



The Feasibility of Business of Buffalo Used in the Traditional Funeral Ceremony (*Rambu solo*) in West Sulawesi, Indonesia

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Abstract | A study was carried out to evaluate the business feasibility and analyze the influence of the production factors on the profit of the buffalo farming business used in funeral ceremony in West Sulawesi Province. This study used a survey method. The locations were selected by purposive random sampling for the highest population of buffalo. One hundred buffalo farmers were taken as respondents by a multistage random sampling method. The data were obtained by observation and direct interviews the farmers. The data was analysed descriptively and quantitatively. The study showed that there are two kinds of buffalo in West Sulawesi, the first one is the expensive buffalo and raised by intensive system. The expensive buffalo were consisted of *Saleko*, *Doti Salamba* and *Bonga*. The another one is *Pudu* (black) buffalo that reared by grazing system. The results showed that Return on Investment (ROI) of the buffalo farming business was 54.3%, Net Present Value (NPV) was IDR 6,642,607, Benefit Cost Ratio (BCR) was 1.25. The factors of production inputs simultaneously significantly affected farmers profit ($P < 0.05$). Forage cost and capital were the main production factors affecting the profit of the buffalo farming business ($P < 0.05$). It is concluded that buffalo farming to fulfil the “Rambu Solo” traditional Ceremonial needed was profitable and feasible to run.

Keywords | Buffalo, Business, Feasibility, Factors, Production

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INTRODUCTION

Rambu Solo is a famous traditional funeral ceremony performed by Torajans (people of Toraja ethnic) in Sulawesi and has been existing for hundreds of years and involves numerous people. The Toraja ethnic is especially the term for the indigenous people who live in Tana Toraja Regency which is located in the mountainous area of South Sulawesi province, Indonesia. In this tradition, dappled buffaloes with specific pattern are used as offerings. The dapple pattern and number of buffaloes slaughtered determine the social status, richness and importance of

the dead (Idaman, 2012). It is believed that the buffaloes sacrificed are considered as vehicles used by the spirits of the dead to get the *puya* (heaven) (Becker *et al.*, 2017; Aswar *et al.*, 2020), the higher the number and the price of the buffalo being sacrificed, the faster the spirit will arrive the *puya* (Hoppenbrouwers *et al.*, 2018; Handayani *et al.*, 2020).

The demand of buffaloes always increases, especially the demand from Toraja Regency. The high demand for buffalo in Tana Toraja Regency leads the increase of importation of buffalo from the surrounding regions, such as regencies in

West Sulawesi Province, the people of West Sulawesi have close social and cultural relations with those of Tana Toraja (Suryaalim and Fausiah, 2022). The demand for buffalo will increase if Rambu Solo ceremony will be held. The increase in demand for buffalo is not based on consumers' need for meat, but depends on the social status of the family that will carry out the funeral ceremony. Rambu solo will be carried out if the family has sufficient finances to hold the ritual. The higher number of buffalo sacrificed is, the higher social status will be.

West Sulawesi Province is potential for developing buffalo farming. The population of buffalo in this province has been increasing from year to year, namely 8,725 in 2019, 8,948 in 2020 and 9,412 in 2021 (Directorate General of Livestock and Animal Health, 2023). The high demand of buffalo induces an opportunity to develop buffalo farming business in West Sulawesi and improves the economy of buffalo farmers. However, efforts to develop buffalo needs more attention to the availability of natural resources and the farmer's capability (Prematilaka *et al.*, 2017; Widaningsih *et al.*, 2023). The development of buffalo business is influenced by several factors. Buffalo business varies from one region to another. Experts have developed many theoretical and practical steps to improve buffalo businesses (Atmoko *et al.*, 2023; Widaningsih *et al.*, 2023; Hegde, 2019). However, study on the sustainability of buffalo business in West Sulawesi to fulfil the traditional funeral ceremony (*Rambu solo*) is still very limited. This study was to determine the production factors and the business feasibility that influenced the sustainability of business of buffalo used in traditional funeral ceremony in West Sulawesi Province, Indonesia.

MATERIALS AND METHODS

STUDY SITE

This study was carried out in West Sulawesi Province, Indonesia. The location of this study was determined by purposive random sampling. The selected regions were 3 regencies in West Sulawesi Province which had the largest buffalo population according (Directorate General of Animal Husbandry and Animal Health, 2022). The sampling technique was conducted using a multistage random sampling method, which was a combination of random and proportionate sampling systems in varying orders. Firstly, 3 regencies with the largest buffalo population were selected, namely Mamasa Regency, Mamuju Regency and Polewali Mandar Regency. Secondly, two districts in each regency were selected for the largest buffalo population. Thirdly two villages of each district with the largest population were selected. Fourthly, in each selected village 8-10 farmers were chosen as respondent, so that there were 100 farmers were chosen as respondents.

DATA COLLECTION

The primary and secondary data were obtained by a survey method. The primary data were collected by interview techniques with buffalo farmers based on a list of questions that had been prepared in the form of a structured questionnaire. The secondary data were obtained from related governmental agencies in West Sulawesi Province.

