Business Income Analysis of Fattening Bali Cattle on Feedlot Systems which are Provided by Local Grass and Concentrate

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I Gusti Nyoman Gde Bidura, B.R.T. Putri, Ida Ayu Kade Widiani, and I Gusti Putu Bagus Suastina

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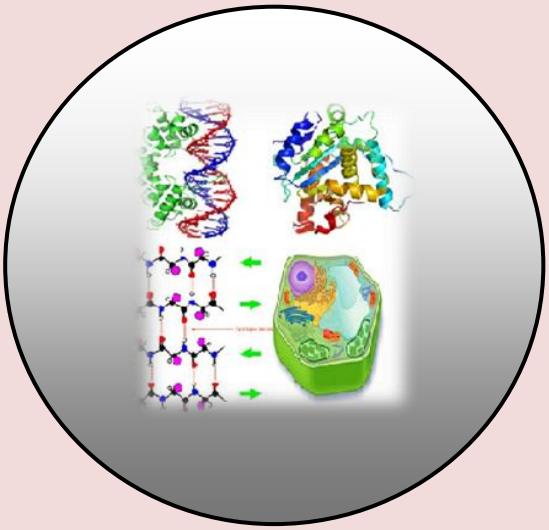

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Business Income Analysis of Fattening Bali Cattle on Feedlot Systems which are Provided by Local Grass and Concentrate

I Gusti Nyoman Gde Bidura, B.R.T. Putri, Ida Ayu Kade Widiani, and *I Gusti Putu Bagus Suastina
Magister Program of Animal Science, Faculty of Anim. Sci., Udayana University, Denpasar-Bali, Indonesia
***Sekolah Tinggi Ilmu Ekonomi 45, Mataram-Lombok, Indonesia**

ABSTRACT

The purpose of this study was to determine the level of income of Bali cattle fattening in the feedlot system which was fed local grass and concentrate in the "Amerta Sari" livestock farmer group in Kerambitan District, Tabanan-Bali Regency, Indonesia. A total of 18 fattenening bali cattle with homogenuous body weight were randomly allotted into three feed treatments. The three feed treatments were groups of cattle fed only local grass (Po), local grass+1.5kg of commercial concentrate (P1); and local grass feed+1.5kg of rice bran concentrate (P2), respectively. The results showed that the performance of cattle in the P1 and P2 treatments were significantly different (P<0.05) higher than in the P0 treatment. However, the provision of commercial concentrates significantly (P<0.05) decreased farmer income, and not significantly different (P>0.05) when given rice bran concentrate. In conclusion that supplementation of concentrate feed (rice bran and commercial concentrate) in the business of fattening Bali cattle with a feed lot system based on field grass feed can improve the performance of Bali cattle. Supplementation of rice bran concentrate does not affect farmers' income.

Key words: Feedlot, Rice Bran, Concentrate and Cattle.

INTRODUCTIONS

Cattle fattening business is one of the leading business sectors of the local government which has the potential to be developed and is very attractive to the community. Beef cattle business or bali cattle fattening, in addition to being a source of economic improvement is also a support for family income that provides employment for farmers and their families (Warmadewi *et al*., 2019). Bali cattle are native to Indonesia and are domesticated directly from Banteng (*Bos sondaicus*) (Handiwirawan and Subandriyo, 2004). A Bali cattle is a native germplasm of Indonesia which is clearly a national asset that is not owned by any country in the world (Bidura, 2019). Bali Province is believed to be the only region that has pure Balinese cattle, so this germplasm needs to be protected by national policies, so that it can be optimally utilized and preserved (Kesuma *et al*., 2019).

Bali Cattle is one of the breeds of cattle from the tropics that has a fairly good body conformation that is the growth of the front and back of the body is balanced, so it is seen as a breed of beef cattle that has a pretty good future. Bali cattle have various advantages compared to other local cattle, including having a high resistance to disease, resistant to extreme environments, able to digest and utilize feed with high levels of crude fiber, as one of the beef cattle's that has the highest percentage of carcasses in the world, has meat with lower cholesterol content (Bidura, 2019).

