

SMALLHOLDER FARM-BASED BUFFALO BREEDING IN BOMBANA REGENCY REVIEWED FROM FINANCIAL FEASIBILITY ASPECT

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Abstract— This study aims to evaluate the condition of buffalo breeding based on smallholder farms from the aspect of financial feasibility in Bombana Regency. The study was conducted in the form of a survey in June - November 2018. The survey location covered six sub-districts with the highest buffalo population representing the land area and the island of Kabaena. All buffalo breeders in the six sub-districts namely 74 people were taken as respondents. The total buffalo population is 557 or 73.6% of the total buffalo in Bombana Regency. The parameters observed were Net BCR, NPV, IRR and PBP. The results showed that the buffalo breeding based on smallholder farms in Bombana Regency was reliable to sustain with a Net BCR value of 1.26, a positive NPV of Rp. 113.508,000, IRR 25.85% and PBP 7.07 years. It is necessary for the government to motivate farmers, facilitate access to capital and facilitate provision of facilities and infrastructure in order to support the development of buffalo breeding business in Bombana Regency.

Index Terms— Financial feasibility, buffalo, breeding.

1 INTRODUCTION

Domestic buffalo can be divided into two sub-species, namely river buffalo and swamp buffalo (Presicce, 2007; Perera, 2008; Yue et al. 2013). The most developed buffalo in Indonesia, including Southeast Sulawesi, is Swamp Buffalo. This domestic buffalo (*Bubalus bubalis*) is one of 40 species of livestock used in the world food and agricultural production (Desta, 2011).

Nationally, there is a relative small buffalo population in Southeast Sulawesi. In 2018, the total population was estimated at 3,120 or only 0.23% of the total buffalo population in Indonesia, which was 1,356,390 animals (DG PKH, 2019). The spread of buffalo in Southeast Sulawesi is not evenly distributed between regencies / cities, there are even 7 out of 17 districts / cities that do not have buffalo cattle, namely Buton, Wakatobi, Konawe Islands, South Buton, Central Buton, Baubau City and Kendari City (BPS Sulawesi Southeast, 2018).

The area with the highest buffalo population in Southeast Sulawesi is Bombana Regency (757 animals), because it is supported by quite suitable agro-climate and agro-ecosystem conditions for buffalo cattle development, as well as socio-cultural conditions of the people who are used to raising buffalo (Nafiu et al., 2017; Kritanto et al., 2017; Nafiu et al., 2018). The spread of buffalo in Bombana Regency is concentrated in the mainland areas of Poleang and Kabaena Island (BPS Bombana, 2019).

The pattern of buffalo maintenance in Bombana Regency is a breeding pattern. Breeders raise male female buffalo to pro-

duce good children. However, some farmers consider buffalo breeding as less profitable because the harvest is too long, so they switch to raising beef cattle. Such conditions will threaten sustainability of buffalo development. According to Handayanta et al. (2016), sustainability of a breeding business is determined by financial description on the business. The business can survive if there are greater benefits obtained than the costs incurred.

Breeding pattern serves as an important factor influencing on successful development of buffalo population (Arienda et al., 2010). Related to this issue, it is necessary to carry out research on financial feasibility of buffalo breeding based on smallholder farms in Bombana Regency, Southeast Sulawesi Province.

2 MATERIALS AND METHOD

2.1 Research Location and Period

This research was conducted in the form of a survey that took place from June to November 2018. The survey location included six sub-districts consisting of: (1) land area of 3 sub-districts, namely South Poleang, West Poleang and Poleang, and (2) Kabaena Island 3 sub-districts, namely North Kabaena, East Kabaena and Central Kabaena.

2.2 Determination Of The Sample

The determination of six sub-district samples as the survey

locations was carried out intentionally (purposive sampling) by considering: (1) representation of land and islands, and (2) the districts with the highest buffalo population in Bombana District. The number of buffalo breeders in the six sub-districts was 74 people, all of whom were taken as the respondents. The structure of buffalo population in Bombana Regency in 2018 can be seen in Table 1.