DATA ANALYSIS

The data obtained were analyzed quantitatively and descriptively. The buffalo rearing practice was analyzed descriptively. The income of the farmers and the buffalo business feasibility were analyzed by quantitative methods. The business feasibility in financial aspects included farmer's income, Return on Investment (ROI), Net Present Value (NPV) and Benefit-Cost Ratio (BCR) and business efficiency were analysed (Santoso *et al.*, 2023). The calculations of Farmer's income, ROI, NPV and BCR used the following formula.

FARMER/S INCOME:

$$\pi = TR - TC$$

π = Income (IDR); TR = Total Revenue (IDR); TC = Total Cost (IDR).

RETURN ON INVESTMENT

$$ROI = \frac{\text{Return}}{\text{total investment}} \times 100\%$$

NET PRESENT VALUE

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

Net Present Value (NPV) was a prediction for the next few years.

DECISION RULE

NPV > 0 (positive NPV): The business was feasible if the benefits received were greater than the costs incurred. NPV < 0 (negative NPV): The business was not feasible to carry out, if the costs incurred were greater than the benefits received.

BENEFIT/ COST RATIO

$$\text{Net BCR} = \frac{\sum a \text{ positive Present Value net Benefit}}{\sum a \text{ negative present Value net benefit}}$$

DECISION RULE

Net BCR > 1: the business was profitable and feasible to operate. Net BCR < 1: the business was unprofitable and not feasible to operate

FACTORS INFLUENCING INCOME OF THE FARMERS

Production factors influencing the income of farmers was determined by Multiple linear regression analysis. The multiple linear regression model was:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \mu$$

Y= Farmer's income (Rp/year); a = constant; X1 = Cost of feed (IDR/Kg); X2 = Livestock ownership scale (AU); X3 = Labour wages (IDR/HKP); X4 = Capital (IDR); X5 = Breeding experience (Years); b = Independent variable regression coefficient; μ = Error (disturbance term).

RESULTS AND DISCUSSION

RESPONDENT PROFILE

The profile of buffalo farmers in West Sulawesi Province can be explained in Table 1. Most of the respondents (69%) aged 27-59 years. The rest of respondents (31%) aged over 59 years. These results showed that the most of buffalo farmers were in the productive age. Kamal *et al.* (2014) stated that the productive age range is 15-59 years. Management of large ruminant farming business using a grazing pattern requires workers who are still young and productive because they have strength and good health. Setiadi *et al.* (2012) claimed that farmers of the productive age had ability to develop their livestock business.

Most of the respondents (80%) had farming experience over 10 years. The more the farming experience, the more the farmer able lead to business management, so that it can increase the farmer's income. The study of Eddy *et al.* (2012) showed that experience influences technology adoption which supports farmers knowledge, attitudes and decision making. There were 36% respondents who had finished elementary school, and 10% respondents who never attended school, and there were 10% respondents who finished Junior High School. The rest of the respondents (44%) finished Senior High School or higher education. The outlook of the farmers is influenced by their education level. Level of education is related to the level of knowledge. The respondents' knowledge about raising buffalo was obtained from their parents, their own experiences and learning from the experiences of others. According to Tatipikalawan (2012), low levels of education make it difficult for buffalo farmers to adopt new innovations. According to Maryam *et al.* (2022), the higher of the farmer education, the higher the motivation of the farmer to develop his buffalo farming business, because the farmers can accept new knowledge and implement their knowledge easily.

The main occupation of almost all respondents (99%) were not buffalo farmer (Table 1, they raised buffalo as a side job. Only 1% of respondent was a buffalo breeder. This implied

that the respondents received their main income from their main job. This condition might cause the respondents not to raise their buffaloes in an intensive way. In turn, the productivity of the buffaloes was not optimum to give significant income to the respondents.

Most of the respondents (54%) had only 1-3 heads of buffalo, 32% respondents had 4-6 heads, 10% respondents had 7-10 heads, and only 4 % of respondents tail who had 11 heads or more. This meant that almost all respondents only had small number of buffalo, and they raised their animals in a simple way. Most of the respondents (63%) raised ordinary Pudu (black) buffalo), and 37% respondents had dappled buffalo. The respondents who had dappled buffalo were relatively rich, because they had to have a big capital to buy and raised dappled bufaaloes.

THE KIND OF BUFFALO

In general, the buffalo developed in Indonesia are swamp buffalo (*Bubalus bubalis*). The visual characteristics of the swamp buffalo in Indonesia are gray skin, with long hair and semi-circular horns like a crescent moon. The study of Yendraliza (2012) and Windusari *et al.* (2015) found that swamp buffalo's skin color is dominantly gray with long black hair and the pattern of horns are semi-curved upwards forming a sickle like a crescent moon. In West Sulawesi, many kinds of buffalo that have unique characteristics and usually used as an offering at a famous funeral ceremony. Mangopang *et al.* (2018) and Baan *et al.* (2022) claimed that the buffalo is valuable because it is a symbol in holding cultural ceremonies and depicts the social status of the family. The more unique the color pattern, the more expensive the price, especially if it is approaching the day of the ceremony.

