A Study On Sustainability Of Dairy Farms In Kerala

Shajeela Rani A[1]*, Dr. P. Antony Raj[2], Dr. M. Jagathish[3]

[1]*Research Scholar, Reg.No. 20213091012007, Muslim Arts College, Thiruvithancode, Manonmaniam Sundaranar University,Abishekapatti, Tirunelveli -627012, TamilNadu, India, shajeelarani@gmail.com
[2]Associate Professor, Department of Commerce, Muslim Arts College, Thiruvithancode , Manonmaniam Sundaranar University,Abishekapatti, Tirunelveli -627012, TamilNadu, India, antonyrajp1959@gmail.com
3 Assistant Professor, Department of Commerce, Muslim Arts College, Thiruvithancode , Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli -627012, TamilNadu, India,drjagathishresearchmac@gmail.com

***Corresponding Author:** Shajeela Rani A
*Research Scholar, Reg.No. 20213091012007, Muslim Arts College, Thiruvithancode, Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli -627012, Tamil Nadu, India ,shajeelarani@gmail.com

Abstract
This study investigates the economic sustainability of dairy farming in Kerala, focusing on factors influencing productivity and cost efficiency. Analyzing data from Southern Kerala, the research reveals that inefficient farms experience lower milk yields and higher production costs. The study recommends improving technical efficiency through increased use of purebred cattle and enhanced feed management. It suggests government support for training programs and the establishment of processing plants by dairy farms. Overall, the findings contribute valuable insights for both farmers and policymakers, emphasizing the need for competitiveness and sustainable management in the dairy sector.

Key words: sustainability, Net Irrigated Area, High Production Cost, Technical efficiency

INTRODUCTION

Agriculture is defined as an art and science of cultivating crops and rearing livestock. Livestock is an integral part of agriculture. Livestock contributes to about one fourth of economic contribution to agriculture sector. Crop residues are used as feed for livestock. In turn they provide milk and dung as by-product. Milk is used to consume and sold mostly through dairy cooperatives. Compost is being used as a farm yard manure. Recently dung and urine is used as a microbial culture called Jeevamrutham. It is used in sustainable farming practices like organic agriculture and zero budget natural farming. Productivity of cattle and buffalo is low in India when compared to world scenario. Feed and fodder resources are available in ample quantities but efficient utilization of those resources are of prime concern. Milk production is an integral product of Animal husbandry and is providing employment directly and indirectly. In addition, it is supplementing nutritional security to households. Through assured income, it is contributing to income security to millions of famers in India, thus bringing income security and positive changes in socio economic dimensions of farming society.

STATEMENT OF THE PROBLEM

In India milk production is increasing exponentially over past decades. This does not mean farmers who are involved in milk production are reaping benefits economically. Over the years cost of feed like green fodder, dry fodder and concentrates has been increased. It also observed that feed cost accounts for majority share in cost of milk production. Diseases attack also affect animal welfare. Cattle and buffalo rearing lead to production of milk and manures essential for farming. Dairying is providing regular income, employment and food security. Dung usage in farm reduces the cost incurred on manure purchase in conventional farming. Greenhouse gas emission takes place in the form of methane and carbon dioxide. Emission happens due to enteric fermentation process in cattle and buffalo. Over the years genetic improvement of cattle and buffalo is being carried out in our country through preserving semen of cattle and disseminating through artificial insemination technique. Under above scenarios current study is most apt to address issues in dairying.

OBJECTIVES OF THE STUDY

1. To identify the economic sustainability of dairy farming in Kerala
2. To assess factors influencing sustainable dairy farming.

SCOPE OF THE STUDY

Study examines the changes composition of cattle and buffalo, veterinary infrastructure. These two are indicators to assess the direction of dairy sector progress. Assessing sustainability of dairy sector in south Kerala.