Table 1. Buffalo Population Structure in Bombana Regency in 2018

No	Sub Distritcs	Mature		Adult		Child		Total
		Males	Females	Males	Females	Males	Females	
	Land area							
1	North Kabaena	6	30	6	8	9	9	68
2	East Kabaena	4	24	3	5	8	7	51
3	Central Kabaena	6	32	10	11	10	10	79
	Island area							
4	South Poleang	9	67	15	20	20	22	153
5	Poleng	7	46	11	13	14	15	106
6	West Poleang	6	44	11	12	13	14	100
	Total	38	243	56	69	74	77	557

Source: BPS Bombana Regency and Results of the survey (2019).

Buffalo populations in the survey location were 557 animals, consisting of 281 adult buffaloes, 125 young buffaloes and 151 baby buffaloes. The data used in the investment feasibility analysis is only for mature buffalo, consisting of 38 males and 243 females.

3 DATA ANALYSIS

The data obtained is tabulated, then there is financial analysis carried out in accordance with the research objectives. The financial feasibility parameters analyzed include:

1. Net Benefit Cost Ratio (BCR)

Net Benefit Cost Ratio (BCR) is a comparison between the amount of present value of benefit flows and the amount of current costs based on the opportunity cost of capital, which is the profit if the capital is invested in the best and easiest possibility (Nurmalina, 2009). The equation for calculating BCR (Moll and Igual, 2016) is:

Net BCR = $\frac{\text{discounted gross benefit}}{\text{discounted total cost}}$. A business is considered feasible if Net BCR > 1, it is said to break even if Net BCR = 1, and business is said to be unreliable if Net BCR < 1.

2. Net Present Value (NPV)

Net Present Value (NPV) is the net difference between the present value of benefits and the present value of costs calculated by the formula (Firdaus, 2009): $\text{Net BCR} = \frac{\text{discounted gross benefit}}{\text{discounted total cost}}$, which Bt is the amount of gross revenue from business in t year, Ct is the amount of gross expenditure from business in t year, n is the economic age and i is the discount rate. A business are said to be feasible if NPV > 0, is said to break even if NPV = 0 and is said to be unprofitable if NPV < 0.

3. Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is an interest rate that will make the NPV value of a project equal to zero. IRR value indicates the ability of a project to produce a return of capital or the level of profit that can be achieved. IRR is calculated by the formula (Kadariah, 2001):

$$IRR = i_1 + \left(\frac{NPV_1}{NPV_1 + NPV_2} \right) (i_1 - i_2)$$

Which NPV1 is NPV at the highest discount rate, NPV2 is NPV at the lowest discount rate, i_1 is the discount rate NPV_1 and i_2 are the discount rate NPV_2 . A business is said to be feasible if IRR > cost of capital and are said to be improper if IRR < cost of capital.

4. Payback Period (PBP)

Payback Period (PBP) is the period required to recoup investment expenses using cash flow, by calculating the net benefits obtained each year. Faster period of payback time will lead to better business. Mathematic Equation for the calculation of PBP (Nurmalina, 2009) is: $PPC = \frac{I}{Ab}$, which I is the amount of investment costs and Ab is the net benefit that can be obtained every year. The business is said to be serviceable if the PBP is shorter than the maximum payback period, and is said to be inappropriate if it is longer than the maximum PPC.

4 RESULTS AND DISCUSSION

Population Development

The development of buffalo population in the research location during the last five years can be seen in Table 2.

The buffalo population in Bombana Regency, especially in the six sub-districts of the study locations has increased, but there are variations between sub-districts, even in East Kabaena District has decreased.

Table 2. Development of Buffalo Population in Bombana Regency in 2013-2018

No	Sub districts	2013	2014	2015	2016	2017	2018	Trend Mean
Land Area								
1	North Kabaena	48	52	36	60	61	68	8.33
2	East Kabaena	54	55	53	54	51	44	-3.70
3	Central Kabaena	68	74	62	68	79	84	4.71
Island Area								
4	South Poleang	79	80	83	105	133	155	19.24
5	Poleng	46	51	54	58	79	106	26.09
6	West Poleang	54	56	65	65	74	100	17.04
	Total	349	368	353	410	477	557	11.92

Source: BPS Bombana Regency in 2014-2019.

