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Economic Analysis and Milk Disposal Pattern of Dairy Farming in Securing Livelihood of Small and Marginal Farmers

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ABSTRACT

India is livestock wealth contribution to the Indian economy is 115 million crores through the production of milk, meat, wool, and egg. The state of Tamil Nadu shares 4.56 per cent of India's livestock population, and smallholders captured 80 per cent of the state's milk production. This study was carried out in Dharmapuri district of Tamil Nadu based on the highest number of small and marginal farmers enrolled in milk cooperatives societies and private milk vendors. The focus of the study was on the livelihood securities of small farmers rearing milch animals, cost and returns and disposal pattern of milk. The annual average milk production of 4.3 animals, which fetches a net income of ₹ 56,756 per annum.

Keywords: Cost and returns, Dairy Farms, Production

"Dairying/ Dairy Farming is a branch of agriculture that encompasses the breeding, raising, and utilization of dairy animals, primarily cows, for the production of milk and the various dairy products processed from it." (Webb, 2018). Indian agriculture is a diversified farming system in which crop production and animal husbandry are devoted to efficient and economic utilization land, labour, and capital. In India, 62.5 per cent of the population is directly or indirectly associated with agriculture and animal husbandry. The small and landless farmers control over 75 per cent of the country's livestock resources. Globally, the livestock wealth comprises 298.2 million buffaloes, 995.7 million cattle, 1520.6 million goats, 2605.2 million sheep, 128.5 million horses, 108.5 million donkeys, and 93.9 million camels. The distribution of livestock populations across the globe showed that ruminants, cattle, and sheep dominated in Asia, Africa, and Europe. More than 1.4 billion cattle are kept worldwide today, of which 159 million (11 per cent) are in this region of Europe and Central Asia. (***Source:*** NDDB – 2018-2019).

India is the world's highest livestock owner at about 535.78 million, with a growth rate of 4.63 per cent. (Livestock census – 2019-20). Among the livestock, cattle accounted for 35.92 per cent (192.49 million), and buffalo accounted for 20.50 per cent (109.85

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million). The livestock sector contributes to the Indian economy through milk, meat, wool, egg, and honey to the value of ₹ 115.96 million crores. (Source: National Accounts Statistics 2020). The dairy was enterprising in treasuring the Indian economy, linking over 11 million farmers through one lakh village milk co-operative societies.

Tamil Nadu is a fast-developing state and has significantly contributed in India's green and white revolution (Anbukani 2010). The state of Tamil Nadu, possessing 4.56 per cent of the Indian livestock population, contributes 4.39 per cent to the country's milk supply. As per the 20th livestock census, the cattle population is 95.19 lakh. Aavin stands in the fourth position among the state co-operatives across the country. Tamil Nadu is one among the top ten milk-producing states in the country, with a daily production of 206 lakh litres per day. The state has a very vibrant cooperative milk sector, with milk producers' co-operative societies spread across nooks and corners of the state. There are 12,585 milk producers' co-operative societies having 20.30 lakh farmers as its member and procured 37.03 lack litres per day. The milk procured from the co-operative society is marketed by Aavin (brand name of Tamil Nadu co-operative milk producing unit). The co-operative societies are very successful in the state (Anbukani 2015 &Vishnu *et al.* 2019), and network of Aavin 6 more unions have been formed, which has benefited both farmers and consumers (NABARD & GOI Tamil Nadu 2021)

Dairying is an important secondary source of income for farm families and adjudges a vital role in employment and income generation for rural as well as urban families. Every small farmer can gradually keep many animals this may results is increased production of milk (Ranjith Kumar *et al.*). The small and marginal farmers 66 per cent also contribute 80 per cent of the milk production. This backdrop of this sector felt necessary to take up research on the socio-economics of the small dairy farm and their disposal pattern in the Dharmapuri district of Tamil Nadu. The data were collected from 120 sample farms with the following objectives. (1) To study the socio-economic profile of livestock farmers in the study area, (2) To estimate the cost and returns of milk production in the study area and (3) To estimate the disposal pattern of milk in the study area.