RESEARCH METHODOLOGY

Research design

Descriptive research design was used for this study

Source of data
Primary and secondary data was used for this study
Sampling techniques
Purposive sampling techniques was used for this study

Tools used for analysis
- Anova
- Regression
- *Descriptive statistics*
- *Hausman test*

LITERATURE REVIEW

Verma et al. (2017) suggested improvement of productivity of milk for fostering sustainable development of agriculture in Uttar Pradesh. Study revealed that to achieve sustainability, artificial insemination could be used so that probability of female offspring increases, this ensure increased milk production. Existing breeds could be upgraded by crossing of indigenous varieties with imported semen from exotic breeds. Eventually these measures increase the possibility of development in agriculture from sustainability perspective.

Wijethilaka et al. (2018) conducted study on factors affecting sustainable dairy production in Uva province of Sri lanka. Primary data was collected for the study. Study identified that farmer training, collectivizing farmers intofarmer societies, culling unproductive male animals, increasing the availability and access to Artificial Insemination or other breading programs and low-cost quality concentrate feed and other supplements were the factors responsible for sustainable dairy production.

Philemon (2015) conducted study tofind factors affecting sustainable dairy farming in Kenya. Study revealed that unpredicted weather, prolonged drought and famine influence sustainability. Further, lack of skills on breeding, insufficient education on dairy food security, insufficient information on dairy nutrition and limited funding sources influence sustainability of small scale dairy farming.

Mote et al. (2016) evaluated the effect of environmental factors on milk production using experiments. It showed that crossbred cows were sensitive to seasonal changes on their lactation length and lactation milk yield. Season of calving had a significant effect on lactation yield and length of crossbreds.

Kiniorska and Wrońska-Kiczor (2015) conducted study of factors affectin
g rural area development in Poland. Factors influenced development were, under used agrarian structure of agricultural holdings, decreasing area of agricultural lands, excessive employment in agriculture and high percent of extensive agriculture. For low progress in environmental infrastructure insufficient quality of life and infrastructural barriers played crucial role.

METHODS AND MATERIALS OF THE STUDY

DATA ANALYSIS AND DISCUSSION

The descriptive statistics of milk production and other variables are given below in Table 1.

Table 1 *Descriptive statistics*

Sl.no	Variable	Mean	Standard deviation
1	Milk production(MPRO)("00")	67.44	65.35
2	Share of crossbred in total milch animals (%) (CRB)	13.21	12.23
3	Share of buffalo in total milch animals (%) (BUF)	8.67	7.98
4	Net Irrigated Area (Ha) (NIA)	456787.3	16758.89
5	Veterinary institutions (No. per '000 bovine units) (VET)	115.34	122.65
6	Milk Producer Co-operative Societies (No. per '000 bovine units) (COOP)	289.34	98.56

The average milk production was 67.44 thousand tonnes, with standard deviation of 65.35. Average value of CRB was 13.21 with standard deviation of 12.23. Mean value of BUF was 8.67 per cent with standard deviation of 19.85. NIA registered average value of 456787.3 with standard deviation of 16758.89. Average of VET was 115.34 with standard deviation of 122. 65. Average COOP was 289.34 with standard deviation of 98.56''

Table 2 *Fixed effects versus random effects model: Hausman test Random effect model is preferred over fixed effect*

S.No.	Test	Statistic	Value
1	Hausman test	Chi square statistic	1.000NS

To decide between fixed or random effects, Hausman test was performed with the null hypothesis that the preferred model is random effects and the alternative hypothesis is fixed effects. It basically tests whether the unique errors (ui) are correlated with the regressors, the null hypothesis is they are not. The results of Hausman test are presented in Table 2 with a non-significant chi square statistical value (1.000). Hence, we failed to reject the null hypothesis so random effect model is preferred to the data..

The ANOVA results of efficiency index among different groups of farmers is given in Table 3

Table-3
ANOVA
Result of efficiency index among different groups of farmers

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	814.723	2	407.362	8.093	.000(a)
	Residual	11375.765	226	50.335		
	Total	12190.488	228			

a Predictors: (Constant), Training, Recognition
The ANOVA results given in the Table 2 indicate that the differences in mean percentage efficiency among small, medium and large producers are very significant

Production function of all producers combined
Table 4 shows the regression results of Cobb-Doulas production function representing all milk producers. The coefficient of various factors

