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Optimum livestock holding for exit out of poverty: A comparative analysis in rural Tamil Nadu*

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ABSTRACT

An attempt was made to assess the income generating capacity of selected livestock species reared by resource poor rural farmers and to estimate minimum livestock holding required to be reared by the households to escape out of poverty in rural Tamil Nadu. The data were collected through personal interview using pre-tested interview schedule from 213 livestock farmers from the six districts covering four agro-climatic zones of Tamil Nadu. Economics of cattle, buffalo, sheep and goat farming were worked out in order to estimate and compare the income generated from various livestock enterprises. The monthly income earned by the sample respondents was calculated to be ₹ 941.52/cattle, ₹ 932.72/buffalo, ₹ 125.91/sheep and ₹ 140.52/goat. Further, the study revealed that a household could tide over the poverty line without any other income source, if they rear a minimum of about 6 cattle (5.32 cattle) or 6 buffaloes (5.37 buffaloes) or 40 sheep (39.79 sheep) or 36 goat (35.65 goat). The present findings might be considered while implementing any poverty alleviation programmes with livestock component. Depending upon the locality and resources availability, suitable livestock species might be recommended to lift the poor from poverty trap and to sustain them with stable income.

Key words: Buffalo, Cattle, Goat, Income, Livestock, Poverty, Sheep

According to Rangarajan committee of Planning commission (2014), about 363 million Indians (29.5% of the total population) were positioned below poverty line (BPL). Out of the total BPL population, about 70% (260.5 million individuals) dwelled in rural areas, which indicated the severity of rural poverty. For most of the rural poor, livestock act as an important part of their livelihood, since livestock have many different utilities. They produce important food products and farmyard manure. They are a viable source of income and provide draught power; and they also fulfill banking and insurance functions. Although, many studies concluded that livestock stops people from falling into poverty and also helps them to climb out of poverty, which leads to sustainable rural development (Krishtjanson *et al.* 2004, Randolph *et al.* 2007, FAO 2014).

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However, studies related to quantification of livestock holding required to escape out of poverty are found to be meagre in India. With this background, the present study was carried out to estimate the income generating efficiency of selected livestock species reared by resource poor rural farmers and to quantify the optimum livestock holding required to be reared by the household to escape out of poverty.

MATERIALS AND METHODS

A composite index (CI) was constructed with the indicators related to livelihood/poverty for different districts of Tamil Nadu, so as to select the sample districts in the state. The indicators for construction of the composite index were chosen based on the previous studies of Srivastava *et al.* (2010) and Shanmugam (2012). Chennai district was excluded for the study, as it was fully urbanized metropolitan. Principal Component Analysis was carried using the poverty related variables to construct the CI for districts. Based on the CI value, six districts which had the index value ≥1.5 (Ramanathapuram, Dharmapuri, Villupuram, Thiruvannamalai, Ariyalur and Pudukottai which falls under four agro-climatic zones of Tamil Nadu viz., Southern, North-Western, North-Eastern and Cauvery Delta zones) were selected for the study. A sample of respondents who pursue livestock farming as their primary

occupation were selected, which lead to the sample size of 213 and they were post-stratified based on livestock species reared as Cattle (80), Buffalo (20), Sheep (35) and Goat (78).

The details pertaining to cost and returns of livestock farming and profitability were collected through personal interview method using pre-tested interview schedule. In order to estimate and compare the income generated from various livestock enterprises, economics of cattle, buffalo, sheep and goat farming were worked out similar to the previous studies of Aruna (2003), Shinde *et al.* (2003), Gajanan (2004), Pandian (2006), Prabu (2008) and Boopathyraja (2014). The net returns were calculated by subtracting the gross cost from the gross returns. It was estimated with and without imputed value of family labour. The return/rupee of expenditure was worked out by dividing gross returns by gross cost.