The buffalo are Saleko, Doti Salamba, Bonga included in the expensive buffalo and Pudu (black) buffalo. Saleko is a type buffalo that having a dominant reddish white skin color with black dappled all over its body, and they have crescent moon white horns. Saleko prices can reach hundreds of millions. According to Baan *et al.* (2022) the price of Saleko buffalo can reach 1 billion. Doti salamba has almost the same pattern and skin color composition as Saleko, but the different is Doti salamba having the white basic skin color with only one black dappled on its skin.

The characteristics of bonga buffalo is having skin black color and short hair on whole body while only head and foot having white color. Similar to Bonga, Talebong have black skin color with long hair in whole body, but the skin face of Talebong is white. Pudu buffalo is a regular type of buffalo in West Sulawesi. Similar to the swamp buffalo in Indonesia and the price is cheapest than dappled buffalo. In general, Pudu have gray skin and hair whole body but Pudu with white eyes is included in the expensive buffalo.

Study by Saleh and Asnawi (2014) found that the price of buffalo in Sulawesi was affected by 93% the pattern of dappled on its skin, 73% eyes color, 63% color and pattern of horns, 60% tail and hair. Suryaalim and Fausiah (2023) stated that price and demand for buffalo in Sulawesi is relatively in line with the needs of buffalo in various socio-cultural activities of the community. The color and dappled pattern on the skin also determines the highest price. The more numerous and unique the dappled pattern, the more expensive the buffalo will be. Lastly, based on horns, the longer and more circular the shape of the horn, the higher the price of the buffalo.

BUFFALO REARING SYSTEM

The rearing system of the expensive buffaloes (Saleko, Doti salamba, Bonga, and Taledong) was different from the black one (Pudu) in general. These expensive buffaloes were kept intensively and kept in cages. The feed provided were napier grass, setaria grass, straw, field grass, corn bran and rice bran. The previous study by Rompis et al. (2013) showed that most of the dappled buffaloes were intensively in pens and fed napier grass. It was due to keep care the expensive buffalo and increase the productivity. Luthfi et al. (2022) stated that intensive rearing system and high feeding level increased animal productivity, feed efficiency, decrease the rearing period.

Different from the dappled buffalo, rearing system of black buffalo was still very traditional. Most of the

buffaloes were grazed on the pasture, some were grazed on rice field bunds and some were reared intensively in the animal houses. In general, buffalo farmers in West Sulawesi provided Napier grass, natural grass, rice straw and setaria grass to the buffaloes in the animal house. For the expensive buffalo or often called marked buffalo, there was additional feed, namely rice bran and corn bran. The study proved that high buffalo production might cannot be achieved without providing high nutrition feed. Several previous studies showed that buffalo was generally still keeping in traditional system in several countries. Buffaloes were grazed in the field, while to increase productivity farmers provide additional feed in the form of concentrate (Uzun et al., 2020; Sacchi et al. 2020; Ozturk et al. 2022). Asryani (2017) stated that a simple tradition of raising buffalo in Sulawesi was related to a number of customary rules or prohibitions so that the activity of raising buffalo consumed various natural resources or in other words there was almost no exploitation of natural resources. Sembiring (2012) found that the nutrient requirements depend on the weight of the livestock, the growth or reproduction phase and the growth rate.

REVENUE

The revenue of buffalo business in West Sulawesi was presented in Table 1. The study showed that the revenue obtained from the buffalo farming business in West Sulawesi came from number of buffalo sold. The respondent who had buffalo did not sell their buffalo in every year.

Table 1: Analysis of buffalo farming business revenue in West Sulawesi.

Buffalo	2021			2022			2023		
	Head	price per head (IDR)	Revenue (IDR)	Head	price per head (IDR)	Revenue (IDR)	Head	price per head (IDR)	Revenue (IDR)
Saleko buffalo bull	2	265,000,000	530,000,000	1	190,000,000	190,000,000	1	120,000,000	120,000,000
Doti salamba	1	70,000,000	70,000,000						
Saleko buffalo calf							1	35,000,000	35,000,000
Bonga buffalo cow	2	40,000,000	80,000,000				2	23,500,000	47,000,000
Bonga buffalo bull	4	51,250,000	205,000,000	5	78,000,000	390,000,000	7	74,285,714	520,000,000
Bonga Buffalo calf							1	20,000,000	20,000,000
Bonga buffalo heifer							1	25,000,000	25,000,000
pudu buffalo cow	6	23,166,667	139,000,000	10	26,800,000	268,000,000	15	23,533,333	353,000,000
Pudu buffalo bull	10	32,100,000	321,000,000	12	34,666,666	416,000,000	46	24,967,391	1,148,500,000
Male pudu buffalo calf	4	16,375,000	65,500,000	4	21,750,000	87,000,000	15	15,600,000	234,000,000
Female pudu buffalo calf	2	14,500,000	29,000,000	1	15,000,000	15,000,000	11	9,636,363	106,000,000
Pudu buffalo bullock	6	22,516,667	135,100,000	1	2,000,000	21,000,000	14	21,607,142	302,500,000
Pudu buffalo heifer	3	16,666,667	50,000,000	3	18,666,666	56,000,000	3	18,000,000	54,000,000
Talebong buffalo bull	2	24,000,000	48,000,000				1	35,000,000	35,000,000
Rejected pudu							1	20,000,000	20,000,000
Total	42	575,575,000	1,672,600,000	37	405,883,333	1,443,000,000	119	466,129,945	3,020,000,000
Average of revenue			16,726,000			14,430,000			30,200,000

Sources: Primary data 2023.