The development of buffalo population in the Bombana mainland area is higher than that of Kabaena Island. Most buffalo breeders in this area turn to raising beef cattle. One reason is low reproduction rate and waiting time for harvesting and selling buffalo taking too long period (Kusnadi, 2008). Silent lust and long reproduction period are the main causes of infertility and low productivity in buffaloes (Arun, 2018). Length of gestation for swamp buffalo is 10.4 months with a spacing of 14-30 children (Budiarto et al., 2018; Nafiu et al., 2013). Meanwhile Gunawan et al. (2011) reported that the length of gestation of Bali cows was only 9 months with a spacing of 12 months.

Basic Of Calculation in Financial Analysis

The basic calculations used in the financial analysis of buffalo breeding based on smallholder farms are as follows:

1. The investment component consists of: (a) 281 adult buffaloes, 38 male and 243 female cows, (b) colony cages and fattening cages available at research sites, (c) feed warehouses, (d) cut grass gardens, (e) grass chopping machines, (e) enclosure equipment
2. Proportion of productive female cages is 40-50% of the total population
3. Child birth rates range from 60-66% of productive females

4. Child to adult mortality rates range from 5-10%
5. Population growth of 4-6% / year
6. 10% investment period, with 10% bank interest
7. The cost component of revenue only comes from buffalo sales, namely:

The buffalo sales include: (a) young buffaloes aged 1.5 - 2.5 years with prices ranging from 13-18 million for males and 9-13 million for females, (b) adult buffalo are generally sold at the age of 3.5-12 years with prices ranging from 16-30 million rupiahs for males and 12-16 million rupiahs for females, (c) buffalo males are rejected at ages 6-8 years and (d) buffalo females are rejected at ages 10-12 years.

Investment Cost

The structure of investment costs in buffalo breeding based on smallholder farms in Bombana Regency can be seen in Table 3.

Table 3. Investment Costs for Smallholder Farming-Based Buffalo Breeding in Bombana Regency

No	Description of Investment Costs	Units	Volume	Price	Total	Technical Age
1	Colony cages	Unit	6	20.000.000	120.000.000	5
2	Grass garden	Ha	4.5	3.000.000	13.500.000	10
3	Male buffalo breeder	Animal	38	20.000.000	760.000.000	-
4	Female buffalo breeder	Animal	241	14.000.000	3.374.000.000	-
5	Cutting grass machine	Unit	2	12.000.000	24.000.000	5
6	Feed warehouse	Unit	2	15.000.000	30.000.000	10
7	Fattening cage	Unit	2	12.500.000	25.000.000	10
8	Cage equipment	Package	1	10.000.000	10.000.000	2
					4.356.500.000	

Source : survey Results (2019).

The biggest investment in stallholder farming -based buffalo breeding is the cost of breeder which reaches 94.89% of the total Rp. 4,356,500,000, while Kristianto et al. (2019) reported that investment costs for buffalo breeder are around 60.06% and cage costs 39.04%. The buffalo breeding business in this study uses almost no high-cost technology inputs because the colony cages are made simple, fattening cages, feed sheds, chopper machines and grass gardens are only found in 2 districts. The maintenance of buffalo is still carried out extensively traditionally, without adequate improvement of feed and housing, so that in the long run, it can reduce buffalo production performance and population (Praharani et al., 2010).

Production and Revenue Costs

Cost analysis and business revenue for buffalo breeding based on smallholder farms in Bombana Regency are presented in Table 4.