RESULTS AND DISCUSSION

Cattle farming: The cost and returns of dairy farming were calculated on per farm as well as per animal basis for 80 sample respondents, who maintained cattle as their primary occupation (Table 1). The average farm size was worked out to be 2.31 animals in the study area. The total fixed investment per dairy cattle farm was calculated to be ₹ 61,157.88, of which cost of animals constituted about

Table 1. Income generation from cattle farming

(₹/annum)

S. No.	Particulars	Per farm basis			Per animal basis		
		NE	NW	Overall	NE	NW	Overall
	Sample size	52	28	80	52	28	80
	Farm size	2.52	1.93	2.31	2.52	1.93	2.31
A	*Fixed investment*						
1	Cost of animals	60903.85	44607.14	55200.00	24168.19	23112.51	23798.70
2	Cost of animal shed	6596.15	3571.43	5537.50	2617.52	1850.48	2349.06
3	Cost of equipments	456.35	353.57	420.38	181.09	183.20	181.83
	Total fixed investment	67956.35	48532.14	61157.88	26966.81	25146.19	26329.59
B	*Fixed cos*t						
1	Interest on investment	8154.76	5823.86	7338.95	3236.02	3017.54	3159.55
2	Depreciation on building	989.42	535.71	830.62	392.63	277.57	352.36
3	Depreciation on equipment	91.27	70.71	84.08	36.22	36.64	36.37
4	Insurance premium	257.11	32.14	178.37	102.03	16.65	72.15
	Total fixed cost	9492.56	6462.43	8432.02	3766.89	3348.41	3620.42
C	*Variable cost*						
1	Cost of concentrate feed	7365.38	8814.29	7872.50	2922.77	4566.99	3498.25
2	Cost of green fodder	1038.46	160.71	731.25	412.09	83.27	297.00
3	Cost of dry fodder	5555.77	6328.57	5826.25	2204.67	3279.05	2580.70
4	Veterinary charges	353.46	291.07	331.62	140.26	150.81	143.95
5	Imputed value of family labour	13638.80	12899.25	13379.96	5412.22	6683.55	5857.19
6	Miscellaneous expenses	375.19	260.71	335.12	148.88	135.08	144.05
	Total variable cost	28327.06	28754.60	28476.70	11240.90	14898.76	12521.15
D	Total cost (B+C)	37819.62	35217.03	36908.71	15007.79	18247.16	16141.57
E	*Gross returns*						
1	Sale of milk	44326.44	41475.00	43328.44	17589.86	21489.64	18954.78
2	Sale of manure	554.22	709.52	608.58	219.93	367.63	271.62
3	Sale of young ones	5576.92	5060.71	5396.25	2213.06	2622.13	2356.24
	Total returns	50457.58	47245.23	49333.26	20022.85	24479.39	21582.64
F	*Net returns*						
1	With imputed value of family labour (E – D)	12637.96	12028.20	12424.54	5015.06	6232.23	5441.07
2	Without imputed value of family labour	26276.76	24927.45	25804.50	10427.28	12915.78	11298.26
3	Net return per month	2189.73	2077.29	2150.38	868.94	1076.31	941.52
4	Net return per day	72.99	69.24	71.68	28.96	35.88	31.38
G	Cost of production per litre of milk	17.20	17.77	17.40	17.20	17.77	17.40
H	Return per rupee of expenditure	1.33	1.34	1.34	1.33	1.34	1.34

NE, North-Eastern zone; NW, North-Western zone.

90%. Out of the total cost of ₹ 36,908.71, variable cost constituted about 77% and rest by the fixed cost. The overall net return per farm was calculated to be ₹ 12,424.54. It was higher in North-Eastern zone when compared to North-Western zone. The return per rupee of expenditure was worked 1.34, which indicated the profitability of cattle farming. Thus, it is evident that the maintenance of one dairy cattle gave the net income of ₹ 11,298.26/annum and ₹ 31.38/day. Thus, a farmer is required to maintain 1.15 dairy cattle to tide over the poverty line of ₹ 36/day (Planning Commission 2014). Thus, by increasing the number of animals in the farm, a farmer could fetch better and regular income.