Table 2: Analysis of production cost for buffalo farmers in West Sulawesi.

No	Variables	Cost of production 2021 (IDR)	Cost of production 2022 (IDR)	Cost of production 2023 (IDR)
Fix cost				
1	Buffalo depreciation	784,533.33	784,533.33	784,533.33
2	Cage depreciation	139,968.00	139,968	139,968
3	Facility depreciation	16,144.20	16,144.20	16,144.20
	Total fix costs	940,645.53	940,645.53	940,645.53
Variable costs				
1	Feed	1,518,400	2,804,295	4,562,500
2	Labor	1,904,900	2,350,982.134	3,091,142
3	Medicine	14,300	20,580	39,700
	Total of variable costs	3,437,600	5,175,857,134	7,693,342.85
	Total of production cost	4,378,245.53	6,116,502.67	8,633,988.39

Sources: Primary data 2023

The kind of buffalo sold consisted of buffalo calf aged 0-1 years, young buffalo aged 1-2 years and buffalo male and female aged more than 2 years. The selling of buffalo was also dominated by a type of buffalo color which was called dappled buffalo i.e., *Saleko*, *Bonga*, *Talebong* and *Pudu* (black buffalo). Based on the study, it showed that, there was a different revenue in different year and different type. The selling buffalo in 2021 was higher than that of the selling in 2022 and 2023. It was due to the greater number of striped buffalo, namely *saleko* and *bonga* had been sold.

The dappled buffalo had highest price than the black one (*pudu*). The highest price buffalo was from *Saleko* buffalo bull which was IDR 265,000,000 per head. In the other hand, the lowest price buffalo was from female *pudu* buffalo calf which was IDR 9,636,363. Therefore, striped buffalo sold greatly affect farmers revenue.

The study also showed that the selling of dappled buffalo and black buffalo in 2023 was sharply increase and the average of revenue achieved IDR 30,200,000. The high revenue was due to the high number of dappled and black buffalo sold. The lowest revenue in 2022 because there were a few numbers of buffalo that was ready for sale yet. It was due to the buffalo were still very young to be sold. Rusdiana *et al.* (2020); Rahmat *et al.* (2019); Kristianto (2019) reported that the farmers revenue will be greater if there were enhancement in the number of buffalo and buffalo sold. The traditional funeral ceremony in Sulawesi made a high price of buffalo. It was because the striped buffalo that were sacrificed showed a high strata status that conducted the ceremonial. The more dappled buffalo sacrificed, the higher strata status of family (Baan *et al.* 2022). The highest revenue indicated that this business was profitable. Nafiu *et al.* (2020) claimed that the higher the revenue in breeding buffalo business so that the higher profitability will be.

COST OF PRODUCTION

The analysis of production of buffalo business in West Sulawesi was presented in Table 2. The study showed that cost of production consisted of fixed and variable cost. Fixed cost consisted of cage depreciation and facility depreciation. Cage depreciation was IDR 139,968 per year and facility depreciation was IDR 16,142 per year.



Figure 1: Saleko buffalo.



Figure 2: Bonga buffalo.



Figure 3: Talebong.



Figure 4: Pudu.

Based on the study, the variable cost consisted of buffalo depreciation, feed cost, labor, and medicine. The cost of buffalo depreciation was IDR 784,533.33 per year. Feed cost increased every year. Start from IDR 1,518,400 to IDR 4.562.500. It was due to the increase of feed price and population of buffalo. The largest component that significantly affected the variable cost was the feed (Ekowati *et al.*, 2018; Agus and Widi, 2018). O'Donovan *et al.* (2021) found that feed was the highest cost component that influence cost for rearing the animals and it was affected by the source and price of feed stuff.

The second highest cost of variable cost was labor and its cost also increased every year. It was due to the increase wage and the number of animals reared. In this study, the labor cost consisted of family members and workers. Farmers who have family members as labor were the people who main job was raising livestock. In the other hand, farmers who employed other people as laborers were farmers who main job was as employees in an agency. Ekowati *et al.* (2016) claimed that labor costs were also a large cost incurred by many farmers, considering the scarce availability of family labor, so that it costs needed to be sacrificed for this. Sugiarto *et al.* (2017) and Adrianus

et al. (2022) claimed that the most farmers in Indonesia using family members as labor to help rearing animals. The farmers assumed that this was intended to help reduce the labor cost. Even though farmers used their families as labor, it was still counted as labor costs based on the length of time of work to raise livestock.

