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Estimating the Cost of Rearing Charolais Mixed Breed (Lembu Sado) for Small-scale and Semi-scale Farms in Terengganu and Kelantan

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ABSTRACT

Charolais mixed breed, or Lembu Sado, is a beef cattle breed popular in Malaysia, valued for its high meat quality and adaptability. However, many Lembu Sado farmers lack awareness of the exact rearing costs, which leads to poor cost management and affects their profitability. Therefore, this study aims to assess the socioeconomic status of Lembu Sado farmers and estimate the cost of rearing Lembu Sado in Terengganu and Kelantan. A quantitative approach was employed using a structured questionnaire divided into three sections: demographic information, farm characteristics, and cost and revenue. Data were collected through a convenience sampling, with 86 respondents from Terengganu and 50 from Kelantan, facilitated by DVS officers in both states. The study population comprised Lembu Sado farmers in these regions, and the data were analysed descriptively using IBM SPSS 2.0 and Microsoft Excel. The findings indicate that the average Lembu Sado farmer is 40 years old, has six years of farming experience, and has a household size of three. Most farmers have attained a secondary level of education, engage in off-farm income activities, and receive limited government support. The estimated cost of rearing Lembu Sado for small-scale farms is RM9,750.07 in Terengganu and RM7,540.04 in Kelantan. For semi-commercial farms, the estimated cost is RM42,806.05 in Terengganu. In conclusion, there is a cost difference between the two states. Therefore, the findings assist policymakers and agricultural agencies develop new strategies and guidelines, as well as implementing solutions such as providing subsidies, and training programmes, tailored to the specific needs of small-scale and semi-commercial Lembu Sado farmers.

Keywords: Charolais cattle, rearing cost, socioeconomics, Lembu Sado, mixed breed cattle

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INTRODUCTION

Livestock farming is vital in supporting the sustenance and economic livelihood of more than 1.3 billion people (Aguirre et al., 2024). Lembu Sado, a local term for mixed-breed cattle. In 2023, Malaysia's beef utilisation for food amounted to 224,110.3 tonnes, which can be interpreted as the level of domestic demand (Department of Veterinary Services, 2024). With a self-sufficiency ratio of 15.9%, local production was at 38667.2 tonnes, while imports reached 205,246.9 tonnes to bridge the gap (Department of Veterinary Services, 2024). These figures highlight Malaysia's heavy reliance on external sources, with more than 80% of beef demand met through imports. On a consumption basis, the per capita beef intake was recorded at 6.7 kg per person per year, equivalent to just 18.4 grams per person per day (Department of Veterinary Services, 2024). Nevertheless, the growing demand relative to stagnant production raises important implications for food security, particularly in the face of global price fluctuations and supply chain disruptions.

LITERATURE REVIEW

Breed Characteristics

The indigenous Kedah-Kelantan (KK) cattle are well adapted to Malaysia's tropical climate and valued for beef production due to their heat tolerance and disease resistance (Islam et al., 2022). To reduce imports, crossbreeding programmes have been promoted in Terengganu and Kelantan (Department of Veterinary Services, 2022). Lembu Sado, a Charolais–KK cross, mature earlier, produce more milk, and wean heavier calves but require higher energy intake (Radzil et al., 2023). Mature males weigh 500–1000 kg and females 300–600 kg (Hisham et al., 2022).

Cost Studies

A cost study examines all expenses in production; here, it refers to rearing Lembu Sado. Fixed costs, such as land rental, remain constant, while variable costs, such as feed, fluctuate with production. Although a Lembu Sado can sell for up to RM30,000, rearing costs are high. Larger producers with cheaper prices pose a serious threat to small-scale farmers, and many investors would rather import beef than help out local breeding farmers (Radzil, 2024).

MATERIALS AND METHODS

This study categorised Lembu Sado farms into small-scale and semi-commercial. Small-scale farms, typically with fewer than five cattle, rely on family labour, minimal inputs, and produce mainly for household use or local sales. In contrast, semi-commercial farms, with 10 or more cattle, target market sales, adopt supplementary feeding and housing, employ veterinary services, and use both family and hired labour to generate sustainable income.

Study Area

This quantitative study was conducted in Terengganu and Kelantan, where agriculture and livestock are key economic activities. Terengganu hosts a major Lembu Sado breeding centre, around 5,000 farmers (Hisham et al., 2022), while Kelantan has around 5,500 farmers and 24,291 cattle (Alias, 2023). These states were therefore suitable study areas.

