

## **Rearing business analysis of Brahman Cross Breed ex import cattle with a partnership between corporations and smallholder farms**

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**ABSTRACT:** The objective of the research was to study the partnership rearing scheme of Brahman Cross (BX) cattle ex import between corporations and smallholder farmers to determine the financial and economic feasibility of the business and the factors that affected the production of rearing cattle. The research was conducted in farmers groups in West Java, Central Java, and Yogyakarta, which developed a partnership with feedlot importer, PT.X. Twenty-eight farmer respondents were determined by purposive sampling. Each of them kept ten male and female calves of BX. Collecting data was done by survey method through interviews using a questionnaire. The investment feasibility criteria were NPV, IRR, B/C ratio and payback period, followed by a sensitivity analysis. Analysis of the factors that affect the production of rearing cattle using multiple linear regression. The results showed that the parties involved in the partnership, PT X, were banks that fund all financing, insurance services, and farmers. The average initial weight, final weight, maintenance time, and ADG were  $145.75 \pm 34.54$  kg,  $318.50 \pm 52.27$  kg,  $9.65 \pm 1.7$  months,  $0.61 \pm 0.17$  kilograms. The results of the analysis of the feasibility with an investment period of 5 years and an interest rate of 9%, micro-credit 13.5%, and commercial 18% are financially and economically feasible to run. Provision of concentrate and initial body weight significantly ( $P < 0.5$ ) had a positive effect on the production (ADG) of rearing cattle. The partnership scheme developed by PT X can be beneficial to all parties involved.

**Keywords:** Partnership; Corporation; Smallholder farmers; Brahman Cross cattle; Business feasibility

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## **INTRODUCTION**

The beef cattle population in Indonesia has increased from 2015 to 2018, which was 15,420,000 to 16,433,000 or an average increase of 2.15% per year. Beef production from 2015 to 2018 has fluctuated and tends to decline, from 506,660 tons to 497,971 tons or an average decline of 1.75%. The beef consumption in Indonesia increased from 2015 to 2018, which was 107,752 tons, to 125,551 tons or an average increase of 5.39% per year (Directorate General of Livestock and Animal Health, 2019).

Increased beef production in Indonesia has not been able to keep up with the increased consumption. The beef production process takes a long time, starting from cow pregnancy to producing calves, raising calves after birth to weaning, growing calves off weaning to become feeders (males) or substituting for cows (females) and fattening of enlarged cows until they are ready to slaughter (Widiati and Widi 2016). The enlargement of calves at the age of weaning is conducted until they become feeders around 18 months, then enter the fattening period for 4-6 months, then the cows are ready to be slaughtered (Sahara *et al.*, 2015).

Almost all local feeder cattle in Indonesia come from smallholder farms (Widiati., 2014). Generally, the people's livestock business using traditional methods and weak capital causes a slow increase in the population of feeder cattle. As a result, imports of feeder cattle and frozen meat to meet national beef consumption continues to increase. Increasing the population or domestic feeder cattle production is an important issue.

The efforts to increase the cattle population, including feeder cattle, have been stipulated by the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 02/Permentan/PK.440/2/2017, which states that one main female cow must accompany every import of five feeder cattle. The investment in raising cows

to get feeders takes a long time, so it needs a lot of capital. The solution to reducing the amount of investment in the maintenance of imported cows by a cow importing company is to engage in a partnership to enlarge the products of ex-imported cows. One of the importing companies in Indonesia that have entered into a partnership to enlarge the products of ex-imported cows is PT. X with smallholder breeders.

Raising calves by smallholder breeders is a high risk, so a partnership is established in the calf rearing phase from weaning to feeder cattle. This research aims to examine the partnership scheme between smallholder farms and PT X and other related corporations, determine the feasibility analysis of the business financial and economical, and determine the factors that affect the production of rearing cattle.

