



## **Cost and Returns of Milk Production from Dairy Animals in East Godavari District of Andhra Pradesh**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

An investigation was conducted to study the cost of milk production in East Godavari district of Andhra Pradesh. A total of 300 dairy farmers were selected from the Godavari delta, the upland and the agency areas of the district. The study revealed that the gross cost (Rs/-) of milk production per animal per day was higher in graded Murrah buffalo (167.17) followed by cross bred cow (140.61), local buffalo (96.22) and local cow (58.32). The cost of milk production per litre was higher in graded Murrah buffaloes (22.75) followed by local buffalo (22.82), local cow (18.89) and crossbred cow (14.02). The gross income (Rs/-) per animal per day was higher in graded Murrah buffaloes (292.78) followed by crossbred (236.51), local buffalo (154.84) and local cow (71.45). The net income (Rs/-) per animal per day was higher in graded Murrah buffaloes (125.61) followed by crossbred (95.90), local buffalo (58.62) and local cow (13.13). The average cost of milk production was Rs/- 23.03 and net income per litre was Rs/- 146.85 in graded Murrah buffaloes which was significantly ( $p \leq .01$ ) higher in the Godavari delta. The average cost of milk production was Rs/- 23.73 and net income per litre was Rs/- 71.77 in local buffalo which was significantly ( $p \leq .01$ ) higher in the upland area. The average cost of milk production and net income per litre in local cow was significantly ( $p \leq .01$ ) higher in the Godavari delta (20.14 and 15.46, respectively) than that in upland and agency areas.

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## 1. INTRODUCTION

Andhra Pradesh is one of the leading states in milk production in India with an annual production of 15.04 MMT of milk production and with a milch animal population of 5.14 million [1]. East Godavari district is one of the potential districts for agriculture and dairying in Andhra Pradesh. The Agri-Dairy-Horticulture farming system is predominant in the district. The information on the economics of milk production of dairy animals is meagre. There is no documentation regarding the expenditure (variable cost) incurred by the dairy farmers towards various components of milk production such as green fodder, dry fodder, concentrate mixture, labour charges as well as fixed components such as depreciation on fixed assets, interest on fixed capital. Further, there is no available data on the cost of milk production per litre, gross income and net income per dairy animal per day for different breeds and type of dairy animals maintained by the farmers in the district. Therefore, the present work was carried out in the East Godavari on the cost and returns of milk production of dairy animals so as to suggest that milk producers to increase the net income from milch animals.

## 2. MATERIALS AND METHODS

East Godavari district is naturally divided into three different agro-climatic areas i.e Godavari delta, upland and agency (hilly) areas. In the present study, five mandals each were selected randomly from Godavari delta, Upland and Agency (hilly) areas. A total of 75 villages were selected randomly by including five villages from each of the 15 mandals. Four dairy farmers were selected from each village resulting in 100 milk producers from the Godavari delta area, 100 from the upland area and 100 from the agency (hilly) area of the district. The 300 milk producers selected from the district for the study possessed milch animals of 167 graded Murrah buffaloes, 107 local buffaloes, 50 crossbred cows and 77 local cows resulting in a total of 401 dairy animals. The data obtained on variable cost and fixed cost was added to get the gross cost. The net cost was worked out by deducting imputed value of dung from the gross cost. Net income was calculated by deducting the gross cost from gross income. The data were subjected to statistical methods according to Snedecor and Cochran [2].

## 3. RESULTS AND DISCUSSION

The study showed that the gross cost (Rs/-) per day was significantly ( $p \leq 0.01$ ) higher in graded Murrah buffalo (Rs.167.17) followed by crossbred cow (140.61), local buffalo (Rs.96.22) and local cow (Rs.58.32) (Table 1).