Buffalo farming: The average farm size was 1.59 animals (Table 2) among sample buffalo farmers. The total fixed investment per dairy buffalo farm was calculated to be lesser (₹ 45,216.00), when compared to cattle farms (₹ 61,157.88) in the study area. Out of the total cost of buffalo farming, variable cost constituted about 80% and rest was the fixed cost. The overall net return was estimated to be ₹ 17,597.87/farm/month and ₹ 31.09/animal/day. The return per rupee of expenditure was worked out to be ₹ 1.12, which was lower than that of cattle (1.34). By increasing the number of buffaloes in their farm and by efficient utilization of the available family labour and they could receive ample profit. This will help in positioning themselves well above the poverty line.

Sheep farming: The income generated from sheep farming was calculated among 35 sheep farmers, out of which 20 belonged to Southern zone and rest to Cauvery

Table 2. Income generation from buffalo farming

(₹/annum)

S.No.	Particulars	Per farm basis			Per animal basis		
		NE	NW	Overall	NE	NW	Overall
	Sample size	11	9	20	11	9	20
	Farm size	1.81	1.33	1.59	1.81	1.33	1.59
A	*Fixed investment*						
1	Cost of animals	45000.00	30000.00	38250.00	24861.88	22556.39	23824.41
2	Cost of animal shed	6000.00	7444.44	6650.00	3314.92	5597.32	4342.00
3	Cost of equipments	331.82	296.67	316.00	183.33	223.06	201.21
	Total fixed investment	51331.82	37741.11	45216.00	28360.12	28376.77	28367.62
B	*Fixed cost*						
1	Interest on investment	6159.82	4528.93	5425.92	3403.21	3405.21	3404.11
2	Depreciation on building	900.00	1116.67	997.50	497.24	839.60	651.30
3	Depreciation on equipment	66.36	59.33	63.20	36.67	44.61	40.24
	Total fixed cost	7126.18	5704.93	6486.62	3937.12	4289.42	4095.66
C	*Variable cost*						
1	Cost of concentrate feed	7372.73	5500.00	6530.00	4073.33	4135.34	4101.23
2	Cost of green fodder	509.09	1125.00	786.25	281.27	845.86	535.33
3	Cost of dry fodder	5636.36	5277.78	5475.00	3114.01	3968.26	3498.42
4	Veterinary charges	280.91	282.78	281.75	155.20	212.62	181.04
5	Imputed value of family labour	14402.98	12527.86	13559.18	7957.45	9419.44	8615.35
6	Miscellaneous expenses	221.82	227.78	224.50	122.55	171.26	144.47
	Total variable cost	28423.89	24941.20	26856.68	15703.81	18752.78	17075.85
D	Total cost (B+C)	35550.07	30646.13	33343.30	19640.92	23042.21	21171.50
E	*Gross returns*						
1	Sale of milk	35010.91	29257.78	32422.00	19343.04	21998.33	20537.92
2	Sale of manure	618.18	633.33	625.00	341.54	476.19	402.13
3	Sale of young ones	4109.09	4611.11	4335.00	2270.22	3467.00	2808.77
	Total returns	39738.18	34502.22	37382.00	21954.80	25941.52	23748.82
F	*Net returns*						
1	With imputed value of family labour (E – D)	4188.11	3856.09	4038.70	2313.87	2899.31	2577.32
2	Without imputed value of family labour	18591.09	16383.95	17597.87	10271.32	12318.76	11192.67
3	Net return per month	1549.26	1365.33	1466.49	855.94	1026.56	932.72
4	Net return per day	51.64	45.51	48.88	28.53	34.22	31.09
G	Cost of production per litre of milk	23.26	22.87	23.08	23.26	22.87	23.08
H	Return per rupee of expenditure	1.12	1.13	1.12	1.12	1.13	1.12

NE, North-Eastern zone; NW, North-Western zone.