## **MATERIALS AND METHODS**

The research was conducted from January to June 2020 in four locations: Ngaglik Yogyakarta District, Nogosari District, Central Java, Gekbrong District and Margawati District, West Java. The research material was beef cattle breeders who are members of the partner livestock group of PT. X, who does the rearing activity of calves, the Brahman Cross breeds aged 6 to 7 months, which were male and female. The calculation of the number of samples using the Slovin formula:

$$n = \frac{N}{1 + Ne^2}$$

Notes :

n = number of samples

N = total population

e = the level of significance (0.05)

(Bishop, 2019)

Based on the calculation, the total sample was 28 farmers. Respondents were taken using the purposive sampling method based on the consideration of breeders who have participated in the partnership at least one maintenance period to obtain complete

data. Data consisted of primary and secondary data. Primary data were from sample breeders, secondary data were from related agencies and records of partnership activities from PT X.

Data were collected using a survey method through interviews with breeders using questionnaires. The data included technical parameters, economic parameters, PT.X provisions regarding partnership rights and obligations, and maintenance management, which had to be performed by breeders. Technical parameters included average daily gain, initial weight, harvest weight, and maintenance time. Economic parameters consisted of input and output prices set by PT.X.

Data analysis was carried out descriptively and quantitatively. Descriptive analysis is carried out to analyze the partnership pattern scheme, the characteristics of the rearing business, the farmer profile, and technical parameters by calculating the mean and standard deviation. Business feasibility analysis is carried out financially and economically. The financial analysis uses private prices (market prices) while economically uses social prices (shadow prices).

The shadow price is determined based on the Cost Insurance Freight (CIF) price plus transportation and trading costs. The shadow price is determined using the CIF price because cattle have the potential to be imported. Determination of the shadow exchange rate price using standard conversion factor values. The standard conversion factor formula is as follows:

$$SCF = \frac{M_t + X_t}{(M_t + Tm_t) + (X_t - Tx_t)}$$

$$SER_t = \frac{OER_t}{SCF_t}$$

Notes :

- SCF = Standard Conversion Factor in year t
- SER = Shadow Exchange Rate in year t
- OER = Official Exchange Rate in year t
- Tx<sub>t</sub> = export tax year t (Rp)
- X<sub>t</sub> = export value in year t (Rp)

- M<sub>t</sub> = value of import year t (Rp)
- TM<sub>t</sub> = import tax year t (Rp)
- (Squire and Van Der Tak., 1975)

The criteria for the analysis of business feasibility financially and economically are net present value (NPV), internal rate of return (IRR), and benefit-cost ratio (B/C), and payback period (PP) (Gray *et al.*, 2007). The analysis period follows the fixed investment age of 5 years with a predetermined interest rate, followed by a sensitivity analysis conducted on the interest rate. (Prasongko *et al.* 2017) stated that sensitivity analysis aims to determine new values with changes in revenue (inflow) and outflow components. The factors that affect the production of rearing cattle are analyzed using the Cobb-Douglas production function with the solution as follows (Gujarati, 2003; Amuka *et al.*, 2018)

$$. Y = aX_1^{b1}X_2^{b2} \dots \dots X_i^{bi}e^n$$

The variable above is not in the form of a linear equation, so it is transformed into a linear regression equation in the form of natural logarithms as follows (Keith, 2015):

$$\ln Y = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \varepsilon_i$$

Notes :

- Y = increase in body weight of rearing cattle (kg)
- α = constant
- β<sub>1</sub> - β<sub>2</sub> = independent variable regression coefficient independent
- X<sub>1</sub> = amount of concentrate (kg/period)
- X<sub>2</sub> = cow's initial weight (kg)
- ε<sub>i</sub> = error term

The solution to getting the regression coefficient used the OLS (Ordinary Least Square) method. Furthermore, testing the factors that influence cattle weight gain simultaneously using the F test while partially using the t-test. The formulation of the F test hypothesis is:

- H<sub>0</sub> : β<sub>i</sub> = 0, the independent variable (X) simultaneously has no significant effect on the weight gain of cows (Y).