The Indonesian Central Statistics Agency (2016) states that the type of beef cattle that is most commonly kept is Bali cattle reaching 32.31%, which is about 4.8 million head of the national beef cattle population, but its productivity is still low. The average daily body weight gain of local beef cattle in Indonesia is only 0.37 kg, whereas the ideal condition is 0.8-0.9 kg (Soedjana *et al.,* 2012). Due to low productivity, local cattle in Indonesia are more often slaughtered when they reach 60% -80% of their genetic and economic potential (Diwyanto and Saptati, 2010). Genetically, according to Diwyanto and Priyanti (2008), the ideal final weight of male Bali cattle can reach 300-400 kg. The appearance of Bali cows (growth, meat quality, child production and milk) can be improved by increasing the quality of feed supply (Mastika and Puger, 2009).

Bali cattle population fluctuations in the province of Bali which tend to decline from 2014 to 2017 due to land conversion, which farmers horticulture farming because the results obtained are better so that the impact of agricultural land narrowing is one of the factors causing the decline in the level of bali cattle population (Dirjen Peternakan dan Kesehatan Hewan, Deptan, 2017). Provision of adequate feed, both in quantity and quality will be able to increase cattle productivity. Balanced feed management, which is providing forages and concentrates that are suitable to the needs of cattle, will be able to increase cattle productivity.

Field grass is the main forage for ruminant animals that are often provided by breeders, because it is easily found around cages and rice fields. Field grass has a high ability to grow, especially in the tropics, although it is often cut, so it is expected to overcome the availability of feed to be available continuously. On the other hand, field grass has a very low nutrient content, which is 6-8% protein; 60% total digestible nutrients; and 28.06% crude fiber (Mathius *et al*., 2006).

Utilization of rice bran in cattle aims to increase the supply of nutrients for microbial degrading crude fiber in the rumen. Rice bran is waste from the processing of rice grain which is the outermost membrane of rice. According to Bidura (2007), rice bran contains crude fiber of 13.0% with protein content ranging from 12-13.5%. Rice bran contains metabolizable energy ranging from 1640-1890 kcal/kg, ether extract around 10-30%, unsaturated fatty acids which are quite high at 75-80%, while carbohydrate content of rice bran reaches 40-49% and partly in the form of starch.

Based on these conditions, the study was conducted aimed at analyzing the financial feasibility/income of Bali cattle fattening in the feed lot system which was given additional field-based grass concentrate. By doing this research, farmers are expected to be able to maximize their profits by reducing the cost of feed using feed ingredients from agricultural waste.

MATERIAL AND METHODS

Experimental design, animals, housing and diets

A total of 18 male Bali cattle aged 1.5 years were prepared in this study. The young male Bali cattle (calves) referred to are calves that will be fattened (heifers) maintained by the "Amerta Sari" Livestock Farmers Group, in Kesiut Village, Kerambitan Sub-District, Tabanan Regency, Bali, Indonesia. All calves used were kept in one colony enclosure and grouped into 6 groups with homogeneous body weights. The cages used in this study are individual cages. The roof of the cage uses asbestos. Each enclosure was equipped with a feed capacity of 30 kg with a size of 50x40x50 cm and a manual drinking water container made of a plastic bucket with a capacity of ± 10 liters. Feedlot was made of permanent cement, so it cannot be moved by cattle. Drinking places were placed in the feed, so it is easy to clean every day. The feed used in this study consisted of two types of feed, namely: forage as a basic feed and two types of concentrate. Forage in the form of field grass was given *ad libitum* and concentrate as much as 1.5 kg per head per day. Field grass used was grass that grows around the study area (rice fields and dry fields)

There were two types of concentrates used in this study, namely rice bran concentrate and factory concentrate (MegaPro). All concentrates were made in the form of flour. Feed were given twice, namely in the morning and evening. Food and drinking water containers were cleaned every morning. Drinking water provided for livestock was taken from spring sources (bore wells). The composition of ingredients and nutrient content of the ration is presented in Tables 1 and 2.