Method of Data Collection and Research Sampling

Data were collected from 86 respondents in Terengganu and 50 in Kelantan using convenience sampling, with farmer lists provided by the DVS. GPower 3.1.9.4 indicated a minimum sample size of 98, and 136 valid responses were obtained. A structured questionnaire, reviewed by experts, covered three sections: demographics, farm characteristics, and cost/revenue, using both open- and closed-ended questions.

Method of Data Analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) to assess farmers' socioeconomics and Excel to estimate rearing costs for small- and semi-scale farms in Terengganu and Kelantan (Table 1).

This study calculates the production costs according to different farm scales and areas. The production costs were grouped into two costs, namely variable costs and fixed costs. The data on beef production costs were;

1. Total variable costs (TVC) - Consisting of feed, fertilizer, pesticide, grass seed, chemical, salary, veterinary, vaccine, deworming, medicine, AI cost, utilities, petrol, rental, transportation, and maintenance.
2. Total fixed costs (TFC) - Including the depreciation cost of the building, equipment, and machinery.
3. Total revenue (TR) - Consisting of sales of calves, slaughtered, and bred.

Table 1
Variables in socioeconomics and their units

Variables in Socioeconomics	Units
Age	Years
Education	No Education, Primary, Secondary, Diploma, and Degree
Experience	Years
Household Size	Number of Persons
Distance from Home	Kilometres (KM)
Off-farm Income	Malaysian Ringgit (MYR)
Government Support	Malaysian Ringgit (MYR)

4. Gross profit - Revenue – Variable Costs (measures earnings before fixed costs).
5. Net profit - Revenue – Total Costs (Variable + Fixed Costs) (final earnings after all expenses).

Ethical Issue of the Study

This study has followed standard research ethics protocols. Respondents were informed about the purpose of the research, their right to refuse or withdraw, and the confidentiality of responses. Participation was entirely voluntary, and results were reported without revealing any personally identifiable information. Farmers were informed with the assistance of DVS Terengganu and Kelantan officers, before the study instruments were distributed. The data were used solely for academic purposes.

RESULTS AND DISCUSSION

Socioeconomics of Lembu Sado Farmers in Terengganu and Kelantan

Table 2 shows that most farmers are in their 40s, with an average of 6.9 years of experience and a household size of three. Education levels are modest: 66.2% completed secondary school, 23.5% a diploma, and 5.9% a degree. Farms are generally close to homesteads (average 1.75 km, up to 20 km). Most farmers (85.3%) rely on off-farm income, while only 18.4% receive government support.

Table 2
Socioeconomic characteristics of Lembu Sado farmers in Terengganu and Kelantan (n = 136)

Characteristics	Min	Max	Mean	Standard deviation	Frequency	Percentage
Age	23 years old	65 years old	40.13	9.608		
Education:	0	4	2.30	0.683211		
0) No Edu					3	2.2
1) Primary					3	2.2
2) Secondary					90	66.2
3) Diploma					32	23.5
4) Degree					8	5.9
Experience	2	18	6.88	4.893		
Household Size	0	10	3.07	2.457		
Distance from Home	0	20	1.75	3.565		
Off-farm Income			0.85	0.355	No – 20 Yes - 116	14.7 85.3
Government Support			0.18	0.389	No – 111 Yes -25	81.6 18.4

The Cost of Rearing Lembu Sado for Small-scale and Semi-commercial Farms in Terengganu and Kelantan

