International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Feasibility Analysis of Beef Cattle Farming Business against Climate Change in Sumenep District Indonesia

Asta Agung Setia Budi[1], Budi Hartono[2], Nanang Febrianto[3]
[1]Student, Faculty of Animal Science, University Brawijaya, Jl. Vetersn Malang 65145 East Java, Indonesia
[2,3] Lecturer, Faculty of Animal Science, University Brawijaya, Jl. Vetersn Malang 65145 East Java, Indonesia

ABSTRACT: The objective of the study was to analyze the feasibility of beef cattle farming to climate change in Sumenep District, East Java Province, Indonesia. The research was conducted at the beef cattle Farm for one month from December to January 2023. The method used in the research is a survey with a quantitative approach while the sampling method is multistage sampling (multi-stage cluster sampling for data collection from a large group of areas with the largest to smallest population) and the method can be combined with other sampling methods namely purposive sampling (deliberate data collection) and data collection methods are interviews, questionnaires, observation, focus group discussions and documentation. The data used is cost data from beef cattle farming businesses with a sample size of 150 respondents. The data analysis used was feasibility analysis, namely R/C ratio, which collected production cost data consisting of variable costs, fixed costs and total revenue. The results showed that beef cattle farming in Sumenep district obtained an R/C ratio value of 0.99 for a population of 2 heads, an R/C ratio of 1.00 for a population of 3 heads, and an R/C ratio of 1.06 for a population of 4 populations. The conclusion is that climate change affects the R/C ratio value of the 2-tailed population which is declared not feasible to run while the 3-tailed and 4-tailed populations are feasible to run and develop.

KEYWORD: Business Feasibility, Beef Cattle, Climate Change.

INTRODUCTION

Climate change impacts beef cattle farming through decreased livestock production, decreased air availability and scarcity, decreased livestock production, decreased fodder availability, scarcity of poor forage, limited freshwater resources, agricultural land degradation, and decreased productivity of livestock and feed crops. As a result, livestock experience heat stress, livestock welfare is compromised, and the spread of livestock diseases increases. The impact of climate change, if it persists, will certainly disrupt national meat production in Indonesia. Animal Husbandry in Figures 2023 states that beef and buffalo meat production is 524,760 tons while beef and buffalo meat consumption in Indonesia is 816,790 tons with a total population of 278,835,740 people, so there is 292,030 tons or 35.8% shortfall in beef and buffalo meat production that must be supplied to maintain food security for animal protein consumption of the population in Indonesia (Statistics Indonesia, 2022). If climate change does not occur, it may not affect the availability of beef production in Indonesia, but in reality, the availability of beef is still decreasing, especially with the impact of climate change, which will certainly decrease drastically.

If this continues, the 2026 beef self-sufficiency target will not be achieved while the largest national population (17,250,000 heads) is generated from East Java Province with 4,560,000 heads or contributing 26.43% and the district that contributes the most to the cattle population in East Java Province is Sumenep District with 383,577 heads or contributing 8.5% (Statistics Indonesia, 2023). The uniqueness of the Sumenep District is that almost all farmers raise Madura cattle which have advantages such as good adaptation to tropical climates, resistance to ticks, adaptability to environments that have limited feed resources, and lower feed requirements than other beef cattle, and good meat quality (Nurgiartiningsih, 2009, Hartatik, 2009, Soeharsono, 2010). Meteorology, Climatology and Geophysics Agency Trunojoyo (2023) states that the climate of Sumenep District has climate indicators, namely the largest wind speed and most often occurs in June, July and August, namely 32.4 km / h, 36.0 km / h and 39.6 km / h, the lowest rainfall that occurs in August (2.0 mm), September (0.0 mm) and October (0.0 mm), then the level of water availability for plants that are in the category of less/deficit/red zone with a range of 0-20% while the level of groundwater availability is also very less category in July 2023. The highest maximum air temperature (ºC) occurred in 2023 in the months of September (34.0 ºC), October (34.6 ºC), November (35.4 ºC). These climate changes bring many impacts such as drought and an increase in the earth's surface temperature and will certainly have an impact on the beef cattle farming sector in Sumenep district.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Beef cattle farming must be able to adapt to climate change to form the ability of the business to run and measure its feasibility as a form of business development carried out (Muhammad and Yekti, 2019); Abidin et al., 2022; Handayanta et al., 2016, Hanum et al., 2021; Hasiruddin et al., 2015; Irfan and Rizki, 2018). Feasibility analysis of beef cattle business is important, so that in the future the business can be run without loss and a measuring tool in providing profits for a long period of time for farmers (Razak, 2023). Beef cattle farming is the most widely run business, therefore it is expected to contribute to improving the welfare of farmers. Feasibility analysis of beef cattle business against climate change in Sumenep District has never been done until now. Feasibility analysis of beef cattle businesses run through traditional rearing systems needs to be done as initial information for farmers in developing their businesses.