Table 1. Composition of feed in concentrate.

Composition of feed	(%)
Rice bran	23
Yellow corn	40
Soy bean	34
Gritz	3
Total	100

Table 2. Nutrient content in research feed.

Nutrient	P0 Native Grass	Concentrate	
		P1	P2
Dry matter (%)	20,79	88	89,38
Organic matter (%)	72,69	12	77,27
Crude protein (%)	12,5	15	21,05
Ether extract (%)	3,89	7	2,03
Crude fibre (%)	23,71	12	12,67
Total digestible nutrient (Kg)	31,24		52,06

Note:
1. Analysis Results at the Animal Nutrition Laboratory, Faculty of Animal Science, Udayana University, Denpasar
2. Table on MegaPro concentrate feed

Operational Definition of Research

To simplify the process of data analysis and to avoid errors in the understanding of the terms in this study, definitions and operational constraints are made as follows: (i) Cattle breeding business is a fattened beef cattle business carried out by the "Amerta Sari" Livestock Group located in Kesiut Village, Kerambitan District, Tabanan Regency, Bali, Indonesia; (ii) Revenue is the amount of money received from the sale of cattle, feces, and organic fertilizer in one maintenance period, which is measured in rupiah (Rp); (iii) Operating income is total revenue less total production costs in one maintenance period measured in rupiah (Rp); (iv) Total costs are all costs incurred consisting of fixed costs and variable costs, as factors in the production process in a maintenance period measured in rupiah (Rp); (v) Fixed costs are the amount of money spent in a cattle fattening business that is fixed in number and does not depend on the number of livestock kept, measured in units of rupiah (Rp); (vi) Variable costs are the amount of money spent in a cattle fattening business, the amount of which depends on the number of livestock raised is measured in rupiah (Rp); (vii) Investment costs are all costs incurred for the purpose of fattening beef cattle business investment, measured in rupiah (Rp); (viii) Fattened cattle productivity is the average daily weight gain (ADG) in a production process of fattened cattle before and after fattening. Productivity is calculated based on final body weight (kg/head) minus initial body weight (kg/head) during the observation time (days).

Techniques in Data Collection.

The data needed in this study were collected in three ways, namely: 1) direct interviews using structured questionnaires that have been prepared, 2) observations that observe the activities and results of business activities that have been carried out by farmers, 3) literature searches or documentation relating to research.

Analysis of operating revenues

Analysis of income in cattle fattening business in Tabanan was used to calculate the income of a business from the results of the business that has been done. Income to cattle fattening business owners can be divided into two, among others: 1) Income for all cash costs, ie. costs actually incurred by the business owner, and 2) Revenue for the total cost where all inputs are also calculated as costs. Income is total revenue after deducting production costs (all costs to be paid) in one maintenance period measured in rupiah (Rp). Gross income is the total production value before deducting production costs Mubyarto (1989). Total costs are total costs, including fixed costs and variable costs. Total Fixed Cost is all costs that must be spent in the production process to produce a product of a fixed amount, not influenced by the number of products produced. Total Variable Cost is the amount of production costs that change according to the amount of production produced, if the production is small, then the variable costs will be a little too.

$TC = TFC + TVC$

Note:

TC = *Total cost*

TFC = *Total Fixed Cost*

TVC = *Total Variable Cost*

Total revenue is all revenue obtained from cattle sales that have not been reduced by production costs. Total receipts can be calculated using the following formula:

$TR = QT \,.P + QK.P$

Note:

TR = *Total Revenue*

Q = Body weight of cattle

P = Price/kg of cattle

The income analysis used to determine the amount of income from a cattle fattening business can be stated in the following equation Mubyarto (1989):

$\pi = TR - TC$

Note:

Π = Revenue (Rupiah)

TR = *Total Revenue*) (Rupiah)