- $H_a : \beta_i \neq 0$ , the independent variable (X) simultaneously has a significant effect on the weight gain of cows (Y)
- $H_0$  is accepted if the F-count statistical value is smaller or equal to the F-table. It shows that the independent variable simultaneously does not significantly influence the dependent variable. The formulation of the hypothesis for the t-test is as follows:
- $H_0 : \beta_i = 0$ , the independent variable has no significant effect on the weight gain of cows (Y).
  - $H_a : \beta_i \neq 0$ , the independent variable individually has a significant effect on the weight gain of cows (Y).

## RESULT AND DISCUSSION

### Profile of farmers

Business performance can be said to be high or low and is always associated with individual characteristics. Individual

characteristics that affect business performance include age, education level, and experience (Fauziyah et al., 2015). The profiles of the farmer that used in this study include age, formal education, number of family members, breeding experience, and main livelihood. The profiles of a farmer can be seen in Table 1.

From Table 1, the respondent's age is included in the productive age to be more effective in managing their business (Anggraini and Putra, 2017). Besides, more than 60% have high school and university education, making it easier for partner breeders to understand the training materials from PT X before starting maintenance activities.

The number of family members of the respondent is small, so that the burden of family expenses is also getting smaller and reduces the barriers to developing their business (Hastang and Asnawi, 2014).

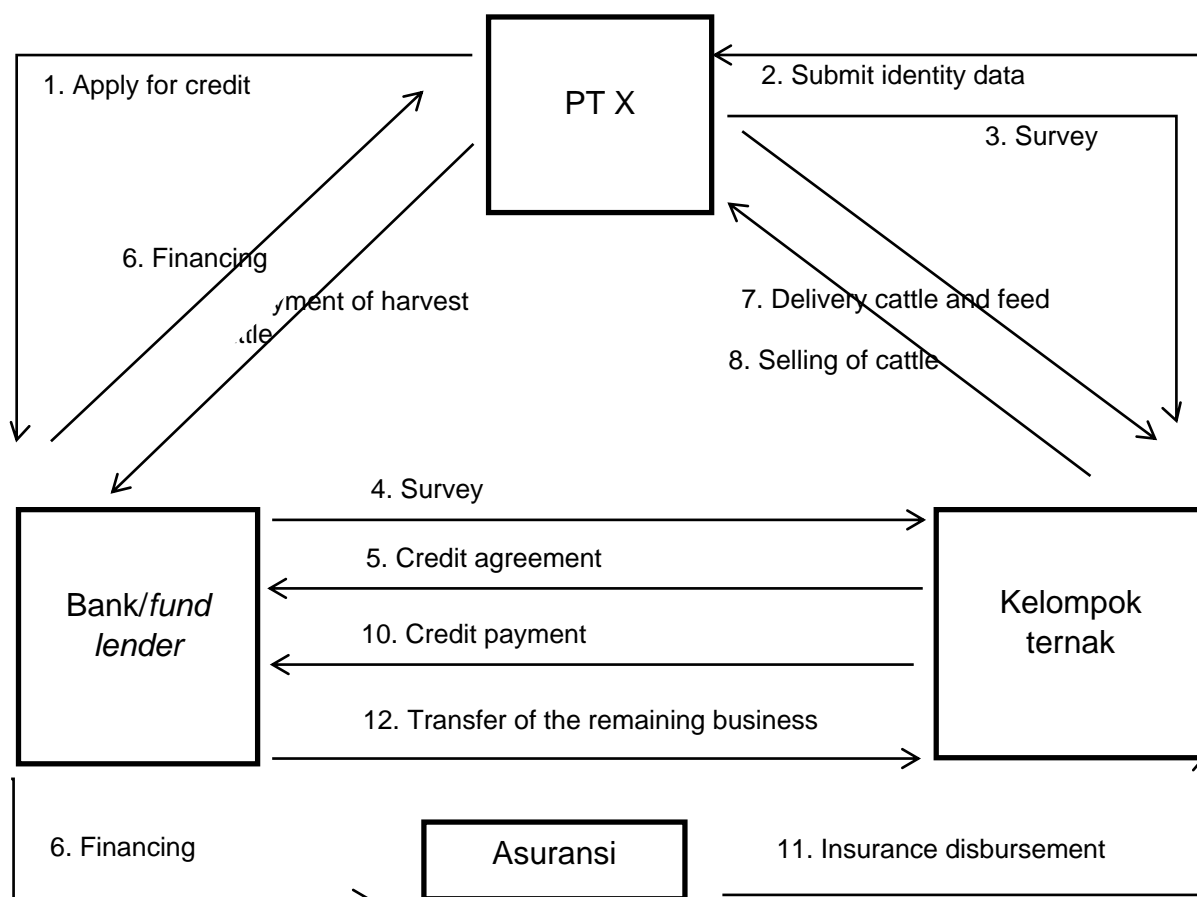
**Table 1.** Profile of farmers (n=28)