TOOLS OF ANALYSIS

Descriptive Analysis

Descriptive statistics and simple percentage analysis are used for the sample characteristics like age, education, family size, educational level, income level, occupational pattern, income, expenditure pattern, and assets position.

Costs involved in Dairy Farms

(A) Fixed cost

The fixed costs consisted of depreciation on animals and sheds, interest on the value of animals and assets related to production and taxes, and insurance premiums, if any paid.

(B) Operational cost

Operational cost includes the cost of feed, labour, ropes, baskets, buckets and veterinary and breeding charges incurred during the reference period with nominal interest charges.

1. Feeding cost

Information about the different feeds and fodders (green fodder, dry fodder, concentrates, and special ration) fed to cows and buffaloes during the study period was collected. The total quantities of different feeds used and the cost incurred per animal per day were calculated based on respective market prices.

2. Labour cost

The expenditure on wages paid to permanent and casual labourers engaged in various operations related to dairy animals was obtained from milk producers. The value of hired labour was considered at the prevailing market rate paid by the milk producers. The family labour was charged at the permanent labour wage rate prevailing in the study area.

3. Other expenses

Under this head, certain items like electricity, Veterinary, and Miscellaneous expenses were included.

(C) Total cost

The total cost of maintenance of cow and buffalo included the cost of all items viz., feed, fodder, labour, miscellaneous items and, depreciation on animals, cattle–shed and equipment, interest on fixed capital.

Income Concepts

(A) Gross income

Gross income is the value of the main product plus by-products. The main products and by-products are to be imputed, considering the actual market prices or prices prevailing in the villages at the time of inquiry. Here gross income consisted of income from milk, dung, and the sale of the calves.

(B) Cash farm income/farm returns

Cash farm income includes cash obtained from the actual sale of milk and does not include the products consumed at home.

(C) Net income

This was obtained by deducting the gross cost from gross income.

Cost of Production of milk

It is the expenditure made to produce one litre of milk in the sample farm by using the formula:

Cost of production of milk (per litre) =

$$\frac{\text{Sale proceeds of milk}}{\text{Total production of milk (in litre)}}$$

Profit per litre of milk

Profit per litre of milk was found by the selling price of milk litre per rupees minus average milk production cost per litre.

Profit per Litre of Milk = Selling price of milk per litre – Production cost of milk per litre

Marketable & Marketing Surplus

Marketable surplus is used to quantify what is an actual surplus under varying conditions after the consumption and other requirements of farmers were met.

$$MS = P\text{-}C$$

Where,

MS = Marketable surplus

P = Total production of milk (in ₹ /annum)

C = Family consumption of milk (in ₹ /annum)

The quantity of milk per day sold in the market was identified as marketed surplus.

Per capita milk consumption =

$$\frac{\text{Quantity of milk retained at home}}{\text{Family size}}$$

Break-Even Analysis

The Break-even level of milk production is a minimum quantity of milk to be produced in the farm to cover the total cost of milk production, below which dairy owners will be at a loss. At that point of production, the farmers neither gain profit nor incur a loss.

Break-even (Quantity) =

$$\frac{\text{Annual Fixed cost of the Farm}}{\text{Selling price per litre} - \text{Variable cost per litre}}$$

RESULTS AND DISCUSSION

The socio-economic characteristics of the sample dairy farm in the study area are presented in table 1. It found that 96 per cent of the sample respondents were male, and more than 50 per cent of them were in the age group above 50 years. Forty per cent of the sample respondents attached only primary education, and 32 per cent of the respondents has not attended any school of education in the study area. It also found that nuclear-type of farm families accounted for 72 per cent of the sample, and the average family size of the sample respondents was 5.23. The land holding distribution revealed that small and marginal farms are almost equal in terms of percentage, i.e., 52 per cent and 48 per cent. The Source of water and shed are important prerequisites for animal rearing. The information revealed that majority of the farms depends on-farm well)76 per

cent) and bore well (46 per cent) as the main water source. It also found that 74 per cent of the sample farms owned animal shed.

Table 1 also mentions various sources of income from the sample respondent 68 per cent of the respondents are earning from income from dairy farming, and 17.30 per cent of the respondents earn income on daily basis wages.