TC = *Total cost*) (Rupiah)

Revenue cost ratio (R/C ratio)

Economically, a business is said to be profitable or unprofitable, it can be analyzed using a comparison between total revenue and total costs called the Revenue Cost Ratio (R/C ratio), which is formulated as follows Mubyarto (1989):

$$\mathrm{R/C} = \frac{\text{Total revenue (TR)}}{\text{Total cost (TC)}}$$

Cattle fattening business can be said to be feasible if the R/C ratio obtained is greater than or equal to one. If there is a loss and it is not feasible to do if the value of R/C ratio obtained is smaller than one. If the greater the value of the R/C ratio, the more profitable the business is, because every rupiah value issued will provide even greater benefits. From the calculation of Revenue and Cost Ratio (R/C ratio) there are three investment eligibility criteria, namely:

a. If the R/C ratio is >1, then the business is declared worthy of continuing.
b. If the R/C ratio <1, then the business is declared not worth continuing.
c. If the R/C ratio = 1, then the business is at the breakeven point

Break even point (BEP)

Calculation of Break even point value (BEP) can be calculated by the formula Mubyarto (1989) as follows:

The BEP formula used to calculate how many head of cattle must be maintained in order to occur Break even point in this study, as follows:

$$\boldsymbol{BEP_{Produksi}} = \frac{\boldsymbol{TFC}}{(\boldsymbol{Pt.Qt} + \boldsymbol{Pk.Qk}) - \boldsymbol{Vc}}$$

Note:

TFC	=	*Total Fixed Cost* (TFC)
P_t	=	Price of cattle per head
Q_t	=	Number of cattle (head)
P_k	=	Stool price per kg(Rp)
Q_k	=	Number of stools(Kg)
Vc	=	Variable Cost per head (Rupiah / head / period of fattening)

The BEP formula for calculating the price per head so that a BEP occurs in this study is as follows:

$$\boldsymbol{BEP_{price}} = \frac{\boldsymbol{TC} - \boldsymbol{Pdk}}{\boldsymbol{Q}}$$

Note:

TC	=	*Total Cost* (Rupiah/period of fattening)
Pdk	=	Proceeds from selling faeces(Rp)
Q	=	Average amount of production (heads)

The formula for the amount of BEP to calculate how many receipts from sales received so that BEP occurs in this study as follows:

$$\boldsymbol{BEP_{sales}} = \boldsymbol{BEP\ Qt.Pt} + \boldsymbol{BEP\ K.Pk}$$

Note:

Qt	=	Body weight (kg)
Pt	=	Price of cattle
Qk	=	Weight of faeces
Pk	=	Price of faeces
BEP	=	Number of stools (faeces) at BEP

Statistical analysis

Data obtained from the results of this study were analyzed using one-way analysis of variance, if there were significant differences between treatments ($P<0.05$), then followed by Duncan's multiple range test.

RESULTS AND DISCUSSION

The survey results show that the main reason for the respondents of breeders doing business in fattening Bali cattle is as savings by 40.91% and increasing income by 22.73%, because this business is a side business of group members. Farmers who have a business motive to utilize forage and agricultural waste and as a spare time each have the same percentage of 13.64%, because members of this group are not purely agricultural actors. There are also as many as 9.04% of breeders who deliberately raise their livestock for the purpose of producing livestock manure which is used as fertilizer for their crops, because around the village there is an organic farming business. This was also confirmed by Kesuma *et al*. (2019) which stated that the main reason for breeders doing bali cattle farming was to use livestock as a family savings that could be sold when families needed large amounts of cash, in addition to utilizing agricultural waste, increasing income, and filling time spare Kesuma *et al*. (2019) also state that the reasons for farmers to raise livestock are for savings, utilizing agricultural and plantation waste, as well as leisure time fillers. More details are presented in Table 3.