The total production cost of buffalo breeding business with 241 females and 38 males in the first year after investment was Rp. 761,100,000 with a total revenue of Rp. 1,977,600,000. The total production cost has increased every year due to the increase in business scale, the price of production facilities and the inflation rate, so that in the 10th year it reached Rp. 956,339,510. Production costs consist of fixed costs and variable costs. The value of revenue also increased because the production capacity and value of buffaloes also increased, so that in the 10th year it reached Rp. 3,854,845,491. Inflation and production cost growth rates influence on the level of profit margins and economic growth (Nurkholifah and Abdullah, 2010; Sutawijaya, 2010).

Table 4. Cost Analysis and Revenue of Smallholder Farming-Based Buffalo Breeding in Bombana Regency

No	Description of Cost and Revenues	Unit	Volume	Price	Total	
					First year	10th years
A	Total Costs				761.100.000	956.339.510
	Fixed Costs				455.250.000	481.865.775
1	Cage depreciation	Unit	6	2.400.000	14.400.000	33.954.447
2	Chopper machine depreciation	Unit	2	1.600.000	3.200.000	7.545.433
3	Cage equipment depreciation	Package	1	2.000.000	2.000.000	4.715.895
4	Bank interest of 10% / year	Year	1	435.650.000	435.650.000	435.650.000
	Costs Variable				305.850.000	474.473.735
1	Maintenance of colony cage	Unit	6	2.500.000	15.000.000	23.269.923
2	Grass garden maintenance	ha	4.5	2.000.000	9.000.000	13.961.954
3	Maintenance of feed warehouse	Unit	2	1.000.000	2.000.000	3.102.656
4	Vehicle rent and gasoline	UK	144	100.000	14.400.000	22.339.126
5	Salary of buffalo supervisor	OB	216	1.100.000	237.600.000	368.595.584
6	Maintenance of buffalo health	ET	557	50.000	27.850.000	43.204.491
B	Total Revenue				1.977.600.000	3.854.845.491
1	Sale of adult male buffalo	Animals	11	22.000.000	242.000.000	463.971.756
2	Sale of adult female buffalo	Animals	42	15.000.000	630.000.000	1.207.860.357
3	Sale of young male buffalo	Animals	35	17.000.000	595.000.000	1.140.757.004
4	Sale of young female buffalo	Animals	17	13.000.000	221.000.000	433.563.459
5	Additional population number	Animals	27	10.000.000	270.000.000	529.692.914
6	Reserve of depreciation costs	Package	1	19.600.000	19.600.000	79.000.000

Source: Processed survey results (2019)

Table 4 shows that total gross revenue is higher than total gross cost, which indicates that the buffalo breeding business based on community farms is profitable. In the first year, there was a gross profit by Rp. 751,250,000. The number of breeders is 74 people with an average of 3-4 buffalo ownership. Thus, in the first year, the average income of farmers was Rp. 10,152,027 / breeders, or around Rp. 860,000 / breeder / month. Farmers' income continues to increase as the scale of buffalo ownership and selling price increases, so that the gross income of farmers in the 9th year was an average of Rp. 28,203,935 / breeders or around Rp. 2,350,328 / breeder / month. This figure is approaching the Southeast Sulawesi UMR value of 2019 of Rp. 2,500,000 / month (Detikfinance, 2019).

Investment Feasibility Analysis

Calculation of cash flow during the buffalo breeding business investment based on smallholder farms in Bombana Regency can be seen in Appendix 1. Based on Appendix 1, a summary of the investment feasibility analysis results is presented in Table 5.

Based on investment criteria (Net BCR, NPV, IRR and PBP), it can be seen that smallholder farming-based buffalo breeding in Bombana Regency is feasible to sustain. Net BCR value of 1.26 indicates that if the buffalo nursery investment by Rp. 1.00, it will produce Rp. 1.26. An IRR value of 25.85% indicates that capital loans can still be returned despite bank interest reaching 25.85%. However, this smallholder farming-based buffalo breeding business requires a long time to return all investment capital, which is 7.07 years.

Table 5. Summary of the Feasibility Analysis Results on the Investment in Smallholder Farming-Based Buffalo Breeding in Bombana Regency

Investment Criteria	Units	feasibility Justification	Obtained values	Notes
NetBCR	-	> 1	1,26	Feasible
NPV	Thousand Rupiah	> 0	113.508	Feasible
IRR	Percentage (%)	> 10	25,85	Feasible
PBP	Years	< 10	7,07	Feasible

Source: Analysis Results (2019).