Component	Average/Frequency	%
Average of age (year)	49.85 ± 11.90	
Formal education		
Elementary school	6	21.43
Junior high school	3	10.71
Senior high school	9	32.15
Universities	10	35.71
Number of family members (person)	4 ± 1.37	
Breeding experience (year)	16.78 ± 13.42	
Main livelihood:		
Only as a cattle breeder	4	14.29
Plant farmer	1	3.57
Civil servant	1	3.57
Entrepreneur	10	35.71
Labours of farmer	12	42.86

### Partnership pattern scheme of Brahman Cross Breed ex import cattle rearing

The three corporations involved in the partnership in this study are PT X, Bank or Fund lenders and insurance service companies. PT X is a feedlot company located in Cianjur District, West Java Province, founded in 2006. As the initiator of the partnership, PT X is a feedlot company that imports feeder cattle

accompanied by sires crossed with the company's preferred breed of bull to produce weaning cattle that are cared for by partner breeders. PT.X imports Brahman Cross cow 2 to 3 times a year, and the number of cows imported are 1000 to 2000 head per import. The partnership scheme that has been conducted since 2017 is as follows:



**Figure 1.** PT X's partnership scheme

**Table 2.** Allocation of funds from banks in the partnership program with a maximum period of 11 months

No	Purpose of the fund allocation	Allocation details
1	PT.X	<ul style="list-style-type: none"> <li>• Weaning calves (10) *</li> <li>• Concentrates from PT X</li> <li>• Assistance from PT X</li> <li>• Insurance</li> <li>• Transportation</li> </ul>
2	Insurance companies	Insurance premiums (2% of total financing)

\*) Components covered by insurance services

**Table 3.** The amount of feed by type (n = 280 from 28 breeders)

Type of feed	Average giving/breeder (10 cattle/day)
<b>Forage</b>	
Straw (bunch (1 bunch equals 10 kg))	
Kolonjono grass (kg)	3
Gajah grass (kg)	33
	27
<b>Concentrate</b>	
PT.X concentrate (kg)	35
Tofu pulp (kg)	10

From the picture above, it can be explained that submitting, allocating, and returning loan funds is managed/handled by PT X. Financing by bank/fund lenders handled by PT.X can be detailed as in Table 2. The crop yield is reduced by costs plus bank interest to pay off bank credit, which is the remaining income from the business as the farmer's profit. Insurance claims are 100% of the price of a cow for a cow's death, while 75% of a claim is for a lost cow. Disbursement of insurance will go to the farmer's account through the bank.

**The characteristics of the Brahman Cross-Breed cattle business by partnership patterns**

The partnership maintenance system for the Brahman Cross breeds cattle rearing is intensive, which is maintenance only in pen. The average cage area is 133 m2 with a capacity of 10 cows. The coop of the partner

farmer has a frame of wood and cement. The cage's roof is made of tile, and the cage's base is hardened with cement. The types of feed used are forage and concentrate. Forage includes *kolonjono* grass, elephant grass, and hay. Concentrates include concentrate produced by PT.X and tofu dregs which are local raw materials. Feeding was performed twice a day, morning and evening. The amount of feed by type can be seen in Table 3.