The lowest of variable cost in this study was medicine of IDR 14,300 in 2021 and increased every year. It was due to the knowledge of farmers about animal health still limited. This study was in line with the finding of Adrianus *et al.* (2022) and Ekowati *et al.* (2018) that the medicine cost was the lowest variable cost in traditional rearing system. Based on this study, the variables cost for rearing buffalo in West Sulawesi were affected by feed, labor and medicine cost and this cost always increased every year. Nafiu *et al.* (2020) stated that the total production cost has increased every year due to increase in business scale.

PROFIT

The profit of buffalo business in West Sulawesi was presented in Table 3. The study found that farmer profit in 2021 was IDR 12,630,396.69, and decreased in 2022 as much as IDR 8,319,777.324, then sharply increased in 2023 as much as IDR 21, 566, 011.28. The high profit of farmer in 2021 and 2023 was influenced by the number and kind of buffalo sold. The average of profit was affected by revenue. The revenue of buffalo farming in this study influenced by the selling price of striped buffalo which were striped motifs, eye color, horn model and color, tail condition, feather swirls and body posture.

Table 3: Profit of buffalo farming in West Sulawesi.

Component	2021 (IDR)	2022 (IDR)	2023 (IDR)
Revenue	16,726,000.00	14,430,000.00	30,200,000.00
Cost of production	4,378,245.53	6,116,502.67	8,633,988.39
Profit	12,630,396.69	8,319,777.32	21,566,011.61

Sources: Primary data 2023

Mohammad and Asnawi (2014) and Suryaalim and Fausiah (2023) reported that the price of dappled buffalo was affected the pattern of strip on skin buffalo. The finding of Bahta and Baker (2015) and Sugiarto *et al.* (2017) showed that the higher number of animals may induce the profit and the livestock business efficiency.

FEASIBILITY ANALYSIS

The feasibility analysis of buffalo farming in West Sulawesi was presented in Table 4. This study showed that the Return of Investment (ROI) value in buffalo farming in West Sulawesi was 53.4%. ROI 53,4 % means every IDR 100 invested, the investment produces a profit of IDR 34. This result indicated that this business was feasible to be

sustained because the value of ROI was greater than the Indonesian Bank deposit interest rate in 2023 i.e., 6%. The high value of ROI induced the business to be carried out. The study by Haloho and Saragih (2021) found that the ROI of beef cattle farming was 27.45% and higher than that of bank interest rates. Lumenta *et al.* (2021) claimed that technical, technological and financial aspects were required to provide higher profits so that animals business can be developed.

Table 4: Feasibility analysis of buffalo farming.

No	Item	Number
1	Return on investment (ROI)	53,4 %
2	Net present value (NPV)	6.642.607
3	Benefit/cost ratio (B/C ratio)	1,25

Sources: Primary data 2023

Based on the study, Net Present Value (NPV) was IDR 6,642,607, NPV 6,642,607 means that the level of profit obtained is 6,642,607 after deducting investment. Therefore, this business was profit to carried out. a positive NPV value indicated that this buffalo business produced were more benefits received than that of costs incurred. This finding was greater than 0 so that the business was feasible. Haloho and Saragih (2021); and Lumenta *et al.* (2021) whose found if $NPV > 0$, indicated the livestock business can be sustained.

This study found that benefit-cost ratio obtained was 1.25. This result indicated that every additional cost of IDR 1 would increase the net benefit for buffalo farming business as much as IDR 1.25. If the benefit cost ratio value was higher than 1, it indicated that the business was feasible to continue. Finding by Santosa *et al.* (2023) revealed that the value of the B/C ratio was more significant than one. The Net Benefit Cost Ratio (B/C/ratio) was a ratio between the present value of positive net benefit and present value of negative net benefit (Nafiu *et al.*, 2020). Based on the feasibility analysis (ROI, NPV and B/C ratio), it can be seen that smallholder farming buffalo in West Sulawesi Province was feasible to run.

ANALYSIS OF FACTORS AFFECTING PROFIT IN BUFFALO FARMING

The factors that affect profit in buffalo farming business was presented in Table 5. The result of F test showed that the independent variables feed, capital, labor, farming experience and scale of ownership were highly significant associated with profit of buffalo farming in West Sulawesi ($P < 0.01$). The value of R^2 was 0.507. It indicated that feed, capital, labor, farming experience, and scale of ownership had affected the profit of buffalo farming as much as 50,7% while only 49.3% affected by the other variables. The regression model is:

$$Y = -343083.68 + 3,87 X_1 + 0,56 X_2 + 1,00 X_3 + 82177.18 X_4 - 2297203.82 X_5$$

Based on the study, the regression coefficient of the feed was 3.87 ($P < 0.01$). It indicated that the increase of feed as much as 1% increased the farmer's profit as much as 3.87%. Providing good quality of feed could fulfil nutrient requirements so that the feed increased the buffalo production. The study by Santoso *et al.* (2016, 2017) and Luthfi *et al.* (2022) found that high quality feed caused animal production increased. Feed cost was also the significant effect on farmer profits. This study was in line with the finding by Haloho *et al.* (2013) that feed costs affect farmers' profits by providing good quality of feed.