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Discussion

At the beginning, it can be stated that there were buffalo breeders who switched to raising beef cattle. They consider buffalo breeding business less profitable. The results of the analysis show that smallholder farming-based buffalo breeding in Bombana Regency are profitable, with monthly income approaching to the UMR value of the Southeast Sulawesi (Detikfinance, 2019). Other studies also report that buffalo farming includes as a feasible and profitable breeding business for farmers (Arienda II et al., 2010; Juarini et al., 2010; Kristianto et al., 2019; Hafid and Musalim, 2016; Mulyandari, 2013). The Government of Bombana Regency and Southeast Sulawesi Province must convince farmers that smallholder farming-based buffalo breeding is quite profitable and feasible to be developed, so that they are motivated to continue their business (Dudi et al., 2012). Farmers must be encouraged to make buffalo breeding as a main business by increasing the scale of ownership. Higher scale of ownership will lead to higher level of income and ability to return on capital (Juarini et al., 2010; Kristianto et al., 2019; Hafid and Musalim, 2016). Thus, breeders will be serious and allocate more time to manage buffalo cattle. In addition, it is also necessary for the government to provide facilities and infrastructure to support the development of smallholder farming-based buffalo breeding, for example improving forage in grazing areas, providing superior grass gardens, providing superior males, handling health and procuring a wallow. Any efforts to facilitate community access to capital resources are also important to be facilitated by the government, bearing in mind that buffalo breeding requires capital and a pay-back period of more than 3 years (Arienda II et al., 2010; Hafid and Musalim, 2016; Kristianto et al., 2019; Sudarman et al., 2019).

5 CONCLUSION AND RECOMMENDATION

By referring at results of the research and discussion, it can be concluded that the smallholder farming-based buffalo breeding in Bombana Regency is feasible to sustain by the Net BCR of 1,26, NPV of Rp. 113.508.000, IRR 25,85% and PBP 7,07 year. It is necessary for the government to motivate the breeders, facilitate access to capital and facilitate to provide facility and equipment in order to support the development of buffalo breeding business.

Important Statement

It is important to carry out this research in order to obtain accurate information which will be used by the Government of Bombana Regency to ensure the breeders that smallholder farming-based buffalo breeding is feasible to sustain and profitable. These research results will contribute to the development of buffalo population and productivity through improvement of maintenance system and ownership scale.