The breeder gave vitamins and deworming medicine twice for each maintenance period to maintain the cows' health. The farmer provides medicine and uses the services of a veterinarian if the cattle are sick. However, PT.X visits the farmer to monitor the health of the cattle every two weeks. Farmers conducted sanitation by cleaning cages, feeding places, and drinking cows every morning and evening.

**Table 4.** Technical parameters of Brahman Cross cattle breeding and input-output price

Technical parameter (n=280)	Average per cattle
Initial weight (kg)	145.75 ± 34.54
Final weight (kg)	318.50 ± 52.27
Length of rearing time (months)	9.65 ± 1.7
ADG (kg/day)	0.61 ± 0.17
Prices of input and output	Average per breeder
Initial cattle financial price (IDR/kg live weight) *	50,000
Initial cattle economic price (IDR/kg live weight)	76,978
Harvest cattle financial price (IDR/kg live weight) *	45,000
Male harvest cattle economic price (IDR/kg live weight)	40,700
Cows are harvested cows at economic prices (IDR/kg live weight)	43,697
PT.X concentrate (IDR/kg) *	2,838
Accompaniment (IDR/10 cattles/period) *	100,000
Transportation (IDR/10 cattles/period) *	100,000
Insurance (IDR/unit) **	1,970,920
Tofu pulp (IDR/kg)	1,422
Gajah grass (IDR/kg)	682
Kolonjono grass (IDR/kg)	704
Hay (IDR/bunch)	5,178
Cage (IDR/unit)	21,750,000
Equipment	583,443
Water and electricity (IDR/month)	88,036
Health (IDR/unit)	68,666
Labor (IDR/day)	53,214

Note: \*) The price is set by PT X

\*\*\*) The agreement price of PT X and insurance services

**Rearing business analysis of Brahman Cross-Breed cattle**

The business analysis used investment analysis financially and economically. Investment analysis started from the determination of technical parameters, input and output price parameters, projections and business timeframes, cash flow, business feasibility analysis, and sensitivity analysis.

**Technical parameters.**

Technical parameters are one of the critical factors in increasing livestock productivity. The technical parameters, input and output prices of the brahman Crossbreed breeding business maintained by partner breeders are as shown in Table 4. The average time to raise cows is  $9.65 \pm 1.7$  months, less than the maximum period set at 11 months, so the farmer receives the return of the remaining feed included in the cash flow. Average daily gain (ADG) is an indicator of the results of rearing cattle. The average daily gain of the bred Brahman

Cross cattle is higher than the study by Haque *et al.* (2016), which was 0.57 kg and Papry *et al.* (2020), which was 0.42 in male Brahman Cross cattle and 0.34 kilograms in females at the age of 1 to 12 months.

**Financial and economic cash flow analysis.**

Cash flow analysis was administered financially and economically and was calculated with a 5-year business projection period with an average interest rate of 9%. Gray *et al.* (2007) stated that calculating the benefits and costs of a project; it can be done through two approaches: private and social. A financial approach is taken if the direct interest party is an individual or entrepreneur. An economic approach is taken if the direct interest is the government or society as a whole. Financial and economic cash flow components can be seen in Table 5.

**Table 5.** Cash flow per 10 cattle per farmer per period (1 package)

Component of cash inflow	Financial (IDR/period)	Economy (IDR/period)
Receipt of credit:		
The calf is weaning off	72,878,571	112,201,435
Concentrates from PT.X	29,066,260	29,066,260
Transportation	1000,000	1,000,000
Accompaniment	1000,000	1,000,000
Insurance	1,970,919	1,970,919
Bank Administration	300,000	300,000
Harvest cows	69,855,967	65,424,886
The proceeds from the sale of soft cows	5,759,125	5,759,125
Dead cow insurance claim	5,200,000	5,200,000
Residual feed (maintenance <11 months)	3,159,439	3,159,439
Component of cash outflow		
Fixed cost		
Credit + interest refund	116,869,175	156,192,039
Non-credit fees		
Tax	180,148	-
Water and electricity	849,545	849,545
Land lease	1,000,000	1,000,000
Equipment	583,443	583,443
Cage	21,750,000	21,750,000
<b>Variable cost</b>		
Tofu pulp	4,110,222	4,110,222
Straw	4,874,663	4,874,663
Gajah Grass	5,350,923	5,350,923
Kolonjono grass	6,789,841	6,789,841
Health	120,332	120,332
Labor	7,476,844	7,476,844