Table 3 shows that a sold Lembu Sado can earn RM20,912.42 for a small-scale farm in Terengganu and RM16,794.30 in Kelantan. A farm generates income through sales, which forms the basis of profitability. While costs can affect the profitability, variable costs (e.g., feed, labour, veterinary expenses) and fixed costs (e.g., depreciation) will reduce the revenue that turns into profit. A total of RM7,642.18 is calculated in Lembu Sado rearing in Terengganu and RM3,715.58 in Kelantan for variable costs, with salary being the highest contributor towards variable costs, followed by feed, and maintenance for Terengganu and utilities for Kelantan traditional farm. Contrary to a study by Lumenta et al. (2024) the most significant cost in the cattle farming business in Sangkub district is feed, amounting to RM4,849.14, equal to 18,208,074 IDR. The fixed costs include depreciation of vehicles, buildings, and machinery, with a total of fixed costs of RM 2,107.89 per head in traditional farm in Terengganu and RM 3,824.46 in Kelantan. The small-scale farm net margin is RM12,171.75 in Terengganu and RM9,254.26 for Kelantan, indicating a difference of RM2,917.09 compared to Terengganu. The lower net margin from Kelantan farms is primarily due to revenue. The differences in revenue mean that Kelantan earns less than Terengganu, even though Kelantan farms' operating costs are lower than those of Terengganu farms, which conforms to the findings from Radzil et al. (2023), a profit of less than RM10,000 per year (39.8 percent) was made. Revenue is closely associated with the pricing market. Selling price is determined based on the product market price, and it is often affected by demand for the product and the number of demands (Lumenta et al., 2021). In contrast, semi-commercial farms earned RM13,976.18 in revenue but faced much higher costs (RM27,794.39) in variable (mainly salaries, feed, AI) and RM15,011.66 in fixed leading to a gross margin of RM13,818.21 and a net loss of RM28,829.87. This indicates severe larger scale production generating significant losses.

Comparison of Small-scale and Semi-commercial Farms

Kelantan's small-scale farms had the lowest variable costs, giving a total cost of RM7,540.04, which was RM2,210.03 less than Terengganu's small-scale farms and RM35,266.01 less than semi-commercial farms. Their fixed costs were higher than Terengganu's due to building depreciation, but still manageable. Overall, Kelantan's small-scale farms achieved a net margin of RM9,254.26 and a profit of RM13,078.72, while Terengganu's small-scale farms, despite higher costs, earned an even higher margin of RM12,171.35. In contrast, Terengganu's semi-commercial farms generated only RM13,976.18 in revenue and recorded large net losses, showing that larger scale does not guarantee profitability. Profitability depends on efficient cost management, with unpaid family labour helping reduce expenses (Radzil, 2024).

Table 3
Enterprise budget of the small-scale and semi-commercial farms in Terengganu and Kelantan

Category	Unit (Head)	Terengganu Small-scale Farm		Unit (Head)	Kelantan Small-scale Farm		Unit (Head)	Terengganu Semi-commercial Farm	
A. Revenue		**Total (RM)**	**Total RM (per-head)**		**Total (RM)**	**Total RM (per-head)**		**Total (RM)**	**Total RM (per-head)**
Slaughtered	207	1,201,300	5,803.38	65	304,160	4,679.38	30	100,000	3,333.33
Breed	146	1,490,700	10,210.27	130	1,085,800	8,352.31	20	150,000	7500
Sale of calves	103	608,500	5,907.76	101	380,024	3,762.61	35	110,000	3,142.85
Total gross revenue			20,921.42	65	304,160	16,794.30			13,976.18
B. Variable cost									
Feed	L/S	1,486.54		L/S	644		L/S	6,541.11	
Fertilizer	L/S	337.54		L/S	249.92		L/S	983.33	
Pesticide	L/S	60.46		L/S	13.6		L/S	14,600	
Grass seed	L/S	49.39		L/S	57		L/S	233.33	
Chemical	L/S	78.76		L/S	18		L/S	66.66	
Salary	L/S	2,939.02		L/S	1,116		L/S	16.66	
Veterinary	L/S	89.15		L/S	116.6		L/S	733.33	
Vaccine	L/S	38.98		L/S	94.7		L/S	1,106.66	
Deworming	L/S	157.65		L/S	178.86		L/S	746.66	
Medicine	L/S	241.24		L/S	170.8		L/S	1,766.66	
AI cost	L/S	304.04		L/S	69.9		L/S	166.66	
Utilities	L/S	389.5		L/S	313.4		L/S	500	
Petrol	L/S	459.52		L/S	135.8		L/S	333.33	
Rental	L/S	118.07		L/S	159				
Transportation	L/S	307.97		L/S	183				
Maintenance	L/S	584.35		L/S	195				
Total variable cost (RM)			7,642.18			3,715.58			27,794.39

Table 3 *(continue)*

Category	Unit (Head)	Terengganu Small-scale Farm	Unit (Head)	Kelantan Small-scale Farm	Unit (Head)	Terengganu Semi-commercial Farm
C. Fixed cost						
Depreciation of the vehicle	L/S	635.29	L/S	165.96	L/S	5,100
Depreciation of the building	L/S	1,118.31	L/S	2,090.52	L/S	9,183.33
Depreciation of machinery	L/S	354.29	L/S	1,567.98	L/S	728.33
Total fixed cost (RM)		2,107.89		3,824.46		15,011.66
D. Total cost (RM) *B+C*		9,750.07		7,540.04		42,806.05
E. Gross margin (RM) *A-B*		14,279.24		13,078.72		-13,818.21
F.Net margin (RM) *A-D*		12,171.35		9,254.26		-28,829.87

