Original Research Article

Cost and returns of milk production from dairy animals in East Godavari district of Andhra Pradesh

ABSTRACT

An investigation was conducted to study the cost of milk production in the Godavari delta, upland and agency areas of East Godavari district in Andhra Pradesh. The study revealed that the average net income per litre of milk was higher in graded Murrah buffaloes (125.61) than that in crossbred (95.90) and local cows (13.13). The average cost of milk production and net income per litre in graded Murrah buffaloes was significantly ($p \leq 0.01$) higher in the Godavari delta (23.03 and 146.85, respectively) than that in upland and agency area. The average cost of milk production and net income per litre in local buffalo was significantly ($p \leq 0.01$) higher in the upland area (23.73 and 71.77, respectively) than that in agency areas (22.28 and 52.12, respectively). There was no significant difference in the cost of milk production and net income per litre in crossbred cows between the Godavari delta and upland area. The average cost of milk production and net income per litre in local cow was significantly ($p \leq 0.01$) higher in the Godavari delta (20.14 and 15.46, respectively) than that in upland and agency areas.

Keywords: Cost of milk production, Graded Murrah, Local buffalo, Crossbred cow

1. INTRODUCTION

Andhra Pradesh is one of the major milk-producing states of the country with an annual production of 15.04 MMT of milk production and a milch animal population of 5.14 million (DAHD, 2019). 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 cost of milk production of dairy animals in the district is limited. Therefore, a study was carried out in the East Godavari district on the cost and returns of milk production of dairy animals to suggest that milk producers increase the net income from milch animals.

2. MATERIALS & 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 and a total of 15 mandals were selected. Five villages were randomly selected from each mandal from 15 mandals. A total of 75 villages were selected. Four dairy farmers were selected from each village at random resulting in a total number of 100 milk producers from the Godavari delta area, 100 from the upland area and 100 from the agency (hilly) area of the district. The data collected during the period of study were scrutinized and tabulated. The data were subjected to analysis of variance following the statistical methods according to **Snedecor and Cochran (1994).** The information obtained was analysed and interpreted.

3. RESULTS AND DISCUSSION:

The study showed that the average maintenance cost /gross cost per day was significantly ($p \leq .01$) 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 average daily cost of milk production per litre was significantly ($p \leq 0.01$) lower in crossbred cows (Rs.14.02) followed by local cow (Rs.18.89), graded Murrah buffalo (Rs. 22.75) and a local buffalo (Rs. 22.82). The average gross income per day was significantly ($p \leq .01$) higher in graded Murrah (Rs.292.78) followed by crossbred cow (Rs. 236.51), local buffalo (Rs.154.84) and local cow (Rs. 71.45). The average net income per day was significantly ($p \leq 0.01$) higher 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. Bulbul *et al.* (2011) reported that the cost of milk production for buffalo was worked out to be Rs. 22.37 in the Vidarbha region of Maharashtra.

Prem *et al.* (2017) reported that the cost of milk production per litre was highest for the buffalo (Rs. 24.84) compared to crossbred cow (Rs. 22.29) in the Malawi region. **Michael *et al.* (2012)** found that the averages cost of milk production for crossbred cow and local cow were Rs. 18.52 and Rs. 28.15 per litre, respectively. The net return was found to be positive for the crossbred cow while it was negative for the local cow. **Rachit *et al.* (2014)** reported that the cost of milk production per litre of milk for buffalo was Rs. 27.19 in Uttarakhand state. **Mahin and Dixit (2015)** found that the cost of milk production ranged from Rs. 22.19 to 26.34 in buffaloes in different areas in south Karnataka. The net returns were highest for

buffaloes and crossbreds while negative returns were observed in local cows in south Karnataka. **Umamageswari*et al.* (2017)** 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.