Table 1: Socio-economic characteristics of the sample farms

Socio-economic	Particulars	No of Respondent	Per cent
Gender	Male	115	95.84
	Female	5	4.16
Age (Years)	18 to 35	14	11.67
	36 to 50	58	48.33
	51 to 80	48	40.00
Educational Level	Primary School	48	40.00
	Secondary School	12	10.00
	Hr Sec School	19	15.83
	Degree	3	2.50
	Illiterate	38	31.67
Family type	Nuclear	72	60.00
	Joint Family	48	40.00
	Average Family Size	5.23	
Landholding (acre)	Small Farmer	62	51.66
	Marginal Farmer	58	48.34
Source of water	On-farm well	92	76.67
	Piped public water supply	14	11.67
	Borewell	65	45
	Hand Pump	10	8.33
Natural Animal Shelter	Own shed	89	74.17
	Open ground	31	25.83

*Percentage of the total of 120 respondents.

Breed-wise Distribution of Milch Animal and the Sample farms

The income of a dairy farm depends on the type of breed reared by the farm. The prevailing milch breed in the study area in Jersey is Jersey Crossbreed, Holstein Friesian, Holstein Friesian Crossbreed, Indigenous, Sindhi, and Toda (Buffalo). The data on breed-wise data of the sample respondents are analysed and presented in Table 2.

Table 2: Breed-wise Distribution of Milch Animal of the Sample farms

Sl. No.	Breed type	Total no. of milch animal	Per cent
1	Jersey	54	10.38
2	Jersey Crossbreed	110	21.15
3	Holstein Friesian	91	17.50
4	HF Crossbreed	99	19.04
5	Indigenous	53	10.19
6	Sindhi	75	14.42
7	Toda (Buffalo)	38	7.32
	Average Animal/ Farms	4.34	100

It revealed that the majority of the sample respondents preferred crossbreed animals that yield more milk than the Indigenous /native breeds. The indigenous breed accounted for 10.19 per cent, and buffalo accounted for 7.32 per cent and the similar findings reported by (Yasmeen *et al.* 2019).

Economics of the livestock production in the study area

Establishment Cost of production of milk in the sample farm

The expenditure on establishing and maintaining the dairy farms is collected from the respondents, and the analysed results are presented in the table 3.

Table 3 revealed that the total cost of establishing a dairy farm consisting of 4.34 animals is estimated at ₹ 2,27,523 of this total fixed cost and the value of animals and shed accounted for 72.78 per cent and 26.47 per cent. The economic life period of an animal is seven years. Hence, the cost of production of milk estimation was estimated from the annual fixed cost and maintenance cost. The annual fixed cost estimate for the fixed asset at the rate of 12 % interest and depreciation rate of 10 % recommended the results presented in the table. The annual maintenance cost of the sample dairy farms was worked out at ₹ 500064.4 of this annual fixed cost from the investment cost accounted 35.62 per cent

and maintenance/variable cost among the variable concentrate accounted 30 per cent total variable cost accounted at 64.38 per cent. It found that average mixed production from the sample farm was 6810.25 litre per year and the cost of production of milk per liter was at ₹ 20.57.

Table 3: Establishment Cost of production of milk in the sample farm

Sl. No.	Particulars	Value (₹)	Per cent
1	Value of Animals	165600	72.78
2	Cost of Shed	60220	26.47
3	Cost of Equipment	1000	0.44
4	Miscellaneous Works in Cost	652	0.31
	Total Fixed cost	227523	100
	Annual Fixed cost		
1	Interest in Milch Animal @ 12%	19872	39.69
2	Interest in Dairy Shed @ 12%	7226.4	14.43
3	Interest in Dairy Equipment @ 12%	120	0.24
4	Depreciation of Milch Animal @ 10%	16560	33.08
5	Depreciation of Dairy Shed @ 10%	6022	12.03
6	Depreciation of Dairy Equipment @ 10%	100	0.33
7	Insurance on Animals	164.00	35.62
	I Annual fixed costs (AFC)	50064.4	24.77
	Variable costs		
1	Green Fodder cost	22408.00	24.77
2	Roughages cost	23900.00	26.42
3	Concentrate	30510.00	33.72
4	Labour wages (Family Labour)	9150.00	10.11
5	Electricity charges	960.00	1.06
6	Veterinary expenses	2708.00	2.99
7	Miscellaneous expenses	838.00	0.93
	II Total variable cost (TVC)	89610.00	64.38
	Total cost (I+II)	117628.50	100.00
	Average annual milk production/farm/ year	6810.25	
	Cost of production/litre	20.63	

*Average farm animals (4.34).