Delta zone (Table 3). The average flock size was 55.83 animals. It is peculiar to note that the actual flock size was higher in Southern zone (68.85), when compared to Cauvery Delta zone (38.47). Majority of farmers in rural areas practised sheep farming as their primary occupation with more number of sheep, which might be due to water scarcity and difficulty in cropping. Further, sheep farming engages two or more family members who would otherwise be jobless. They also provided annual income, which helped the farmers to meet various high end obligations like education, marriage and medical expenses. The total fixed investment per sheep farm was calculated to be the highest among farms of various livestock species (₹ 226,660.98), which might be due to more number of sheep in a farm. About 99% of the investment in sheep farms was constituted by the animal assets.

Out of the total cost of ₹ 85,876.82, imputed value of family labour constituted major share of about 62%, followed by interest on investment (32%) and veterinary expenses (about 8%). The data further implied that the sheep farming fetched an ample profit of ₹ 83,609.07/farm/annum without imputed value of family labour. The return per rupee of expenditure was worked to be ₹ 1.35, which indicated better profitability of sheep farming, when compared to other livestock species. The cost and returns per sheep basis was also calculated and it could be seen that rearing of one sheep fetches the net income of ₹ 1,510.93 without imputed value of family labour, which could place the people well above the poverty line of ₹ 1,081.94/month. Although income received from sheep farming was the highest among various livestock species, sheep farming needs an efficient labourer, who has to take the animals for grazing at least for 6 to 8 hours a day throughout the year and has to walk for a longer distance in spite of various constraints viz., extreme weather conditions, festival seasons, sickness and even during the incidences of birth or death in a family as

Table 3. Income generation from sheep farming

(₹/annum)

S. No.	Particulars	Per farm basis			Per animal basis		
		Cau Delt	Southern	Overall	Cau Delt	Southern	Overall
	Sample size	15.00	20.00	35.00	15.00	20.00	35.00
	Farm size	38.47	68.85	55.83	38.47	68.85	55.83
A	*Fixed investment*						
1	Cost of animals	153866.67	275400.00	223314.29	3999.65	4000.00	3999.85
2	Cost of animal shed	2700.00	3630.00	3231.43	70.18	52.72	60.21
3	Cost of equipments	23.33	184.21	115.26	0.61	2.68	1.79
	Total fixed investment	156643.47	279303.06	226660.98	4070.44	4055.40	4061.85
B	*Fixed cost*						
1	Interest on investment	18797.22	33516.37	27208.16	488.62	486.80	487.58
2	Depreciation on building	405.00	544.50	484.71	10.53	7.91	9.03
3	Depreciation on equipment	4.67	36.84	23.05	0.12	0.54	0.36
	Total fixed cost	19206.88	34097.71	27715.93	499.27	495.25	496.97
C	*Variable cost*						
1	Cost of concentrate feed	203.33	26.25	102.14	5.29	0.38	2.48
2	Veterinary charges	426.67	7455.00	4442.86	11.09	108.28	66.63
3	Imputed value of family labour	49001.25	57076.88	53615.90	1273.75	829.00	1019.61
	Total variable cost	49631.25	64558.13	58160.90	1290.13	937.66	1088.72
D	Total cost (B+C)	68838.13	98655.84	85876.82	1789.40	1432.91	1585.69
E	*Gross returns*						
1	Value of animals sold	25433.33	64090.00	47522.86	661.12	930.86	815.26
2	Imputed value of animals added to the existing stock	49200.00	71307.50	61832.86	1278.92	1035.69	1139.93
3	Sale of manure	5533.33	7250.00	6514.28	143.83	105.30	121.82
	Total returns	80166.66	142647.50	115870.00	2083.87	2071.86	2077.01
F	*Net returns*						
1	With imputed value of family labour (E – D)	11328.53	43991.66	29993.18	294.48	638.95	491.32
2	Without imputed value of family labour	60329.78	101068.54	83609.07	1568.23	1467.95	1510.93
3	Net return per month	5027.48	8422.38	6967.42	130.69	122.33	125.91
4	Net return per day	167.58	280.75	232.25	4.36	4.08	4.20
G	Return per rupee of expenditure	1.16	1.45	1.35	1.16	1.45	1.35

Cau Delt, Cauvery Delta zone.