RESEARCH METHODS

Time, Location and General Situation

The research was conducted on beef cattle farms for one month from December to January 2023. The research was conducted in Sumenep District, East Java Province with the consideration that Sumenep District is an area located on the easternmost Madura Island. East Java Province is also the province with the largest beef cattle population in Indonesia at 5,070,240 heads (Statistics Indonesia, 2022). One of the districts in East Java Province, Sumenep District, has the largest beef cattle population. The beef cattle population in Sumenep District in the last five years shows an increase in the following data:

Table 1. Beef Cattle Population in Sumenep District 2018-2022

Year	Population (tail)
2018	367.382
2019	372.623
2020	377.124
2021	383.059
2022	388.090

Source: East Java Central Bureau of Statistics (2022)

In addition to considering the beef cattle population, based on BMKG data from Trunojoyo Meteorological Station (2023) that Sumenep District is experiencing climate change supported and characterized by the following weather elements:

1. Peak drought is quite severe because rainfall (millimeters) occurs in August (2.0 mm), September (0.0 mm) and October 0.0 mm). The three months were the highest time of water evaporation (millimeters), namely August (198.5 mm), September (213.8 mm) and October (219.9 mm).
2. Solar irradiation was 100% in two months, September and October, respectively, and solar irradiation in August did not differ much from the following month at 99.2%.
3. The maximum air temperature (ºC) in September, October, and November was the highest temperature of the other months because each month there was an increase in air temperature to 34.0 ºC, 34.6 ºC, and 35.4 ºC.

Data collection

The research was conducted in Lenteng, Batuputih and Kalianget sub-districts, Sumenep district, East Java province from November 2023 to January 2024. The research method used was a survey method with a quantitative approach. The sampling method uses two methods, namely multistage sampling and puIDRosive sampling. The method determines the village of each sub-district, namely Batuputih Sub-district (Aengmerah and Gedang-gedang Villages), Lenteng Sub-district (East Lenteng and Daramista Villages) and Kalianget Sub-district (Kertasada and Karanganyar Villages). The types of data sources used are primary and secondary data. Primary data was collected through interviews, observations, questionnaires, documentation and focus group discussions, while secondary data was sourced from government and private agencies, literature reviews, books, government statistics, social media, journals and others.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Data Analysis

Production Cost

Production cost or total cost (TC) is the total of the sum of total fixed costs and total non-fixed (variable) costs in rupiah units (Lumenta 2022). This formula can be calculated mathematically as follows

TC = TFC + TVC

Description:
TC : Total Cost
TFC : Total Fixed Cost
TVC : Total Variable cost.

Variable Cost

Variable costs are funds that must be spent by farmers for the production of a certain period, the amount of which is highly dependent on the number of livestock populations being raised (Datuela, 2021). Variable costs include the cost of feed, broodstock, OVK, electricity, water, and so on. Variable costs are dynamic costs whose quantity and value are bound to change depending on influencing indicators such as the price of feed, medicine, vitamins, electricity, water, etc.

Fixed Costs

Fixed costs are funds that do not change in amount in both large and small production in the maintenance of beef cattle. The group of costs contained in fixed costs is goods that can be depreciated within a certain period of time. the cost of depreciation of goods that become fixed costs, such as the cost of depreciation of cages and equipment within a certain time while other fixed costs are transportation, land tax, land rent (Saleh, 2018).

R/C (Revenue/Cost Ratio)

R/C ratio is the ratio between total revenue and total cost with the following formula (Hanum, 2021). The R/C ratio formula can be expressed as follows:

R/C *ratio*= TR/TC

Description:
Revenue : Revenue
Cost : Cost
Total Revenue : Total Revenue
Total Cost : Production Cost
R/C > 1 : Profit/feasible
R/C < 1 : Loss/not worth doing
R/C = 1 : Break-even point

Revenue

Revenue is the amount of output sold multiplied by the specified unit price, which will result in a revenue (Simanjuntak, 2018). The revenue formula can be written with the following formula:

TR = Q x P

Description:
Total Revenue : Total revenue
Quantity : Number of products
Price : Price per unit of goods

Income (Profit)

Walid (2021) that the income of farmers can be calculated from the difference in total revenue minus the total production costs in one period which can be used the following formula:

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

∏ = **TR - TC**

Description:
∏ : Profit
TR : Total Revenue
TC : Total Cost

RESULTS AND DISCUSSION

Feasibility Analysis of Beef Cattle Farming in Sumenep District

Analysis of the feasibility of cattle business using the R/C ratio formula which requires the value of total revenue and total costs (production costs). Business feasibility analysis is needed in the Sumenep district as information for farmers to develop their livestock business or as evaluation material in adapting to climate change in the following year.