Calves and reared cows are tradable components, so there are differences in calculations between private and economic factors. The private calf price is based on the agreed price between PT X and the farmer, which is IDR 50,000 per kg. Calf prices in economic analysis are based on shadow prices using the cost insurance and freight (CIF) price of 4.78 US\$/kg (Sub-directorate of Import Statistics, 2019) and added trading costs are then converted into rupiah values using the Shadow Exchange Rate (SER) so that the price is IDR 10,137,118 per cattle or an average of IDR 69,548 per kg.

The price of calves in the economic calculation is higher than in financial terms because the CIF price of calves is higher than the price received by breeders. The private harvest cow price is based on the agreed price between PT X and the farmer, which is IDR 45,000 per kg. Harvest cow prices in economic analysis are based on shadow prices using the cost insurance and freight (CIF) price of 2.65 US\$/kg for male cow and 2.64 US\$/kg for female cow (Sub-directorate of Import Statistics, 2019) and

added trading costs are then converted into rupiah values using the Shadow Exchange Rate (SER) so that the price is IDR 38,923 per kg for male cow and IDR 38,849 per kg for the female cow.

In the economic calculation, the price of the harvest cow is higher than in financial terms because the CIF price is higher than the price received by breeders. The proceeds from sales of rejected cows come from the sale of cows that are slaughtered by breeders and based on the approval of PT.X.

**Feasibility analysis of a beef cattle rearing partnership.**

The indicators used are net present value (NPV), benefit-cost ratio (BCR), internal rate return (IRR), and payback period (Gray *et al.*, 2007).

The results of the cash flow calculation above are then performed a business feasibility analysis. The results of research on the feasibility of raising beef cattle for partner breeders with three corporations handled by PT.X for 5 years, the average interest rate of 9% per year, can be seen in Table 6.

**Table 6.** Results of the feasibility analysis of the business of rearing Brahman Crossbreeds

Feasibility criteria	Financial	Economy
NPV (IDR/5 years)	136,594,682	77,065,617
NPV (IDR/year)	22,765,780	12,844,269
NPV (IDR/month)	2,276,578	1,284,427
BCR	1.23	1.11
IRR (%)	185	125
PP	11 months	15 months

Beef cattle rearing business with a partnership program is feasible because  $NPV > 0$ ,  $BCR > 1$  and  $IRR > 9\%$  discount rate (Anis *et al.*, 2015). The payback value of the period is smaller than the project investment age, so the business can be said to be feasible (Maeanti *et al.*, 2013).

Raising Brahman Crossbreeds of the partnership program from PT.X is financially profitable for partner breeders. Economically, it benefits the whole community in the beef cattle sector (Ajibola *et al.*, 2017). The calculation result shows that the value of the financial feasibility is

higher than the social value, which means that the partner breeders do not experience disincentives in carrying out maintenance. PT.X provides prices for their crops at a reasonable price so that farmers benefit.

**Sensitivity analysis**

In this study, a sensitivity analysis towards an increase in bank interest was administered to consider that there is a possibility of an increase in bank interest rates. Bank interest rates are carried out using three different interest rates, namely microcredit 13.34% and commercial credit 18%. The results of the sensitivity analysis



can be seen in Table 7. The sensitivity analysis results show that the business of rearing Brahman Cross ex-imported cattle with a partnership pattern up to a commercial interest rate of 18% per year is still feasible to run (Table 6).