Table 4. Income generation from goat farming

(₹/annum)

S. No.	Particulars	Per farm basis			Per animal basis		
		Cau Delt	Southern	Overall	Cau Delt	Southern	Overall
	Sample size	56.00	22.00	78.00	56.00	22.00	78.00
	Farm size	5.89	15.14	8.50	5.89	15.14	8.50
A	*Fixed investment*						
1	Cost of animals	14732.14	37840.91	21250.00	2501.21	2499.40	2500.70
2	Cost of animal shed	919.64	9068.18	3217.95	156.14	598.96	281.03
3	Cost of equipments	31.25	245.45	91.67	5.31	16.21	8.38
	Total fixed investment	15683.03	47154.54	24559.61	2662.65	3114.57	2790.12
B	*Fixed cost*						
1	Interest on investment	1881.96	5658.54	2947.15	319.52	373.75	334.81
2	Depreciation on building	137.95	1360.23	482.69	23.42	89.84	42.16
3	Depreciation on equipment	6.25	49.09	18.33	1.06	3.24	1.68
4	Insurance premium	172.32	27.27	131.41	29.26	1.80	21.51
	Total fixed cost	2198.48	7095.13	3579.59	373.26	468.63	400.16
C	*Variable cost*						
1	Cost of concentrate feed	0.00	168.18	47.44	0.00	11.11	3.13
2	Cost of fodder	53.57	454.55	166.67	9.10	30.02	15.00
3	Veterinary charges	41.96	286.36	110.89	7.12	18.91	10.45
4	Imputed value of family labour	7778.66	11276.63	8765.27	1320.66	744.82	1158.24
	Total variable cost	7874.19	12185.72	9090.26	1336.87	804.87	1186.82
D	Total cost (B+C)	10072.67	19280.85	12669.85	1710.13	1273.50	1586.98
E	*Gross returns*						
1	Value of animals sold	6375.00	20545.45	10371.79	1082.34	1357.03	1159.82
2	Imputed value of animals added to the existing stock	5258.93	16250.00	8358.98	892.86	1073.32	943.76
3	Sale of manure	49.11	290.91	117.31	8.34	19.21	11.41
	Total returns	11683.04	37086.36	18848.08	1983.54	2449.56	2114.98
F	*Net returns*						
1	With imputed value of family labour (E – D)	1610.37	17805.51	6178.23	273.41	1176.06	528.00
2	Without imputed value of family labour	9389.03	29082.14	14943.50	1594.06	1920.88	1686.24
3	Net return per month	782.42	2423.51	1245.29	132.84	160.07	140.52
4	Net return per day	26.08	80.78	41.51	4.43	5.34	4.68
G	Return per rupee of expenditure	1.16	1.92	1.49	1.16	1.92	1.33

Cau Delt, Cauvery Delta zone.

reported by the sample respondents. Sometimes migration has to be practised depending upon the suitability/ availability of the grazing land. Although, sheep farming fetches better income, the above issues have to be considered while framing any poverty alleviation programmes.

Goat farming: The income generated from goat farming was computed among 78 sample goat farmers (Table 4). The average flock size was 8.50 animals, which was noticed to be higher in Southern zone (15.14) than Cauvery Delta zone (5.89). The total fixed investment per goat farm was calculated to be the ₹ 24,559.61. Out of the total cost of ₹ 12,669.85 in a goat farm, imputed value of family labour constituted major share of about 69%, followed by interest on investment (23%). Further, it could be revealed that the goat farming yielded the net return of ₹ 6,178.23/farm/ annum and ₹ 528/goat/annum with imputed value of family labour. The net income per goat was slightly higher than the findings of Kumar (2007) and lower than the findings of Prabu (2008). The profit/ goat was ₹ 1,686.24 without imputed value of family labour, which could lift the economically poor people well above the poverty line. When compared to sheep rearing, goat could be easily reared by women by sparing their surplus or unutilized mandays. Further, goat could also be maintained by family members at the backyard by feeding tree fodder with or without grazing.