Table 2. Feasibility of Beef Cattle Farming on the Smallholder Scale with Populations of 2, 3, and 4 Cows (IDR/year/farmer)

Fixed Cost	Population 2 tail	(%)	Population 3 tail	(%)	Population 4 tail	(%)
Land lease	500.000	1,93	500.000	1,33	500.000	1,04
Cage depreciation	400.000	1,55	500.000	1,33	833.333	1,73
Equipment depreciation	441.000	1,71	494.833	1,32	567.833	1,18
Fixed Cost	1.341.000	5,19	1.494.833	3,97	1.901.167	3,95
Variable Costs	Population 2 tail		Population 3 tail		Population 4 tail	
Feeder cattle	15.800.000	61,1	23.400.000	62,2	31.400.000	65,2
Grass	4.500.000	17,4	5.400.000	14,4	6.300.000	13,1
Concentrate	1.800.000	6,97	1.800.000	4,79	2.340.000	4,86
Operational	2.040.000	7,90	2.040.000	5,42	1.608.000	3,34
Medicine and Vitamins	360.000	1,39	3.476.000	9,20	4.579.200	9,50
Variable Costs	24.500.000	94,8	36.116.000	96,0	46.227.200	96,0
Production Cost	25.841.000	100	37.610.833	100	48.128.367	100
Revenue	25.500.000		37.500.000		51.000.000	
R/C *ratio*	0,99		1,00		1,06	

Source: Primary data processed (2024)

Table 3. Farmer's Revenue (IDR/year)

Number of Livestock	Purchase price	Selling Price	Income	Revenue
2 tail	15.800.000	25.500.000	9.700.000	25.500.000
3 tail	23.400.000	37.500.000	14.100.000	37.500.000
4 tail	31.400.000	51.000.000	19.600.000	51.000.000

Source: Primary data processed (2024)

Production Costs

Fixed costs are calculated starting from land rental costs, depreciation of cage buildings and depreciation of cage equipment such as motors, water hoses, drums, buckets, hoes, ropes, sickles, and shovels in units per year. The calculation of equipment and cage depreciation is calculated using the formula (Depreciation = Purchase Price - Selling Price/Economic Age), resulting in depreciation costs per year for fixed costs. The calculation of fixed costs is done by summing up all depreciation costs for one year and will be cheaper if the population is kept more and more because it is seen from the average fixed cost per head.

Variable costs are calculated starting from the use of grass, electricity, feeder cattle, concentrates, operational costs, drugs and vitamins (vitamin B complex), herbs, tofu pulp which are calculated by determining the unit price (IDR), then determining the needs of the total cattle population (tail) to know the total costs incurred per day then multiplied by 30 days to know the expenditure of

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

one month, then multiplied by 12 months to produce variable costs in one year. The calculation of variable costs is done by summing up all costs for one year and will be cheaper if the population that is kept more and more because it is seen from the average variable cost per head, then the production cost is calculated by summing up the fixed and variable costs in one year of maintenance. Similarities in cost expenditure between populations of 2, 3 and 4 tails are the cost of equipment used in fixed costs while the difference between populations of 2 tails with 3 and 4 tails is the cost of using tofu pulp and concoctions (eggs and turmeric) because the population of 2 tails does not incur these costs.

Variable Costs

Based on the cost data, it shows that a 4-head business scale incurs the highest feeder cattle purchase costs while the lowest feed costs are incurred by a 2-head business scale, thus affecting business feasibility. In contrast, the beef cattle farming business has the highest cost, namely the cost of feed while the beef cattle farming business has the highest cost, namely the cost of purchasing feeder cattle. This is in accordance with Cemara (2023) which states that the cost of purchasing feeders is the highest cost because of the costs incurred. Datuela (2021) shows that the cost of purchasing feeder cattle is the highest cost because the cost of purchasing feeders is incurred with a percentage of 57% while the cost of feed is 16%.