However, in terms of the regional minimum wage (UMR) value at the research location, the average monthly NPV value obtained by farmers with a scale of ownership of 10 cows at an interest rate of

9% still fulfils the UMR value. Furthermore, if the interest rate increases to 13.34% and 18%, the monthly NPV value is smaller than the UMR value. The minimum wage for Sleman Regency is IDR 1,846,000/month (Governor of the Special Region of Yogyakarta., 2019), Boyolali Regency IDR 1,942,000 (Central Java Governor, 2019), Cianjur Regency IDR 2,534,798, and IDR 1,961,085 for Garut Regency (Governor of West Java, 2019)

**Table 7.** The results of the sensitivity analysis of bank interest rates and forage costs on the feasibility of enlarging the business

	Interest level per year	BCR	NPV (IDR/5 years)	Average of NPV (IDR/month)	IRR (%)	Period payback (months)
Financial	Respondent (9%)	1.23	136,594,682	2,276,578	185	11
	Microcredit (13,34%)	1.19	102,892,315	1,714,871	162	14
	Commercial credit (18%)	1.14	72,892,920	1,214,882	136	19
Economy	Respondent (9%)	1.11	77,065,617	1,284,427	125	15
	Microcredit (13,34%)	1.08	50,013,466	833,558	100	21
	Commercial (18%)	1.04	25,926,118	432,102	70	33

**Factors that influence the production of Brahman Cross Breed ex import rearing**

Regression analysis was performed to determine the factors that influence weight gain resulting from the production of

imported Cross ex Brahman breeds rearing. The regression analysis results of the factors that influence the imported Cross ex Brahman breeds rearing production using the OLS method are shown in Table 8.

**Table 8.** Results of multiple linear regression analysis of the factors that influence the production of body weight for the rearing of male and female cattle (n=280 cattle)

Variable	Male		Female	
	Coefficient	Sig	Koefisien	Coefficient
(Constant)	2.3848	0.0000	1.2361	0.0000
Amount of concentrate (X1)	0.3065**	0.0000	0.1924**	0.0000
Initial body weight (X2)	-0.3402**	0.0026	-0.3070**	0.0000
Prob (F-statistic)	0.5169		0.3681	
R-square	0.5096		0.3589	

Notes :

\*\* = significance at the 99% confidence level ( $\alpha = 0.01$ )

\* = significance at the 95% confidence level ( $\alpha = 0.05$ )

ns = not significant

Table 7 shows that the provision of concentrate feed and initial body weight for rearing cows has a significant positive effect on production in the form of weight gain for rearing cows. Concentrate feed has a significant positive effect on production or

weight gain, according to Quang *et al.* (2015) and Indrayani *et al.* (2012), who stated that the provision of concentrate has a positive effect on increasing cow body weight. Sahara *et al.* (2015) emphasized that concentrate can affect weight gain in rearing

cattle because concentrate is a source of energy needed to increase body weight. Therefore, concentrate feeding needs to be appropriately managed so that it will provide optimal production.

The initial body weight of rearing cattle has a significant negative effect on the increase in rearing cattle; it means that the larger the initial body weight, the smaller the weight gain, following Koknaroglu *et al.* (2017), who explained that initial weight has a significant effect on body weight gain. Furthermore, in the research of Ngadiyono *et al.* (2019) and Firdausi *et al.* (2012), it is stated that if the body weight at the beginning of maintenance is low, it will have a high average body weight gain when compared to cows that have high body weight at the beginning of maintenance so that an alternative selection of cattle with initial body weight is needed.

## CONCLUSIONS

The partnership pattern on imported Cross ex Brahman breeds rearing involves people's farms with banks as the fund lender, insurance companies, and PT X as the initiator of the partnership. Based on the feasibility analysis financially and economically, the partnership pattern of imported Cross ex Brahman breeds rearing is worth cultivating.

The farmer's income with an interest rate of 9% per year can meet the regional minimum wage, but if the interest rate increases above 13%, it cannot meet the farmer's UMR. The amount of concentrate given has a significant positive effect on production in weight gain for rearing cattle, while initial body weight has a significant negative effect on production. An increase in production or livestock body weight can be managed by providing concentrate and selecting the appropriate initial weight for maintenance.

The partnership scheme developed by PT X can support an increase in the feeder cattle population and benefit smallholder beef farmers and all the corporations involved.

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