The mean cost (Rs.) of milk yield per litre was lower ( $p \leq 0.01$ ) in crossbred cow (14.02) followed by local cow (18.89), graded Murrah buffalo (Rs. 22.75) and local buffalo (Rs. 22.82). The mean gross income (Rs.) per day was higher ( $p \leq 0.01$ ) in graded Murrah (292.78) followed by crossbred cow (236.51), local buffalo (154.84) and local cow (71.45). The mean net income per day was higher ( $p \leq 0.01$ ) in graded Murrah (Rs.125.61) followed by a crossbred cow (Rs. 95.90), local buffaloes (Rs.58.62) and local cow (Rs. 13.13). The higher net income in buffaloes is due to the higher sale price of buffalo milk as compared to crossbred cow milk in the study area. The cost of milk production in buffalo (Rs. 22.37) reported by Bulbul et al. [3] in Vidarbha region of Maharashtra is similar to the values of the present study.

Chand et al. [4] reported that the cost of milk yield (Rs.) per litre was more in buffalo (24.84) than crossbred cow (22.29) in the Malwa region of M.P. The cost of milk production in the present study was lower than the values reported by Michael Khomeio et al. [5] in crossbred cow and local cow. The values of cost of milk yield reported by Vishnoi et al. [6] and Sharif and Dixit [7] in buffaloes were slightly higher than the present study. Umamageswari et al. [8] also reported that the average net returns per litre of milk were Rs. 8.98, -5.37 and 4.77 in crossbred, local cow and buffalo in Coimbatore and Trippur districts of Tamilnadu.

The percent of feed cost towards the gross cost of milk production was 56.62, 56.74, 52.89 and 44.31 in graded Murrah, crossbred cow, local buffalo and the local cow, respectively. The percent of labour cost towards the gross cost of milk production was 15.92, 20.27, 22.58 and 24.38 in graded Murrah, cross bred cow, local buffalo and local cow, respectively. The share of feed cost towards the gross cost reported by Wani et al. [9] in Jammu and Kashmir and Chand and Sirohi [in Rajasthan were higher than the values reported in present study. The labour cost of the present study was in agreement with

the values reported by Vishnoi et al. [6] in buffaloes of Uttarakhand state, where as Sharif and Dixit [7] reported high percent of labour cost south Karnataka.

The mean gross cost per day in graded Murrah buffalo was higher ( $p \leq .01$ ) in Godavari delta (Rs.188.20) than that in upland (Rs.153.99) and agency area (Rs. 123.11)(Table 2).

The mean cost of milk yield (Rs.) was higher ( $p \leq .01$ ) in Godavari delta (Rs.23.03) than that in upland (22.93) and agency area (20.99). The average gross income per day from graded Murrah buffalo is significantly higher ( $p \leq .01$ ) in the Godavari delta area (Rs.335.05) than that in upland (Rs.263.28) and agency area (Rs.217.69). The net income from graded Murrah buffalo was also higher ( $p \leq .01$ ) in the delta area(Rs.146.85) than that in upland (Rs. 109.29) and agency area (Rs. 94.58). The percent of feed cost (56.62%) and labour cost (15.92%) towards gross cost were higher than other costs in the study area. The net income per animal per day reported in the present study was Rs/- 125.61 which is similar to that of Reddy et al. [10] reported in graded Murrah buffaloes of Guntur district of Andhra Pradesh.

The mean gross cost (Rs.) per day in local buffalo was higher ( $p \leq .01$ ) in upland (113.23) than that in agency area (87.24)( Table 3).

The mean cost of milk yield (Rs.) was lower ( $p \leq .01$ ) in agency area (22.28) than that in the upland area (23.73). The gross income (Rs.) from local buffalo was higher ( $p \leq .01$ ) in the upland area (185.00) than that in the agency area (139.36). The net income (Rs.) from local

buffalo was higher ( $p \leq .01$ ) in the upland area (71.77) than that in the agency area (52.12). The percent of feed cost (52.89%) and labour cost(22.58%) towards gross cost were higher than other costs of milk production.

The mean gross cost (Rs.) per day in crossbred cows was higher in the delta area (148.01) compared to the upland area (130.40) (Table 4).