Table 5: Factors affecting profit analysis of buffalo farming business in West Sulawesi.

Variabel	Koefisien	Sig
Constanta	-343083.68	0.000
Feed	3.87	0.001*
Capital	0,56	0.007*
Labor	1.00	0.111
Farming experience	82177.18	0.651
Scale of ownership	-2297203.82	0.204
F Test	19.345	0.000

R Squared 50,7%; R 71,2%; Significantly: * $< 1\%$; Sources: Primary data 2023.

Based on the study, the regression coefficient of capitals was 0.56. It means that every increase of capital as much as 1%, it increased profit of buffalo business as much as 5.6%. The capital (X_3) significantly ($P < 0.01$) influenced on the profits of buffalo (Y) *ceteris paribus*. Capital is an important factor in the buffalo business because capital can finance all operational costs. The significant effect between capital and profit were proved by increasing capital to buy buffalo. Mostly, buffalo ownership in West Sulawesi is inherited from the farmer's parents. Capital in this study included buffalo, cage, and equipment that can support the buffalo rearing. Mostly farmer used grazing system to raise the buffalo. Therefore, it would be better if the farmer provided a cage for the buffalo to keep care the dappled and weaning buffalo (calf). According to study by Haloho *et al.* (2013) that capital is in the dairy farm business because it needs large enough capital to start the business and operational activities.

CONCLUSIONS AND RECOMMENDATIONS

The production factors that significantly influenced farmers profit were feed and capital. The Return on Investment (ROI) value of the buffalo farming business was 54.3%.

Net Present Value (NPV) was IDR 6,642,607. BCR was 1.25. Based on research results, the buffalo farming business in West Sulawesi was feasible to run. Buffalo was feasible technically and economically to develop beside to support the cultural ceremony also to provide meat as well.

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NOVELTY STATEMENT

Studies regarding the business analysis of buffalo used for traditional ceremonies have not been tested.

AUTHOR'S CONTRIBUTION

All authors contribute to the conduct of research, the writing process, and data analysis.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

REFERENCES

- Adrianus Y, Mekiaw A, Rizal Nurliah N (2022). Income analysis of cattle business integrated with rice farming in Semangga District, Merauke Regency, Indonesia. *J. Ilmu dan Teknologi Petern. Trop.*, 9(3): 625-629. <https://doi.org/10.33772/ijaas.v3i3.24965>
- Agus A, Widi TSM (2018). Current situation and prospect of beef cattle production in Indonesia. A review. *Asian-Australas. J. Anim. Sci.*, 31(7): 976-983. <https://doi.org/10.5713/ajas.18.0233>
- Asriany A (2017). Kearifan lokal dalam pemeliharaan kerbau lokal di desa randan batu kabupaten tana toraja. *Bull. Nutr. Makanan Ternak*. 12(2): 64-72.
- Aswar T, Sani MY, Basir M (2020). Function and meaning of symbolic fashion in Rambu Solo ceremony. *Eur. J. Res. Soc. Sci.*, 8(3): 17-25.
- Atmoko BA, Prabowo BW, Sumantri I, Prastowo S, Widyas N, Satya T, Widi TSM (2023). Conceptual framework for assessing sustainability of swamp buffalo production systems. *J. Buffalo Sci.*, 12: 44-54. <https://doi.org/10.6000/1927-520X.2023.12.06>
- Baan A, Deli M, Allo G, Anto A (2022). Heliyon The cultural attitudes of a funeral ritual discourse in the indigenous Torajan, Indonesia. *Heliyon.*, 8(2): 1-11. <https://doi.org/10.1016/j.heliyon.2022.e08925>
- Bahta S, Baker TSM (2015). Determinants of profit efficiency among smallholder beef producers in botswana. *Int. Food Agribus. Manage. Rev.*, 18(3): 107-129.