Credits

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REFERENCES

- [1] Arrienda II, F.Q., C.V. Cruz, M.V. Perilla and B.M. Setiawan. 2010. Feasibility study of establishing an artificial insemination (AI) center for carabaos in SAN Ildefonso, Bulacan, Philippines. *J.Indonesian Trop.Anim.Agric.* 35(2): 134-141
- [2] Arun, R. 2018. Pregnancy enhancement using ovsynch protocol in jaffarabadi buffaloes. *Buffalo Bulletin* 37 (4): 583-586.
- [3] Bombana Regency BPS. 2019. Bombana Regency in Figures 2018. Central Statistics Agency of Bombana Regency, Kasipute.
- [4] Southeast Sulawesi BPS. 2018. Southeast Sulawesi in Figures. Central Statistics Agency of Southeast Sulawesi, Kendari.
- [5] Budiarto, A, G Ciptadi, L Hakim, and A.I. Putri. 2019. Reproductive performance and fertility index of swamp buffalo (*Bubalus bubalis*) in ngawi regency, east java. *IOP Conf. Series: Journal of Physics: Conf. Series* 1146 (2019)012024:1-4. IOP Publishing doi:10.1088/1742-6596/1146/1/012024.
- [6] Desta, T.T. 2011. Introduction of domestic buffalo (*Bubalus bubalis*) into Ethiopia would be feasible. *Renewable Agriculture and Food Systems*: 27(4): 305–313. doi:10.1017/S1742170511000366
- [7] Detikfinance, 2019. Southeast Sulawesi UMP Increase to Rp. 2.5 Million, Governor Asks Entrepreneurs to comply. Detikfinance, November 1, 2019.
- [8] PKH Directorate General. 2019. Statistics of Indonesian Animal Husbandry in 2018. Directorate General of Animal Husbandry and Animal Health, Ministry of Agriculture of the Republic of Indonesia. Jakarta.
- [9] Dudi, C. Sumantri, H. Martojo and A. Anang. 2012. Study of sustainable patterns of local buffalo breeding in an effort to support the adequacy of national meat. *Journal of Animal Science* 12 (1): 11-19.
- [10] Firdaus, M. 2009. Agribusiness Management. Bumi Aksara. Jakarta.
- [11] Gunawan, A., R. Sari, and Y. Parwoto. 2011. Genetic analysis of reproductive traits in Bali cattle maintained on range under artificially and naturally bred. *J.Indonesian Trop.Anim.Agric.* 36(3):152-158
- [12] Hafid, N. and Musalim. 2016. Analysis of local buffalo (*Bubalus bubalis*) breeding business with a shepherd system in Dingil Village, Jatirogo Sub District, Tuban Regency. *Fillia Scholar Journal* 1 (2): 8-14.
- [13] Handayanta, E., E. T. Rahayu and M. Sumiyati. 2016. Financial analysis on smallholder beef cattle breeding business in dryland farming areas. *Animal Science* 14 (1): 13-20
- [14] Juarini, E., Sumanto, I.G.M. Budiarsana and L. Praharani. 2010. Feasibility study of buffalo cattle breeding business in Banten Province. *Proceedings of the 2010 Buffalo National Seminar and Workshop*: 127-135.
- [15] Kadariah. 2001. Introduction to Project Evaluation. LPEE University of Indonesia. Jakarta.
- [16] Kristianto, L. K. 2007. Development of kalang buffalo breeding in supporting agribusiness and agro-tourism in East Kalimantan. *Pros. Buffalo Workshop and Workshop. Jambi*, June 22-23, 2006.
- [17] Kristianto, L.K., Z. Fanani, B. Nugroho and H. Utami, 2019. Buffalo breeding business system and feasibility analysis in rice fields plateau of North Kalimantan. *Int. J. Adv. Res.* 7(3): 1112-1121.