CONCLUSION

In conclusion, Lembu Sado farmers in Terengganu and Kelantan are on average 40 years old, with six years of experience, and small households. Most have secondary education, off-farm income, and little government support. The estimated net margin is RM12,171.35 in Terengganu and RM9,254.26 in Kelantan, while semi-commercial farms face heavy losses (−RM28,829.87) due to high costs. Overall, profitability depends more on efficient cost management than farm size, for instance small-scale farms in Kelantan showing better financial outcomes. These findings highlight the need for improved cost management, financial support, and policies to ensure Lembu Sado farming remains viable.

Limitations of the Study

This study has faced some limitations. Firstly, the research was carried out on a limited sample of Lembu Sado farmers in specific areas, which may not accurately reflect the entire population of beef farmers in Terengganu and Kelantan. Secondly, no pilot test was conducted prior to data collection due to limited time of the study. However, despite these limitations, the study provides valuable insights into the socioeconomic profile and production challenges of Lembu Sado farmers in Malaysia.

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REFERENCES

Alias, N. A. (2023, June 15). Kelantan kuasai sektor ternakan lembu hibrid cecah RM193 juta. *Berita Harian*. https://www.bharian.com.my/berita/nasional/2023/06/1114830/kelantan-kuasai-sektor-ternakan-lembu-hidrid-cecah-rm193-juta

Aguirre, E., Suárez, F. G., & Sicilia, G. (2024). Technical efficiency in beef cattle farming in Uruguay: Insights from census data. *Agrociencia Uruguay*, *28*, Article e1237. https://doi.org/10.31285/AGRO.28.1237

Department of Veterinary Services (2022). *Perangkaan ternakan 2022/2023*. Ministry of Agriculture and Food Security, Malaysia. https://www.dvs.gov.my

Department of Veterinary Services. (2024). *Livestock statistics 2023/2024*. Ministry of Agriculture and Food Security, Malaysia. https://www.dvs.gov.my

Hisham, A. D. B., Suhaimi, N. A. M., Arumugam, N., Nor, N. M., & Indrawan, D. (2022). Consumer perception of Charolais mixed breed (Lembu Sado) meat consumption in Terengganu, Malaysia. *Jurnal Manajemen Dan Agribisnis*, *19*(3), 461-470. https://doi.org/10.17358/jma.19.3.461

Islam, M. S., Yimer, N., Haron, A. W., Abdullah, F. F. J., Wen Han, M. H., Mamat-Hamidi, K., & Zawawi, H. B. M. (2022). First study on phenotypic and morphological characteristics of Malaysian Kedah-Kelantan cattle (Bos indicus) and method of estimating their body weight. *Veterinary World*, *15*(3), 728-736. https://doi.org/10.14202/vetworld.2022.728-736

Lumenta, I. D. R., Moningkey, S. A. E., & Oroh, F. N. S. (2021). Financial feasibility analysis study of beef cattle business in Minahasa regency. *IOP Conference Series: Earth and Environmental Science*, *902*(1). Article 012031. https://doi.org/10.1088/1755-1315/902/1/012031

Lumenta, I. D. R., Moningkey, S. A. E., & Oroh, F. N. S. (2024). Profit analysis of beef cattle business as agrotechnopark development effort in North Bolaang Mongondow Regency, North Sulawesi. *IOP Conference Series: Earth and Environmental Science*, *1341*(1), Article 012086. https://doi.org/10.1088/1755-1315/1341/1/012086

Radzil, R. H. M., Hamzah, H. Z., Sidique, S. F. A., & Samsudin, A. A. H. (2023). Technical efficiency of beef cattle farms in Peninsular Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *13*(7), 1065-1090. https://doi.org/10.6007/ijarbss/v13-i7/17545

Radzil, R. (2024). Economic efficiency of beef cattle farms in Peninsular Malaysia. *IOP Conference Series Earth and Environmental Science*, *1397*(1), 012028-012028. https://doi.org/10.1088/1755-1315/1397/1/012028