As many as 45.45% of the members of the "Amerta Sari" livestock farmer group provide forage to their livestock without providing additional feed (rice bran or concentrate), and as many as 54.55% of group members provide additional feed given during the day, after grass in the morning and in the afternoon. Drinking water is given to livestock by using a bucket placed in a feed tank that is given ad linitum.

Bali cattle performance in feed lot

The effect of supplementary feeding based on rice bran and commercial concentrate on Bali cattle on final body weight, weight gain, feed consumption, and value of feed covertion ratio (FCR) are shown in Table 4.

Table 3. Motives for raising cattle.

Motive for Trying	Number of cattle ranchers (people)	Percentage
As savings	9	40.91
To get organic fertilizer	2	9.09
Utilization of forage and agricultural waste	3	13.64
Increase revenue	5	22.73
To fill in spare time	3	13.64
Total	22	100

Table 4. Performance of male Bali cattle given local grass and concentrate.

Variables	Treatment Group[1)]			SEM[2)]
	P0	P1	P2	
Initial body weight (kg)	148.67[a]	148.83 [a]	147.67 [a]	4.654
Final body weight (kg)	166.83 [a3)]	206.5[b]	198.25 [b]	6.793
Body weight gains (kg/ head/day)	0.22 [a]	0.69 [b]	0.60 [b]	4.373
Feed consumption (kg DM/head/day)	4.71 [a]	4.97 [a]	4.98 [a]	8,9
Feed Convertion Ratio (FCR)	21.79 [b]	7.24 [a]	8.27 [a]	1.681

Note:

1. Bali cattle fed with grass field *ad libitum* (P0), plus 1.5 kg of commercial concentrate (P1) and 1.5 kg of rice bran based concentrate (P2).
2. *SEM: standard error of treatment means*
3. Means with different superscripts within raw values are significantly different (P<0.05)

Figure 1. Performance of Balinese cattle fed local grass (left), supplemented with rice bran concentrate (center), and fed commercial concentrate (right).

The results showed that cattle that received concentrate on the final body weight of P0 Group cattle were 166.83 kg; P1 206.50 kg; and P2 198.25kg. The final body weight of group P0 cattle was significantly different (P<0.05) with groups P1 and P2. The final body weight of P1 group cattle was 19.21% as high as P0 (P<0.05) and 3.99% of P3 (P>0.05). The right concentrate mixture on the P1 treatment gives the highest end weight, this is in line with the opinion of Partama (2013) which states that the concentrate will accelerate the body weight gain of cattle and increase feed efficiency better. One optimization to get better feed utilization efficiency is to determine the right amount of concentrate. In Group P1 cattle use commercial concentrates, so that the content of gums or supplements in this concentrate is easier to digest cows.

The results showed that the highest body weight gain in the P1 treatment was 0.69kg/day compared to the P0 treatment of 0.22kg/day ($P<0.05$) and P2 Group was 0.60kg day ($P>0.05$). In the P1 treatment a higher level of protein and energy consumption will result in a higher growth rate. The effect of nutrition will be greater if the treatment begins at the beginning of the growth period. So growth can be manipulated by different nutritional treatments (Partama, 2013). Average daily body weight gain in local cattle according to Soedjana et al. (2012) were 0.30-0.75 kg/day for PO or Ongole cattle of; 0.35-0.66 kg/day for Bali cattle; and 0.25-0.60 kg/day for Madura cattle. This means that the daily body weight gain of cattle in the study tends to exceed the average daily body weight gain of local cattle in general. In Figure 1, the performance of bali bulls displayed in the local grazing land, given grass, and additional concentrate.

The results showed that the FCR value (ration consumption: weight gain) in the P0 Group cattle was highest with a value of 21.79 compared to P1 of 7.24; and P2 at 8.27. Statistically the P0 treatment was significantly different ($P<0.05$) higher than the P1 and P2 treatments. The FCR average is strongly influenced by the quality or nutritional content of the feed, as well as the ability of the cow to use nutrients in the feed for body growth (Kesuma *et al*., 2019). The average FCR value is obtained from a comparison of the amount of feed consumed with beef body weight gain. The higher the FCR value, the lower the effectiveness of the feed to produce cattle body weight gain. The average conversion of feed costs to body weight gain is an economical measure of feed costs that must be incurred to produce weight gain.