- Becker JC, Kraus MW, Same MR (2017). Cultural expressions of social class and their implications for group-related beliefs and behaviors. *J. Soc.* 73(1): 158-174. <https://doi.org/10.1111/josi.12209>
- Directorate General of Livestock and Animal Health. 2023. Accessed 24 March 2023. <https://sulbar.bps.go.id/indicator/24/571/1/populasi-kerbau-menurut-kabupaten.html>
- Eddy BT, Roessali W, Marzuki S (2012). Dairy cattle farmers behaviour and factors affecting the effort to enhance the economics of scale at Getasan District, Semarang Regency. *J. Indones Trop. Anim. Agric.*, 37(1): 34-40. <https://doi.org/10.14710/jitaa.37.1.34-40>
- Ekwati T, Prasetyo E, Handayani M (2016). The factors influencing production and economic efficiency of beef cattle farm in Grobogan Region, Central Java. *J. Indonesian Trop. Anim. Agric.*, 43(1): 76-84. <https://doi.org/10.14710/jitaa.43.1.76-84>
- General Directorate of Livestock and Animal Health. 2023. Accessed 24 March 2023. <https://sulbar.bps.go.id/indicator/24/571/1/populasi-kerbau-menurut-kabupaten.html>
- Haloho RD, Saragih CL (2021). Analisis kelayakan usaha peternakan sapi potong rakyat di kabupaten langkat. *Agrimor*, 6(1): 9-14. <https://doi.org/10.32938/ag.v6i1.1189>
- Haloho RD, Santoso SI, Marzuki S, Roessali W, Setiadi A (2013). Profit function analysis of dairy cattle farming in getasan and west Ungaran districts, Semarang regency. *J. Indonesian Trop. Anim. Agric.*, 38(2): 116-122. <https://doi.org/10.14710/jitaa.38.2.116-122>
- Handayani R, Ahimsa-Putra HS, Budiman C (2020). Out of crisis: Maintaining hegemony through Rambu Solo Ritual in Toraja. *Int. J. Indonesian Soc. Cult.*, 12(2): 246-258. <https://doi.org/10.15294/komunitas.v12i2.23014>
- Hegde NG (2019). Buffalo husbandry for sustainable development of small farmers in India and other developing countries. *Asian J. Res. Anim. Vet. Sci.*, 3(1): 1-20.
- Hoppenbrouwers T, Stanislaus S, Donzelli A (2018). From the womb to the tree Child-rearing practices and beliefs among the Toraja of Sulawesi Child rearing practices and beliefs. *J. Hum. Indonesia*, 18(3): 658-691. <https://doi.org/10.17510/wacana.v18i3.632>
- Idaman (2012). Religious ritual as a contestation arena: the Experiences of aluk todolo community in Tana Toraja of South Sulawesi. *JICSA*. 1(1): 141-173.
- Kamal MM, Bhuiyan MMU, Parveen N, Momont HW, Shamsuddin M (2014). Risk factors for postpartum anestrus in crossbred cows in Bangladesh. *Turk. J. Vet. Anim. Sci.*, 38(2): 151-156. <https://doi.org/10.3906/vet-1303-74>
- Kristianto LK, Fanani Z, Nugroho BA, Utami HD (2019). Buffalo breeding business system and feasibility analysis in rice fields plateau of north Kalimantan. *Int. J. Adv. Res.*, 7(3): 1112-1121. <https://doi.org/10.21474/IJAR01/8743>
- Lumenta IDR, Moningkey SAE, Oroh FNS (2021). Financial feasibility analysis study of beef cattle business in Minahasa regency. *IOP Conf. Ser. Earth Environ. Sci.*, 902: 012031. The 1st International Conference on Livestock in Tropical Environment (ICLiTE-1). <https://doi.org/10.1088/1755-1315/902/1/012031>
- Luthfi N, Adiwinarti R, Rianto E (2022). Effect of feeding level on growth rate, carcass characteristics and meat quality of thin tailed lambs. *J. Indonesian Trop. Anim. Agric.*, 47(4): 290-300. <https://doi.org/10.14710/jitaa.47.4.290-300>

