X6) and production costs (X7) are related to farmer's revenue. The coefficient of determination R Square) is 0.576 means 57.6% independent variable affects the revenue.

3. Calculation of Return/cost ratio

The return cost ratio comparing revenue with total production cost showed in Table 6. In this program, the farmer suffers a loss. The additional calves were covering the loss. Calves sales with body

weights that meet the target will cover the loss. However, the calf's death and not

achieving the bodyweight target causes farmers to still a loss.

Table 6. Average of return cost ratio

Location	Total revenue (IDR)	Total production cost (IDR)	Average return cost ratio
Probolinggo regency	262.682.933	306.629.590	0.88
Bojonegoro regency	135.447.071	170.519.908	0.80
Malang regency	151.586.650	177.666.260	0.84
Batu city	145.987.375	162.559.126	0.91

Source: Primary data analysis

The average return cost ratio from Malang Regency is 0.84 then Batu City is 0.91. The lower return cost ratio value than in other regencies finds in farmers in Bojonegoro is 0.80. Total production costs incurred are higher than the total revenue. Return cost average ratio (R/C) <1. It is caused by the farmer revenue lowest than the total production costs. The revenue from farmers comes from the sale of heifer post-calving purchased by feedlot companies.

A rearing calf sells to cattle traders. Weaning calves selling can cover the farmer's loss. The sale of calves with body weights that meet the target will cover the loss. Death calf not achieving the target bodyweight causes farmers still losses. The return/cost ratio describes the efficiency of livestock businesses based on the variable costs to revenues (Sukmayadi et al. 2016). as the results of Tawaf's research (2018) show, pregnant heifer farming is detrimental to business activity. Data shows that farmers in Batu City are more efficient with a higher return cost ratio when compared to farmers in Malang Regency, Bojonegoro Regency, and Probolinggo Regency. This ratio showed that this partnership program is not efficient.

CONCLUSIONS

The beef cattle partnership showed that the farmer suffered a loss in the one-period production. The independent variable such as ownership scale, number of dependents, and production costs significantly affected the farmer revenue.

Age, education level, experience in farming, and labor scale were not significantly affected. In this study, a cattle farmer's partnership of Brahman Cross cattle and PT Santosa Agrindo experienced losses in one production period.

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