The cost of purchasing feeder cattle affects variable costs by the highest percentage. Variable costs incurred at the scale of business with a population of 2 heads, 3 heads and 4 heads showed the highest average percentage of costs compared to fixed costs with 94.8%, 96.0%, and 96.0% respectively while fixed costs were 5.19%, 3.97%, and 3.95% respectively. Based on the cost data, it shows that the scale of business of 3 and 4 heads incurred the highest variable costs while the highest feed costs were incurred by the scale of business of 2 heads, thus affecting business feasibility. The high and low percentage of fixed and variable costs depends on the scale of the business being run because these costs will affect production costs, but the biggest influence is the variable costs caused by the highest percentage. This is supported by Suherman (2021), which states that variable costs are the highest costs compared to fixed costs because the results obtained are variable costs generated with a percentage of 75.45% while fixed costs are 24.55%.

Revenue/Cost Ratio

The results of the research for the calculation of the feasibility of livestock business obtained from the scale of business of 2 heads, 3 heads and 4 heads are quite different. The scale of business of 2 tails obtained R / C ratio 0.89, then the scale of business of 3 tails obtained R / C ratio 1.00 and the scale of business of 4 tails obtained R / C ratio 1.06. The business scale of 2 tails (R / C ratio 0.99) shows that every IDR 1,000.00 costs incurred then the farmer will get revenue of IDR 990.00, then the business scale of 3 tails (R / C ratio 1.00) shows that every IDR 1,000.00 costs incurred then the farmer will get revenue of IDR 1,000.00, and the business scale of 4 tails (R / C ratio 1.06) shows that every IDR 1,000.00 costs incurred then the farmer will get revenue of IDR 1,060.00.

The feasibility of the livestock business of the three business scales can be inteIDRreted, namely the 2-tailed business scale is said to be "not feasible or loss" because expenses (production costs) > (greater) than revenue, while the 3-tailed business scale is said to be "break even or no loss and no profit" because expenses (production costs) = (equal to) revenue, and the 4-tailed business scale is said to be "feasible or profitable" because expenses (production costs) < (smaller) than revenue or revenue is greater than expenses. This is supported by Hanum (2021), which states that R/C (Revenue Cost Ratio) is the ratio between revenue and expenses (production costs) to be a benchmark in determining the feasibility of beef cattle farming. Feasibility means that if the R/C ratio is > 1, the business is profitable and feasible, while if the R/C ratio is < 1, the business is not feasible, and if the R/C ratio = 1, the business is not loss or profit.

The most sensitive influence on the value of the R/C ratio is because the cost of purchasing feeder cattle is the largest or the purchase of feeder cattle is quite expensive and drains capital. Costs incurred at the business scale with a population of 2 heads, 3 heads and 4 heads show the highest average percentage of costs, namely feeder cattle as a large capital with a percentage of 61.4%, 62.2% and 65.2%, respectively. The price of feeder cattle varies considerably depending on body weight, age and breed and the financial resources of the farmer. Feed is the second highest cost with 24.3%, 19.1% and 18.0% respectively.

Revenue

The results showed that the acceptance of a population of 2 heads (IDR 25,500,000/head/year) with an average purchase price (IDR 7,900,000/head/year) and selling price (IDR 12,750,000/head/year), a population of 3 heads (IDR 37,500. 000/head/year) with an

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

average purchase price (IDR 7,800,000/head/year) and selling price (IDR 12,500,000/head/year), population of 4 heads (IDR 51,000,000/year) with an average purchase price (IDR 7,850,000/head/year) with selling price (IDR 12,750,000/head/year). The difference between the average production cost and the average selling price is for a population of 2 heads (production cost; IDR 12,920,500/head/year and selling price; IDR 12,750,000/head/year; difference of IDR -170,500/head/year), a population of 3 heads (production cost; IDR 12,536,944/head/year, selling price; IDR 12,500,000/head/year, difference; IDR 36,944/head/year) and a population of 4 heads (production cost: IDR 12,032,092/year/head; selling price; IDR 12,750,000/head/year, difference; IDR 717,908/head/year).

CONCLUSION

Analysis of the feasibility of beef cattle farming in Sumenep District to climate change stated that the R/C ratio of the population of 2 heads (0.99) is not feasible to run while the population of 3 heads (1.00) and 4 heads (1.06) is declared feasible to run and develop.