Table 5. Economic analysis.

	Description	Value for 3 months for each treatment		
		P0	P1	P2
A	Business acceptance			
	Sale of bulls	6.673.200	8.260.000	7.930.000
	Sale of cattle feces	480.000	480.000	480.000
	Total Revenue	7.153.200	8.740.000	8.410.000
	Total Revenue / month	2.384.400	2.913.333	2.803.333
B	Business expenses			
	Purchase of male calves	4.462.800	4.464.900	4.430.100
	Feed	1.059.750	3.354.750	2.330.640
	Vaccines, drugs and vitamins	120.000	120.000	120.000
	Total Variable Cost	5.642.550	7.939.650	6.880.740
	Total Variable Cost / month	1.880.850	2.646.550	2.293.580
	Electricity cost	36.000	36.000	36.000
	Water Cost	75.000	75.000	75.000
	Cost of maintaining the cage	50.000	50.000	50.000
	Total Fixed Costs	161.000	161.000	161.000
	Total Fixed Cost / month	53.667	53.667	53.667
	Total cost	5.803.550	8.100.650	7.041.740
C	Income	1.349.650	639.350	1.368.260
D	BEP			
	Production	4	10	5
	Price (kg)	34.787	48.556	42.209
	Reception	762.364	1.758.156	885.402
	R/C Ratio	1,23	1,08	1,19

Note: Bali cattle fed with native grass *ad libitum* (P0), plus 1.5 kg of commercial concentrate (P1) and 1.5 kg of rice bran concentrate (P2).

Economic Analysis

Analysis of income in cattle fattening in cattle groups in Tabanan-Bali Regency, Indonesia can be divided into two, namely: (i) Income for all cash costs, i.e. costs actually incurred by business owners, and (ii) income from costs total, where all inputs are also calculated as costs. Income is total revenue after deducting production costs (all costs to be paid) in one maintenance period measured in rupiah (Rp). Gross income is the total production value before deducting production costs Mubyarto (1989). Total cost is the overall cost, including fixed costs and variable costs. Total fixed cost is all costs that must be spent in the production process to produce a product of a fixed amount, not influenced by the number of products produced. Total variable cost is the amount of production costs that change according to the amount of production produced, if production is small, the variable costs are few and vice versa.

Based on the results of economic analysis in the treatment of P0, P1, and P2 (Table 5), the BEP value of the unit was as follows: 4; 10; and 5. It means, each farmer must maintain a minimum amount of cattle according to the number of each treatment in order to break even. R/C is the value of the ratio between total revenue and total costs. The total income received in the P0 group was Rp. 2,384,400; grup P1 amounting to Rp. 2,913,333; and P2 group Rp. 2,803,333. Total costs incurred in the P0 group amounted to Rp. 1,934,517; P1 amounting to Rp. 2,700,217; and P2 in the amount of Rp. 2,347,247. Based on the description above, it can be said that the livestock business is declared profitable and feasible to be undertaken or continued. This can be seen from the comparison between total revenue and total costs whose value is greater than one, namely in Group P0 has a number 1.23>1, Group P1 has a number 1.08>1, and Group P0 has a number 1.19>1 In other words, an R/C value of 1.23 means that for every Rp.100; costs incurred, then can earn an income of Rp. 123;

CONCLUSION

We conclude that supplementation of concentrate feed (rice bran and commercial concentrate) in the business of fattening Bali cattle with a feed lot system based on field grass feed can improve the performance of Bali cattle. Supplementation of rice bran concentrate does not affect farmers' income.

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Corresponding authors: I.G.N.G. Bidura, Magister Program of Animal Science, Faculty of Anim. Sci., Udayana University, Denpasar-Bali, Indonesia
Email: bidura_unud@yahoo.com