The cost of milk production was higher in the delta area (Rs.14.18) than that in the upland area (Rs. 13.78). The gross income (Rs.) was higher ( $p \leq .01$ ) in the Godavari delta area (249.15) when compared to the upland area (219.46). The net income in crossbred cow was also higher in the delta area (Rs.101.14) than that in the upland area (Rs. 89.06) which can be attributed to higher milk production as well as sale price of milk in the delta area. The percent of feed cost (56.74%) and labour cost (20.27%) towards gross cost was higher than other costs [11].

The mean gross cost in local cow was higher ( $p \leq .01$ ) in the Godavari delta area (Rs. 75.07) than that in the upland area (Rs. 63.86) and agency area (Rs. 44.95) (Table 5).

The milk production cost (Rs.) was higher in the Godavari delta (20.14) than that in upland (18.85) and agency area (17.86). The gross income (Rs.) per day was higher ( $p \leq .01$ ) in the delta area (90.53) than that in upland (79.01) and agency area (56.36). The net income in local cow was higher ( $p \leq .01$ ) in delta (Rs.15.15) and agency area (Rs.15.21) than that in agency area (Rs. 11.30).

**Table 1. Economics of milk production in East Godavari district (per animal per day in Rupees)**

S.No	Particulars	Graded Murrah (N=167)	Local buffaloes (N=107)	Crossbred cows (N=50)	Local cows (N=77)
1	Green fodder	16.35 (9.78)	9.39 (9.76)	15.38 (10.94)	5.50 (9.43)
2	Dry fodder	13.48 (8.06)	12.21 (12.69)	10.40 (7.40)	9.81 (16.82)
3	Concentrate	64.83 (38.78)	29.29 (30.44)	54.00 (38.40)	10.53 (18.06)
4	Total feed cost	94.66 (56.62)	50.89 (52.89)	79.78 (56.74)	25.84 (44.31)
5	Family labour	23.83 (14.25)	21.73 (22.58)	24.40 (17.35)	13.57 (23.27)
6	Hired labour	2.78 (1.66)	0.00 (0.00)	4.10 (2.92)	0.65 (1.11)

S.No	Particulars	Graded Murrah (N=167)	Local buffaloes (N=107)	Crossbred cows (N=50)	Local cows (N=77)
7	Total labour cost	26.61 (15.92)	21.73 (22.58)	28.50 (20.27)	14.22 (24.38)
8	Misc. Expenses	8.41 (5.03)	5.69 (5.91)	8.32 (5.92)	4.58 (7.85)
9	Total variable cost(TVC)	129.68 (77.57)	78.31 (81.39)	116.62 (82.94)	44.64 (76.54)
10	Depreciation on fixed assets	21.94 (13.12)	10.90 (11.33)	13.62 (9.69)	7.84 (13.44)
11	Interest on fixed capital	15.55 (9.30)	7.01 (7.29)	10.37 (7.38)	5.84 (10.01)
12	Total fixed cost(TFC)	37.49 (22.43)	17.91 (18.61)	23.99 (17.06)	13.68 (23.46)
13	Gross cost (TVC+TFC)	167.17 (100.00)	96.22 (100.00)	140.61 (100.00)	58.32 (100.00)
14	Dung value	17.25	15.22	16.50	9.02
15	Net cost(13-14)	149.92	81.00	124.11	49.30
16	Milk yield(Lit/day)	6.59	3.55	8.85	2.61
17	Cost of litre milk	22.75	22.82	14.02	18.89
18	Sale price of milk (Rs/lit)	41.81	39.33	24.86	23.92
19	Milk income	275.53	139.62	220.01	62.43
20	Gross income	292.78	154.84	236.51	71.45
21	Net income(20-13)	125.61	58.62	95.90	13.13

N= Number of animals

**Table 2. Economics of milk production in graded Murrah buffaloes of East Godavari district ( per animal per day in Rupees)**