REFERENCES

1. Abidin, A., M.J. Pattinama, and L.O. Kakisina. 2022. Feasibility analysis of cattle business in waeapo district.
2. Central Bureau of Statistics. 2022. Beef Production by Province (Tons), 2020-2022. Central Bureau of Statistics.
3. Central Bureau of Statistics of East Java Province. 2023. Population of Beef Cattle and Beef Cattle by District/City and Type of Livestock in East Java Province (Heads), 2021 and 2022. Statistics East Java.
4. Central Bureau of Statistics of East Java Province. 2023. Population of Beef Cattle and Beef Cattle by District/City and Type of Livestock in East Java Province (head), 2021 and 2022. Statistics East Java.
5. Cemara, F., H. Koesmara, and F. Khairi. 2023. Analysis of Profit Sharing System of Beef Cattle Farming in Cot Mentiwan Village, Ingin Jaya Subdistrict, Aceh Besar District. *Scientific Journal of Agricultural Students*, 8(3): 235-245.
6. Datuela, F., A.H.S, Salendu, L.S. Kalangi, E. Wantasen. 2021. 'Production and Profit Analysis of Beef Cattle Farming Business in Sidodadi Village, Sangkub Subdistrict, North Bolaang Mongondow District (Case Study of Beringin Jaya Livestock Group)'. *Zootec* 41, No. 2 (July): 489-99.
7. Hartatik, T., D. A. Mahardika, T. S. Widi, and E. Baliarti. 2009. Characteristics and performance of Limousin-Madura and Madura crossbred cows in Sumenep and Pemekasan districts. *Livestock Bulletin*, 33(3): 143-147.
8. Handayanta, E., E.T. Rahayu, and M. Sumiyati. 2016. Financial Analysis of Beef Cattle Breeding Farm Business in Dryland Farming Areas: Case Study in Semin District, Gunungkidul Regency, Yogyakarta Special Region. Science of Animal Husbandry: *Journal of Animal Science Research*, 14(1): 13-20.
9. Hanum, N., Miswar., U. Amanda. 2021. Feasibility analysis of beef cattle business in sei litur tasik village, Sawit seberang District, Langkat Regency. *Journal of Samudra Ekonomika* 5(1): 68-78.
10. Hasiruddin, H. Hafid, and L. Malesi. 2015. Potential and financial feasibility of beef cattle farming in alebo village, konda sub-district, south konawe district. *Jitro* 2(3):88-105.
11. Irfan, M., and C.Z. Rizki. 2018. Feasibility analysis of beef cattle business in meurah dua sub-district, pidie jaya district. *Scientific Journal of Development Economics Students*. 3(1): 68-79.
12. Lumenta, I.D.R., R.E.M.F. Osak, V. Rambulangi, and S.P. Pangemanan. 2022. 'Income Analysis of "Golden Paniki Ps" Layer Chicken Farming Business'. *Jambura Journal of Animal Science*. 4, No. 2 (May): 117-25.
13. Nurgiartiningsih, V. M. A. (2010). Breeding system and performance of crossbred Madura cattle in Madura. *Journal of Tropical Animal Production*, 11(2), 23-31.
14. Saleh, I.M., S. Nurlaelah, and I. Wirawan. 2018. 'Cost Analysis of Beef Cattle Businesses of Different Scales in Tanete Riaja District, Barru Regency'. In Semnas Persepsi In Manado, Edited By I.M Saleh, 284-88. Manado: Faculty of Animal Husbandry, Hasanuddin University.
15. Simanjuntak, M.C. 2018. 'Analysis of Beef Chicken Business in Chicken Farms During One Production Period'. *Journal of Fapertanak*. 3(1): 60-81.
16. Soeharsono, R.A. Saptati and K. Dwiyanto. 2010. Reproductive Performance of Local Beef Cattle and Artificially Inseminated Crossbred Cattle in Yogyakarta Special Region. *Proceedings of the National Seminar on Animal Husbandry and Veterinary Technology*. Bogor August 3-4, 2010. Livestock Research and Development Center. Bogor.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 05 May 2024
DOI: 10.47191/ijcsrr/V7-i5-39, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

17. Razak, A.F., N.M. Santa, P.O.V. Waleleng. 2023. Financial feasibility analysis of cattle business in Saleo Village, East Bolangitang Subdistrict, North Bolaang Mongondow District (case study). *Zootec*, 43(2): 246- 253
18. Muhammad, A., and G.I.A. Yekti. 2019. Feasibility analysis of beef cattle business in the youth group working II (case study in Kendit village, Kendit District, Situbondo Regency). *Agribios*, 17(2): 51-64.
19. Walid, A.H., W. Artini, T.D. Sutiknjo, N. Lisanty. 2021. 'Comparative Income of Beef Chicken Farmers Independent Pattern and Partnership Pattern in Trenggalek Regency'. *National Scientific Journal of Agriculture (Jintan).* 1(2): 101-10.

Cite this Article: Asta Agung Setia Budi, Budi Hartono, Nanang Febrianto (2024). Feasibility Analysis of Beef Cattle Farming Business against Climate Change in Sumenep District Indonesia. International Journal of Current Science Research and Review, 7(5), 2786-2792