Table 4 *Regression results of production function for all milk producers*

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.489	0.183		-2.671	0.008
	log value of raw material per cow	0.495	0.047	.550	10.572	.000
	Log value of labour per cow	-0.117	0.050	-0.121	2.326	0.021
	Log value of capital per cow	0.178	0.041	0.232	4.388	0.000

The value of constant term signifies the contribution of technological and other related components. Here, the total factor productivity (TFP) is negative. In the present situation the managerial skill and organisation capacity of farmers do not play any positive role in utilising the existing factors of production and determining the level of milk production. It provides the insight that the milk production and the efficiency in utilisation of factors can be increased by improving the existing mode of cow-rearing practices. Returns to scale is the sum total of the coefficients of all factors of production. The returns to scale measures the change in output when there is one unit change in all factors of production simultaneously.

Table-5
ANOVA
Result of efficiency index among different Groups of Farmers

Model		Sum of Squares	Df	Mean Square	F	Sig.
Value of concentrates per day per in milk cow	Between group	37.77	2	18.89	.027	.983
	Within group	246128.54	226	1089.06		
Value of Roughages per day per in milk cow	Between group	0.14	2	.07	.002	.002
	Within group	7021.45	226	31.07		
Total feeding cost per day per in milk cow	Between group	34.31	2	17.16	.015	.985
	Within group	256707.48	226	1135.87		

The above table depicts the respondents' level of agreement regarding cost of maintaining in milk cows between various groups of producers 'F-value is found to be not statistically significant as the p-value is more than the alpha value so accept the null hypothesis. It indicates that cost of maintaining in milk cows particularly with respect tofeeding cost

remains the same for all groups of milk producers. Table 5 shows the average value of different types of feeding cost between traditional and new entrants in milk production.

Table-6
ANOVA
Result of Non-feeding cost in respect of different Groups of Farmers

Model		Sum of Squares	Df	Mean Square	F	Sig.
Milking expenses per in milk cow per day	Between group	14.41	2	7.21	21.58	.000
	Within group	75.45	226	.334		
Value of Domestic labour per In milk cow per da	Between group	10628.02	2	5341.7	119.23	.001
	Within group	10017.64	226	44.32		
Health, insurance and insemination expenses per inmilk cow per day	Between group	4.35	2	2.17	1.215	.229
	Within group	404.07	226	1.79		
The opportunity cost of cow and cattle shed per inmilk cow per day	Between group	164.54	2	82.27	23.505	.000
	Within group	791.02	226	3.50		

The above table depicts the respondents' level of agreement regarding variation of Non-feeding cost in respect of different Groups of Farmers 'F-value is found to be statistically significant as the p-value is less than the alpha value so reject the null hypothesis. It indicates that variation of Non-feeding cost in respect of different Groups of Farmers diffenet for all groups of milk producers.

Table-7
ANOVA
Result of total cost between various groups of producers

Model		Sum of Squares	Df	Mean Square	F	Sig.
Total cost excluding incidental expense	Between group	14207.99	2	7103.995	7.015	.003
	Within group	266896.52	226	1180.958		
Incidental Expenses	Between group	142.08	2	71.040	6.873	.002
	Within group	2668.97	226	11.810		
Total cost including incidental expense	Between group	17191.67	2	8595.834	8.43	.000
	Within group	322944.78	226	1428.959		

The above table depicts the respondents' level of agreement regarding variation in total cost between various groups of producers 'F-value is found to be statistically significant as the p-value is less than the alpha value so accept the alternative hypothesis. It implies that the total cost per in milk cow and herd size of cows held by the farmers are closely inter linked. The test of significance of variations in cost components between various groups of dairy farmers is depicted in Table 7.

Table 8
ANOVA
Result of cost per litre among different group of farmers

Model		Sum of Squares	Df	Mean Square	F	Sig.
Total cost excluding incidental expense	Between group	418.73	2	250.36	17.34	.000
	Within group	3148.58	226	13.93		
Incidental Expenses	Between group	58.56	2	29.28	2.716	.064
	Within group	2434.79	226	10.77		

The above table depicts the respondents' level of agreement regarding variation cost per litre among different group of farmers 'F-value is found to be statistically significant as the p-value is less than the alpha value so accept the alternative

hypothesis. It implies that the cost per litre among different group of farmers are closely inter linked. The test of significance of variations in cost per litre among different group of farmers is depicted in Table 6.