S.No	Particulars	Godavari delta area (N=86)	Upland area (N=57)	Agency (hilly) area (N=24)	Overall (N=167)
1	Green fodder	19.17 (10.19)	15.83 (10.28)	7.45 (6.05)	16.35 (9.78)
2	Dry fodder	10.85 (5.77)	16.37 (10.63)	16.04 (13.03)	13.48 (8.06)
3	Concentrate	78.66 (41.80)	53.00 (34.42)	43.33 (35.20)	64.83 (38.78)
4	Total feed cost	108.68 (57.75)	85.20 (55.33)	66.82 (54.28)	94.66 (56.62)
5	Family labour	27.21 (14.46)	23.25 (15.10)	13.13 (10.67)	23.83 (14.25)
6	Hired labour	3.26 (1.73)	2.19 (1.42)	2.50 (2.03)	2.78 (1.66)
7	Total labour cost	30.47 (16.19)	25.44 (16.52)	15.63 (12.70)	26.61 (15.92)
8	Misc. Expenses	9.63 (5.12)	7.40 (4.81)	6.42 (5.21)	8.41 (5.03)
9	Total variable cost(TVC)	148.78 (79.05)	118.04 (76.65)	88.87 (72.19)	129.68 (77.57)
10	Depreciation on fixed assets	22.69 (12.06)	21.40 (13.90)	20.52 (16.67)	21.94 (13.12)
11	Interest on fixed capital	16.73 (8.89)	14.55 (9.45)	13.72 (11.14)	15.55 (9.30)
12	Total fixed cost(TFC)	39.42 (20.95)	35.95 (23.35)	34.24 (27.81)	37.49 (22.43)

S.No	Particulars	Godavari delta area (N=86)	Upland area (N=57)	Agency (hilly) area (N=24)	Overall (N=167)
13	Gross cost(TVC+TFC)**	188.20 <sup>a</sup> (100.00)	153.99 <sup>b</sup> (100.00)	123.11 <sup>c</sup> (100.00)	167.17 (100.00)
14	Dung value	18.30	16.21	16.04	17.25
15	Net cost(13-14)	169.90	137.78	107.07	149.9
16	Milk yield(Lit/day)	7.38	6.01	5.10	6.59
17	Cost of litre milk**	23.03 <sup>a</sup>	22.93 <sup>b</sup>	20.99 <sup>c</sup>	22.75
18	Sale price of milk (Rs/lit)	42.92	41.11	39.54	41.81
19	Milk income	316.75	247.07	201.65	275.53
20	Gross income**	335.05 <sup>a</sup>	263.28 <sup>b</sup>	217.69 <sup>c</sup>	292.78
21	Net income(20-13)**	146.85 <sup>a</sup>	109.29 <sup>b</sup>	94.58 <sup>c</sup>	125.61

\*\* Significant ( $P \leq 0.01$ )**Table 3. Economics of milk production of local buffaloes in East Godavari district ( per animal per day in Rupees)**