Recommended herd/ flock size per household to exit out of poverty: The income generation potential per animal (Fig. 1), indicated that by maintaining 1 cattle an individual could earn about ₹ 941.52/ month and it was ₹ 932.72 in case of buffaloes. Further, it was found that a sheep had the potential to generate an income of ₹ 125.91/month and it was ₹ 140.52/month for a goat. Keeping in mind the average

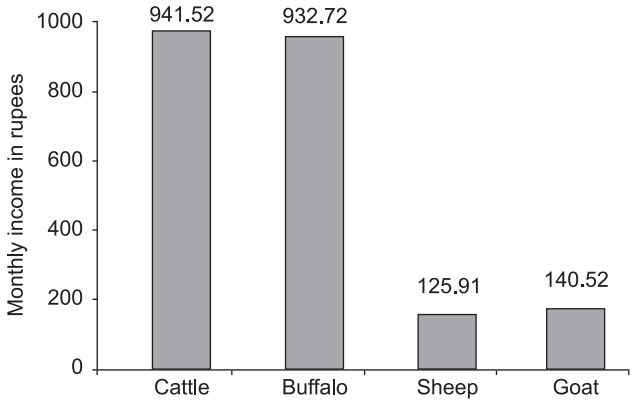

Fig. 1. Income generation potential/animal/month.

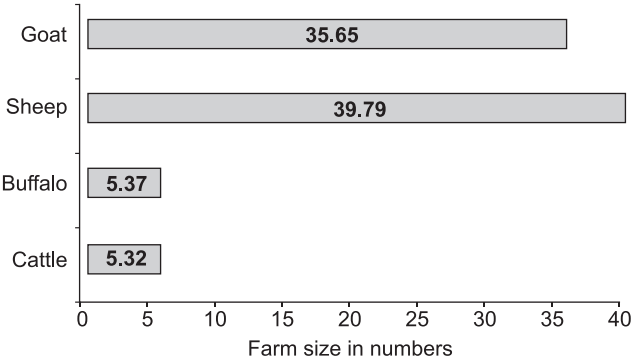

Fig. 2. Recommended herd/flock size/household to get out of poverty.

family size of 4.63 persons/household among the sample respondents and economic poverty line (per capita income of ₹ 1,081.94/month in rural Tamil Nadu) indicated by Planning commission (2014), the total monthly household income required to escape out of poverty was ₹ 5,009.38. Further, the flock/herd size of different species of livestock required to get out of poverty was estimated based on their income generation potential of each species (Fig. 2). Thus, a household could tide over the poverty line without any other income source, if they rear a minimum of 5.32 cattle (about 6) or 5.37 buffaloes (about 6 buffaloes) or 39.79 sheep (about 40 sheep) or 35.65 goat (36 goat). The above mentioned livestock holding could be maintained easily by a family (average size of 4.63 persons), by engaging the unutilized family labour.

The present study clearly indicated that the livestock had good potential of income generation for resource poor rural households in their existing resource conditions. By rearing the 6 cows or 6 buffaloes, a household with average family size of 4.63 persons could easily cross over the poverty line. On the other hand, they could position above the poverty line, by rearing 40 sheep or 36 goats. Based on the personal preference, resource availability and market situations, an individual may choose any one of the livestock farming as their primary occupation, so that they could have a reasonable income, thereby become an Above Poverty Line (APL) household. Based on the results of the present study, suitable livestock species might be recommended to lift the poor from poverty trap and to sustain them with stable income. Not only to livestock species, optimum livestock holding should also be given due importance in any livestock development programmes in order to make the BPL households to exit out of poverty, so as to achieve the ultimate goal of the programme.

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