FINDINGS OF THE STUDY

The results could also inform policy makers regarding resource use efficiency and economic sustainability in the dairy farming sector and the impacts of livestock supports on the profitability of the farms. The primary conclusions relating to the management of dairy farms are as follows. The majority of farms were found to be managed in a technically inefficient manner. Milk yield per cow in the inefficient farms was almost 1/3 less than the efficient farms. The main reason for this low yield performance was the high share of indigenous and crossbreeds in the cattle population and the current feeding systems. In order to increase milk yield, the inefficient farms should increase the proportion of purebreds in the cattle population and graze their animals in pasture. Milk produced by the inefficient farms was also found to be 1/3 higher in cost than the milk produced by the efficient farms. However, it is very important for the inefficient farms to produce milk at a competitive cost in order to sustain their economic viability. The most important cost items were feed and labor. However, the prices of these two cost drivers were found to have risen higher than milk prices in Southern Kerala.

SUGGESTIONS

- The inefficient farms were also found to use higher levels of roughage, concentrate feed and labor per cow compared to the efficient farms. In order to use input more efficiently in dairy farming, the dairy farmers should expand their basic knowledge, develop more effective farm management skills and adapt more efficient feed management programs. However, the government should also support training programs which ensure efficient use of dairy farming inputs.
- The dairy farms should adopt a more efficient management system which could also contribute positive economic benefits
- Dairy farms should establish their own processing plants to process raw milk into dairy products and then market their dairy products at more favourable prices. The government should encourage this by giving necessary supports to dairy farmers for this kind of entrepreneurship.

CONCLUSIONS

There has been an increasing trend in both cattle population and milk production on account of the provision of domestic livestock supports in Southern Kerala. Dairy farming had been generally performed by family farms. In the dairy sector, input prices increased more than milk prices, developments which led to the decreased profitability levels of farms. Therefore, there is a need for the dairy farms to increase their level of competitiveness to improve their economic sustainability. This empirical study provides detailed insights into the economic sustainability of family dairy farming in the Southern Kerala within the scope of technical efficiency. The study results will no doubt prove useful for both dairy farmers and policy makers in identifying the strengths and weaknesses of farms and the sustainable management of dairy farming. This concluded that the inefficient farms could sustain their economic viability through the receipt of livestock supports. Nevertheless, the government supports to the dairy farming sector should be regarded as a necessary complement for economic viability.

REFERENCES:

1. Verma, Smriti, Ashok Gulati, and Siraj Hussain. 2017. Doubling agricultural growth in Uttar Pradesh: sources and drivers of agricultural growth and policy lessons. Indian council for Research on International Economic Relations. 1-62
2. Wijethilaka, D, S De Silva, RMC Deshapriya, and LHP Gunaratne. 2018. "Factors affecting sustainable dairy production: A case study from Uva Province of Sri Lanka." IOP Conference Series: Earth and Environmental Science.
3. Philemon, Bidii Koro. 2015. "Factors Influencing Sustainability of Small Scale Dairy Farming; A Case of Small Scale Dairy Farmers in Cherang'any Sub County, Trans-Nzoia County, Kenya."
4. Mote, SS, DS Chauhan, and Nilotpal Ghosh. 2016. "Effect of environment factors on milk production and lactation length under different seasons in crossbred cattle." Indian J. Anim. Res 50 (2):175-180.
5. Kiniorska, Iwona, and Janina Wrońska-Kiczor. 2015. "Factors Affecting Sustainable Development of Agriculture and Rural Areas in the Świętokrzyskie Voivodship." Barometr Regionalny. Analizy i prognozy 1:41-46.
6. Kishor, Sunita, and Kamla Gupta. 2004. "Women's empowerment in India and its states: evidence from the NFHS." Economic and Political Weekly 39 (7): 694-712.
7. Klaassen, Ger AJ, and Johannes B Opschoor. 1991. "Economics of sustainability or the sustainability of economics: different paradigms." Ecological economics 4 (2):93-115.