S.No	Particulars	Upland area (N=37)	Agency (hilly) area (N=70)	Overall (N=107)	F ratio
1	Green fodder	12.65 (11.17)	7.67 (8.79)	9.39 (9.76)	-
2	Dry fodder	13.20 (11.66)	11.68 (13.39)	12.21 (12.69)	-
3	Concentrate	35.41 (31.27)	26.06 (29.87)	29.29 (30.44)	-
4	Total feed cost	61.26 (54.10)	45.41 (52.05)	50.89 (52.89)	-
5	Family labour	25.00 (22.08)	20.00 (22.93)	21.73 (22.58)	-
6	Hired labour	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-
7	Total labour cost	25.00 (22.08)	20.00 (22.93)	21.73 (22.58)	-
8	Misc. Expenses	6.49 (5.73)	5.27 (6.04)	5.69 (5.91)	-
9	Total variable cost(TVC)	92.75 (81.91)	70.68 (81.02)	78.31 (81.39)	-
10	Depreciation on fixed assets	12.39 (10.94)	10.12 (11.60)	10.90 (11.33)	-
11	Interest on fixed capital	8.09 (7.14)	6.44 (7.38)	7.01 (7.29)	-
12	Total fixed cost(TFC)	20.48 (18.09)	16.56 (18.98)	17.91 (18.61)	-
13	Gross cost(TVC+TFC)**	113.23 (100.00)	87.24 (100.00)	96.22 (100.00)	155.164**
14	Dung value	16.41	14.60	15.22	-
15	Net cost(13-14)	96.82	72.64	81.00	-
16	Milk yield(Lit/day)	4.08	3.26	3.55	-
17	Cost of litre milk**	23.73	22.28	22.82	35.790**
18	Sale price of milk (Rs/lit)	41.32	38.27	39.33	-
19	Milk income	168.59	124.76	139.62	-
20	Gross income**	185.00	139.36	154.84	158.589**
21	Net income(20-13)**	71.77	52.12	58.62	141.711**

N= No. of animals, \*\* Significant ( $P \leq 0.01$ )

**Table 4. Economics of milk production of crossbred cows in East Godavari district (per animal per day in Rupees)**

S.No	Particulars	Godavari deltaarea (N=29)	Upland area (N=21)	Overall (N=50)	F ratio
1	Green fodder	15.37 (10.38)	15.38 (11.79)	15.38 (10.94)	-
2	Dry fodder	8.62 (5.82)	12.86 (9.86)	10.40 (7.40)	-
3	Concentrate	58.62 (39.61)	47.71 (36.59)	54.00 (38.40)	-
4	Total feed cost	82.61 (55.81)	75.95 (58.24)	79.78 (56.74)	-
5	Family labour	24.83 (16.78)	23.81 (18.26)	24.40 (17.35)	-
6	Hired labour	6.03 (4.07)	1.43 (1.10)	4.10 (2.92)	-
7	Total labour cost	30.86 (20.85)	25.24 (19.36)	28.50 (20.27)	-
8	Misc. Expenses	9.00 (6.08)	7.38 (5.66)	8.32 (5.92)	-
9	Total variable cost(TVC)	122.47 (82.74)	108.57 (83.26)	116.62 (82.94)	-
10	Depreciation on fixed assets	14.02 (9.47)	13.06 (10.02)	13.62 (9.69)	-
11	Interest on fixed capital	11.52 (7.78)	8.77 (6.73)	10.37 (7.38)	-
12	Total fixed cost(TFC)	25.54 (17.26)	21.83 (16.74)	23.99 (17.06)	-
13	Gross cost(TVC+TFC)**	148.01 (100.00)	130.40 (100.00)	140.61 (100.00)	14.722**
14	Dung value	16.72	16.19	16.50	-
15	Net cost(13-14)	131.29	114.21	124.11	-
16	Milk yield(Lit/day)	9.26	8.29	8.85	-
17	Cost of litre milk	14.18	13.78	14.02	3.718
18	Sale price of milk (Rs/lit)	25.10	24.52	24.86	-
19	Milk income	232.43	203.27	220.01	-
20	Gross income**	249.15	219.46	236.51	7.540**
21	Net income(20-13)	101.14	89.06	95.90	3.436

N= No of animals,\*\* Significant at ( $P \leq .01$ )

**Table 5. Economics of milk production of local cows in East Godavari district (per animal per day in Rupees)**

S.No	Particulars	Godavari delta area (N=21)	Upland area (N=21)	Agency (hilly) area (N=35)	Overall (N=77)
1	Green fodder	9.61 (12.80)	8.50 (13.31)	1.23 (2.74)	5.50 (9.43)
2	Dry fodder	9.43 (12.56)	10.05 (15.74)	9.89 (22.00)	9.81 (16.82)
3	Concentrate	12.52 (16.68)	11.67 (18.27)	8.65 (19.24)	10.53 (18.06)
4	Total feed cost	31.56 (42.04)	30.22 (47.32)	19.77 (43.98)	25.84 (44.31)
5	Family labour	18.10	15.00	10.00	13.57