Return Analysis

The dairy enterprise generates the income from the three different source viz sale of milk, sale of animal manures and sale of young animals the average income estimated at ₹ 197294.7. The average net income of the farm was ₹ 56756.31, and BCR at 1.40. Dairy farming is an important enterprise helping in the diversification of agriculture in the Dharmapuri region (Perumal).

Break-Even Analysis of Milk Production

The break-even point analysis was done to estimate the minimum quantity of milk to be produced to cover the total cost of the dairy units discussed. The total fixed cost and variable cost /lit of the sample farms were estimated at ₹ 28019 and ₹ 15.74, and the average selling price of the milk was worked at ₹ 24.84. From this, the break-even quantity of milk was estimated at 3082.02 lit. It inferred that the sample household dairy farms should produce a minimum of 3082.02-litre annum to attain no loss, no gain point. Beyond this level of production, the farms start to earn a profit. It inferred that the dairy unit consisting of 4.34 animals should produce minimum of 9.75 litres of milk per day to attain the break-even level.

Table 4: Return from the Dairy Farms

Sl. No.	Particulars	Annual (₹)	Per cent
1	Income from milk (₹)	169234.7	85.78
2	Value of manure (₹)	13260.00	6.72
3	Sale of calves (₹)	14800.00	7.50
4	Total income (₹) (2+3+4)	197294.7	100.00
5	Net Return	56756.31	
6	BCR	1.40	

Mode of Sale of Milk by the Sample Respondents

The disposal of milk in rural areas is done through different channels. The four major milk disposing channels were identified in the study area, and the analysed results are presented in the table 5.

It could be seen from table 5 that two-thirds of the milk producers marketed their milk through Aavin/ Milk Co-operative society and earned a better price of ₹ 26 per litre, followed that local milk vendors procuring the milk from the producers and accounted for 24.16 per cent of the sample respondents' disposal through this mode. Besides these two channels, 6.67

per cent of the respondents sold their milk to the local tea shops, and 2.5 per cent of the producers sold it to direct consumers for ₹ 30. Dairy owners sold the produced milk to various agencies as per the quantity of milk produced and demand by various agencies (Kumawat *et al.* 2014).

Table 5: Mode of Sale of Milk by the Sample Respondents

Sl. No.	Particulars	No. of Respondent	Per cent	Average selling price (₹)/litre
1	Milk vendor	29	24.16	25.08
2	Tea shops	8	6.67	24.33
3	Aavin / Cooperative society	80	66.67	26
4	Local consumer	3	2.50	30
	Total	**120**	**100**	**24.85**

Marketable Surplus of Milk Production of Sample Respondents

The data on average production and average consumption of the sample respondents were collected, and marketable and marketed surplus were analysed and presented in the table 6.

Table 6: Marketable Surplus of Milk Production of Sample Respondents

Sl. No.	Particulars	Milk (litre/ day)	Per cent
1	Total Production	19.05	100
2	Family Consumption	1.09	5.72
3	Marketable Surplus (2-1)	17.96	94.28