- Mangopang J, Widiarto T, Sunardi S (2018). Tedong sebagai syarat dalam upacara Rambu Solo'di Kecamatan Makale Kabupaten Tana Toraja. *J. Keguruan Ilmu Pendidikan*. 7(3): 18-24.
- Maryam MH, Sugiharto ST, Nugroho TRDA (2022). Analysis of breeder motivation in raising Madura cattle at West Waru Village, Waru District, Pemekasan Regency. *Agrisocionomics*. 6(2): 253-268.
- Mohammad SI, Asnawi A (2014). Identifikasi Karakteristik Kerbau Belang Yang Menentukan Harga Jual Tertinggi Di Pasar Hewan Bolu Kabupaten Toraja Utara. *J Ilmu Ilmu Perternakan*, 1(2): 168-176.
- Nafiu LO, Ode L, Sani A, Salam I (2020). Smallholder farm-based buffalo breed-ing in bombana regency reviewed from financial feasibility aspect. *Int. J. Sci. Eng. Res.*, 11(1): 1228-1232.
- O'Donovan M, Hennessy D, Creighton P (2021). Ruminant grassland production systems in Ireland. *Irish J. Agric. Food Res.*, 59(2): 225-232. <https://doi.org/10.15212/ijafr-2020-0118>
- Ozturk N, Kocak O, Peker A, Serva L, Kaygisiz F, Kecici PD, Yalcintan H, Kilic HI, Magrin L (2022). Characteristics of buffalo farming systems in turkey based on a multivariate aggregation of indicators: A survey study. *Animals*, 12(21): 1-19. <https://doi.org/10.3390/ani12213056>
- Premathilaka S, Seresinhe T, Gajaweera C (2017). Socio-economic characteristics of small-scale buffalo farms in Tanamalwila Area in Moneragala District of Sri Lanka. *Int. Semin. Livest. Prod. Vet. Technol.*, pp. 198-203. <https://doi.org/10.14334/Proc.Intsem.LPVT-2016-p.198-203>
- Rahmat M, Premono BT, Ulya NA, Waluyo EA, Sumardi A, Azwar F, Kurniawan A, Muhakka (2019). Management of swamp buffalo farms in forest areas to preserve forest ecosystem and sustainability of community livelihoods. *IOP Conf. Ser. Earth Environ. Sci.*, 298: 012038. <https://doi.org/10.1088/1755-1315/298/1/012038>
- Rompis JEG, Paat JF, Kawatutu MM, Demmalona (2013). Tatalaksana pemeliharaan ternak kerbau belang di kecamatan mamasa kabupaten mamasa provinsi sulawesi barat. *Jurnal ZooteK (ZooteK J.)*, 33(1): 68-79. <https://doi.org/10.35792/zot.33.1.2013.3337>
- Rusdiana S, Praharani L, Sianturi RG (2020). The economic efficiency of buffalo business (*Bubalus bubalis*) with the shepherd. *SOCA: J. Soc. Ekonomi Pertanian*, 14(2): 275-287. <https://doi.org/10.24843/SOCA.2020.v14.i02.p08>
- Saleh I M, Asnawi A. (2014). Identifikasi Karakteristik Kerbau Belang Yang Menentukan Harga Jual Tertinggi Di Pasar Hewan Bolu Kabupaten Toraja Utara. *JiIP*, 1(2): 168-176.
- Sacchi R, Marrazzo A, Masucci F, Di A, Francia F, Serrapica AG (2020). Effects of inclusion of fresh forage in the diet for lactating buffaloes on volatile organic compounds of milk and mozzarella cheese. *Molecules*, 25: 1-13. <https://doi.org/10.3390/molecules25061332>
- Santoso SI, Suprijatna E, Setiadi A, Susanti S (2016). Effect of duck diet supplemented with fermented seaweed wastes on carcass characteristics and production efficiency of indigenous Indonesian ducks. *Indian J. Anim. Res.*, 50(5): 699-704. <https://doi.org/10.18805/ijar.11160>
- Santoso SI, Susanti S, Setiadi A (2017). Economic analysis of male broiler chickens fed diets supplemented with *Salvinia molesta*. *Int. J. Poult. Sci.*, 16(6): 233-237. <https://doi.org/10.3923/ijps.2017.233.237>
- Santoso SI, Setiadi A, Prastiwi WD (2023). Sustainability performance of indonesian duck farming and the related determinants. *Adv. Anim. Vet. Sci.*, 11(7): 1176-1182. <https://doi.org/10.17582/journal.aavs/2023/11.7.1176.1182>
- Setiadi A, Santoso SI, Nuswantara LK, Sunarso (2012). Some factors influencing the income of kaligesing goat farmers in Borobudur subdistrict, magelang regency, Central Java, Indonesia. *J. Indonesian Trop. Anim. Agric.*, 37(4): 308-312. <https://doi.org/10.14710/jitaa.37.4.308-313>
- Sembiring F, Hamdan, Mirwandhono E. 2012. Analisis morfometrik kerbau lumpur (*Bubalus bubalis*) kabupaten karo sumatera utara. *Jurnal Peternakan Integratif*. 1 (2): 134-145.
- Sugiarto M, Wakhidati YN, Einstein A, Khaerudin (2017). The competitiveness of beef cattle business on various agro-ecological zones in tegal regency. *Anim. Prod.*, 19(2): 127-134. <https://doi.org/10.20884/1.jap.2017.19.2.604>
- Suryaalim AMA, Fauziah A (2022). Analisis hirarki proses pada penetapan harga kerbau di kabupaten mamasa propinsi sulawesi barat. *Agrovital J. Ilmu Pertanian*, 7(2): 85-90. <https://doi.org/10.35329/agrovital.v7i2.3561>
- Suryaalim AM, Fausiah A (2023). Community perceptions of comparison of buffalo price criteria in Mamasa Regency, West Sulawesi Province. *AGRIMOR*, 8(2): 68-76. <https://doi.org/10.32938/ag.v8i2.1985>
- Tatikpikalawan (2012). Analisis produktivitas tenaga kerja keluarga pada usaha peternakan kerbau di Pulau Moa Kabupaten Maluku Baratdaya. *Agroforestri*. 7: 8- 11
- Uzun P, Serrapica F, Massucci F, Assunta BCM, Yildiz H, Grasso F, Francia AD (2020). Diversity of traditional Caciocavallo cheeses produced in Italy. *Int. J. Dairy Technol.*, 73: 234-243. <https://doi.org/10.1111/1471-0307.12640>
- Widaningsih N, Hartono B, Rohaeni HD, Gunawan ESE (2023). Indicators of swamp buffalo business sustainability using partial least squares structural equation modelling. *Open Agric.*, 8(1): 1-13. <https://doi.org/10.1515/opag-2022-0216>
- Windusari Y, Laila H, Erwin N, Mustafa K, Adri A (2015). Characteristic of swamp buffalo (*Bubalus bubalis*) Pampangan at Distric of Banyuasin, South Sumatera, Indonesia. *Handb. Emerg. Trends Sci. Res.*, 4: 37-44.
- Yendraliza, 2012. Karakteristik Penampilan tubuh penjantan unggul kerbau lumpur (*Bubalus bubalis*) di Kabupaten Kampar. *AGRINAK*, 2(1): 17-21.