- [18] Kusnadi, U. 2008. Analysis of buffalo cattle business efficiency (Analysis of Efficiency in Buffaloes Farming). Proceedings of the National Seminar on Animal Husbandry and Veterinary Technology: 335-345
- [19] Moll, E.M.P. and J.F.J. Igual. 2006. Long-term feasibility of sustainable citrus-farming systems in the Region of Valencia, Spain. Journal of Food Distribution Research 37(1):133-141
- [20] Mulyandari, L., 2013. Business Analysis of Swamp Buffalo (Bubalus Bubalis Carabanesis) Tempursari Sub District Lumajang Regency. Thesis of Bachelor degree, Brawijaya University.
- [21] Nafiu, L.O. and T. Saili. 2013. Portrait of reproductive management implementation in the buffalo breeding at Bombana district. Article of Buffalo International Conference 2013. Makassar 3-4 November 2013. pp: 122-131.
- [22] Nafiu, L.O., T. Saili and A. Bain. 2015. Morfometric portrait of swamp buffalo in Bombana. Proceeding of International Seminar "Improving Tropical Animal Production for Food Security":94-107
- [23] Nafiu, L.O, T. Saili, R. Badaruddin, A. Madiki, Rahman and Suparman. 2017. Growth performance of young bull buffalo in feed improvement program. International Conference Preparing Human Resources for Global Entrepreneurship Kendari, October 21st: 48-56.
- [24] Nafiu, L.O., T. Saili, A. Bain, Muhidin, M. Rusdin and R. Badaruddin, 2018. Response of selected heifer buffalo to feed improvement in Bombana regency, Indonesia. Pak. J. Nutr., 17 (12): 683-688. ISSN 1680-5194. DOI: 10.3923/pjn.2018.683.688.
- [25] Nurkholifah, S. and M. F. Abdullah. 2010. Analysis of the effect of inflation and production cost growth on profit margins in food and beverage companies that go public on the IDX. Journal of Development Economics 8 (1): 294-306
- [26] Nurmalina R, Tintin S, Arif K. 2009. Business Feasibility Study. Bogor (ID): Department of Agribusiness, Faculty of Economics and Management, Bogor Agricultural University.
- [27] Perera, B.M.A.O. 2008. Reproduction in domestic buffalo. Reproduction in Domestic Animals 43(Suppl. 2):200–206.
- [28] Praharani, L., E. Juarini, C. Talib and Ashari. 2010. Population development and development strategies of buffalo cattle. WARTA-ZOA 20 (3): 119-129.
- [29] Presicce, G.A. 2007. Reproduction in the water buffalo. Reproduction in Domestic Animals 42(Suppl. 2):24–32.
- [30] Ranch Advisory Partners. 2013. South Unit Buffalo Expansion feasibility Study. Oglala Sioux Parks & Recreation Authority
- [31] Sudarman, A., N Hidayati, S Suharti. 2019. Nutritional Status of Female Buffaloes in Cibungbulang Smallholder Farms: The Effect of Indigofera sp and Gapek Supplementation on Changes in Blood Profile. JINTP 17 (2): 32-37.
- [32] Sutawijaya, A. 2012. Effect of Economic Factors on Inflation in Indonesia. Journal of Organization and Management, 8 (2): 85-101.
- [33] Yue, XP, Li R, Xie WM, Xu P, Chang TC, Liu L, Cheng F, Zhang RF, Lan XY, Chen H, Lei CZ (2013): Phylogeography and Domestication of Chinese Swamp Buffalo. Plos One 8.

Lampiran 1. Arus Kas Usaha Peternakan Rakyat Pembibitan Kerbau di Kabupaten Bombana												
Tahun	Investasi	Total Biaya	Penetrisan	Penetrisan Bersih	Discount Factor 25%				Discount Factor 25%			
					DF	BDF	CDF	(4.002.330)	DF	BDF	CDF	NB
0	4.356.800	4.002.330	-	(4.002.330)	1.000	-	4.002.330	(4.002.330)	1.000	-	4.002.330	(4.002.330)
1	10.000	1.226.350	1.977.600	751.250	0.800	1.582.080	991.080	601.000	0.781	1.345.000	958.080	556.914
2	-	1.235.563	2.183.830	948.268	0.640	1.397.604	790.760	606.904	0.610	1.332.916	784.128	378.788
3	10.000	1.263.932	2.341.714	1.078.782	0.512	1.196.937	646.157	550.800	0.610	1.429.268	772.663	656.608
4	66.750	1.344.268	2.511.417	1.167.132	0.409	1.028.677	550.619	478.037	0.372	935.976	500.768	434.792
5	10.000	1.310.458	2.693.849	1.363.393	0.327	862.720	429.410	463.310	0.291	784.013	381.593	402.623
6	-	1.324.783	2.869.962	1.568.180	0.262	737.586	347.254	410.302	0.237	657.101	301.221	355.882
7	10.000	1.360.613	3.100.754	1.740.171	0.209	650.282	285.341	364.940	0.177	580.610	241.693	309.118
8	-	1.378.051	3.327.415	1.949.367	0.167	558.246	231.199	327.049	0.138	461.772	191.243	270.529
9	76.750	1.483.988	3.571.030	2.087.051	0.134	479.296	199.174	280.123	0.108	387.174	160.591	226.283
10	-	1.436.208	7.988.548	6.552.340	0.107	407.796	194.426	703.370	0.083	676.682	121.821	354.862
Jumlah							9.279.500	113.509				
Net BCR							9.393.308	1.26				
NPV (Ribu Rupiah)								113.509				
IRR (%)								25,85				
PBP (Tahun)								7,07				