S.No	Particulars	Godavari delta area (N=21)	Upland area (N=21)	Agency (hilly) area (N=35)	Overall (N=77)
		(24.11)	(23.49)	(22.25)	(23.27)
6	Hired labour	2.38	0.00	0.00	0.65
		(3.17)	(0.00)	(0.00)	(1.11)
7	Total labour cost	20.48	15.00	10.00	14.22
		(27.28)	(23.49)	(22.25)	(24.38)
8	Misc. Expenses	5.14	5.00	4.00	4.58
		(6.85)	(7.83)	(8.90)	(7.85)
9	Total variable cost(TVC)	57.18	50.22	33.77	44.64
		(76.17)	(78.64)	(75.13)	(76.54)
10	Depreciation on fixed assets	9.37	7.90	6.89	7.84
		(12.48)	(12.37)	(15.33)	(13.44)
11	Interest on fixed capital	8.52	5.74	4.29	5.84
		(11.35)	(8.99)	(9.54)	(10.01)
12	Total fixed cost(TFC)	17.89	13.64	11.18	13.68
		(23.83)	(21.36)	(24.87)	(23.46)
13	Gross cost(TVC+TFC)**	75.07 <sup>a</sup>	63.86 <sup>b</sup>	44.95 <sup>c</sup>	58.32
		(100.00)	(100.00)	(100.00)	(100.00)
14	Dung value	11.62	10.81	6.38	9.02
15	Net cost(13-14)	63.45	53.05	38.57	49.30
16	Milk yield(Lit/day)	3.15	2.83	2.16	2.61
17	Cost of milk production per litre	20.14 <sup>a</sup>	18.85 <sup>b</sup>	17.86 <sup>c</sup>	18.89
18	Sale price of milk (Rs/lit)	25.05	24.10	23.14	23.92
19	Milk income	78.91	68.20	49.98	62.43
20	Gross income**	90.53 <sup>a</sup>	79.01 <sup>b</sup>	56.36 <sup>c</sup>	71.45
21	Net income(20-13)**	15.46 <sup>a</sup>	15.15 <sup>b</sup>	11.41 <sup>c</sup>	13.13

\*\*significant ( $P \leq .01$ )

The study revealed that dairy farmers obtained more net income per animal per day (Rs/-) from graded Murrah buffaloes (125.61), followed by crossbred cows (95.90) and local buffaloes (58.62), where as the net income from local cows was only Rs. 13.13 which was similar to the findings of Sunil et al. [12] who reported lower productivity of local cows compared to buffalo and cross bred cows. Similarly Suresh et al. [13] reported higher net income from buffalo compared to cow in Karnal district of Haryana. The study suggested that the farmers may rear more of graded Murrah buffaloes and cross bred cows rather than local animals so as to increase the net income per animal and ensure profitable dairy farming.

#### 4. CONCLUSION

The cost (Rs/-) of milk production was lower ( $p \leq .01$ ) in crossbred cows (14.02) followed by local cows (18.89), graded Murrah buffaloes (22.75) and local buffaloes (22.82) in the study area. The gross income and net income were higher ( $p \leq .01$ ) in graded Murrah buffaloes followed by crossbred cows, local buffaloes and local cows.

The cost of milk production, gross income and net income of graded Murrah buffaloes, crossbred cows and local cows were higher ( $p \leq .01$ ) in the Godavari delta of the study area. There was a higher ( $p \leq .01$ ) cost of milk production, gross income and net income from local buffalo of upland area.

The study suggested that technical inputs, services and assured milk marketing facilities should be made available particularly to the dairy farmers in the upland and agency area of the district. The field veterinary staff should also educate the milk producers regarding scientific feeding, management and health care of dairy animals for profitable dairy farming.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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