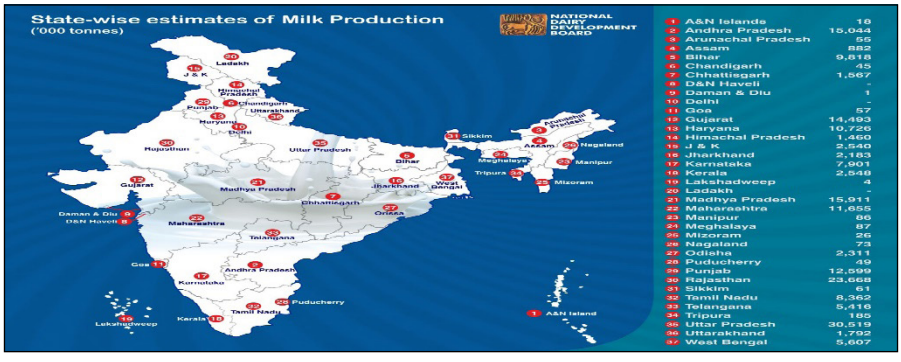
It could be noticed from table 6 that the average productions of milk in the sample respondents were 19.05 litres/day. Of this, 1.09 litre (5.72 per cent) of milk was retained for family consumption, and 17.96 litres, i.e., 94.28 per cent of the produced milk, were available for marketable surplus, and 100 per cent of the marketable surplus of the milk was marketed.

Income Distribution of Sample Diary Farms

Dairying contributes positively and significantly to the income and employment of small and marginal farmers, providing them with livelihoods and sustenance. It helps in the equitable distribution of income and employment among rural farming households and boosts the nutrient-level food security of rural farming households (Jaiswal *et al.* 2018). The table 7 mentioned income distribution among the selection dairy farms 71.60 per cent income earned from dairy farming, 3.40 per cent

Table 7: Income Distribution

	Particulars	No of Respondent	Per cent
Average Monthly Income (In rupees)	Dairy Farming	16441.22	71.60
	Other Livestock	780.00	3.40
	Crop (Agriculture)	2300.00	10.02
	Daily Wages	3440.00	14.98



Source: https://nddb.coop - 2019-20

Fig. 1: State-wise estimates of milk production – 2019-20

income earned from other livestock rearing, 14.98 per cent of income earned on daily basis wages and 10 per cent of the income earn from cultivation of crops.

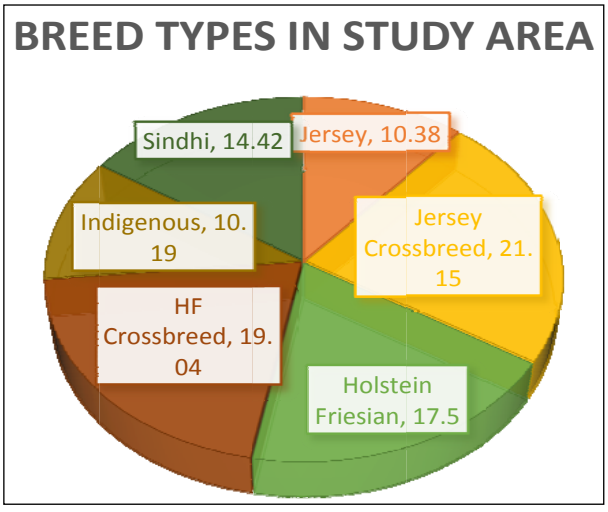


Fig. 2

CONCLUSION

The study concludes that 21.15 per cent of the sample respondents have jersey crossbreeds and HF crossbreeds in 19.04 per cent of the sample respondents in the study area, with 4.34 being average animals on every farm in the study area in the district. Various cost is involved in the farm The high value in fixed costs is ₹ 2,27,523 in the fixed cost 50 per cent of the cost are purchasing of animals, and the annual fixed cost in the study area was ₹ 50064.4 (35.62 per cent) in the total cost. They are various costs included from variable costs from ₹ 90474.00 (64.38 per cent), and the total cost obtained from the farm is ₹ 140538.40 in sample respondents of the area. The average annual farm milk production is 6810.25 litres, and the cost of milk per litre is 20.63 in the sample respondents. Income from the milk sale is ₹ 169234.7, and the selling of manure from ₹ 13260. The dairy farm is profitable in the Dharmapuri district because Benefit-Cost Ratio is 1.40 Rupees, and 66.67 per cent of the sample respondents are sold through the Aavin Co-operative society 24.16 per cent sold from milk vendors. The average price of sale milk to local consumers was 30 rupees, and the Aavin co-operative milk society purchased milk was ₹ 26. Only 5.72 per cent of milk is used in home consumption, and the remaining per cent is milk sold.

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