It was also observed that the share of total feed cost in graded Murrah, crossbred cow, local buffalo and the local cow was 56.62, 56.74, 52.89 and 44.31 %, respectively. The share of total labour cost in graded Murrah, C.B cow, local buffalo and local cow was 15.92, 20.27, 22.58 and 24.38 %, respectively, in the total maintenance cost (gross cost). **Wani *et al.* (2010)** reported that feed cost accounted for more than 60% of the total gross cost followed by labour cost and depreciation on building and animals in Jammu and Kashmir. **Prem and Smita (2012)** reported that the share of total feed cost and labour cost in gross cost was 72.51 and 17.06 %, respectively, in Rajasthan. **Rachit *et al.* (2014)** reported that the share of total feed cost and labour cost in gross cost was 64 and 21 %, respectively, in buffaloes in Uttara Khand state. **Mahin and Dixit (2015)** found that the share of total labour cost in gross cost ranged from 18.54 to 30.02% in south Karnataka.

The average maintenance cost/gross cost per day in graded Murrah buffalo was significantly ($p \leq 0.01$) higher in Godavari delta (Rs.188.20) than that in upland (Rs.153.99) and agency area (Rs. 123.11) **(Table 2).**

The average cost of milk production per litre was significantly ($p \leq 0.01$) higher in Godavari delta (Rs.23.03) than that in upland (Rs. 22.93) and agency milk producers (Rs. 20.99). The average gross income per day from graded Murrah buffalo is significantly higher ($p \leq 0.01$) in the Godavari delta area (Rs.335.05) than that in upland (Rs.263.28) and agency area (Rs.217.69). The average net income per day from graded Murrah buffalo was also significantly ($p \leq 0.01$) higher in the Godavari delta area (Rs.146.85) than that in upland (Rs. 109.29) and agency area (Rs. 94.58). It might be due to the higher milk yield per animal and the higher sale price of milk in the Godavari delta area than that in the upland and agency area. It was also found that the share of overall feed cost (56.62%) and labour cost (15.92%) was higher than other costs in the overall total maintenance cost (gross cost) of graded Murrah buffaloes. A similar trend was also observed in the Godavari delta upland and agency area in the study area.

Table 1: Cost and returns of milk production in dairy animals per animal per day (in Rupees) in East Godavari district

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)
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: Cost and returns of milk production in graded Murrah buffaloes per animal per day (in Rupees) in different areas of East Godavari district

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)
13	Gross cost (TVC+TFC)**	188.20[a] (100.00)	153.99[b] (100.00)	123.11[c] (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[a]	22.93[b]	20.99[c]	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[a]	263.28[b]	217.69[c]	292.78
21	Net income (20-13)**	146.85[a]	109.29[b]	94.58[c]	125.61

N= No of animals

** Means with different superscripts row-wise under each character differ significantly ($P \leq .01$)

Table 3: Cost and returns of milk production in local buffaloes per animal per day (in Rupees) in different areas of East Godavari district

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 at ($P \leq .01$)

Table 4: Cost and returns of milk production in crossbred cows per animal per day (in Rupees) in different areas of East Godavari district

S.No	Particulars	Godavari delta area (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 ($P \leq .01$)

The average maintenance cost/gross cost per day in local buffalo was significantly ($p \leq$ 0.01) higher in upland (Rs. 113.23) than that in agency area (Rs.87.24) **(Table 3).**

The average cost of milk production per litre was significantly ($p \leq$ .01) lower in the agency area (Rs.22.28) than that in the upland area (Rs.23.73). The average gross income (Rupees/day) from local buffalo was significantly ($p \leq 0.01$) higher in the upland area (Rs.185.00) than that in the agency area (Rs. 139.36). The average net income (Rupees/day) from local buffalo was significantly ($p \leq 0.01$) higher in the upland area (Rs.71.77) than that in the agency area (Rs. 52.12). It might be due to the higher milk yield and the higher sale price of milk in the upland area. It was also observed that the share of overall feed cost (52.89%) and labour cost (22.58%) were higher than other costs in the overall total maintenance cost (gross cost) of local buffaloes. A similar trend was also observed in upland and agency areas in the study area.

The average maintenance cost/gross cost per day in crossbred cows was higher in the delta area (Rs.148.01) than that in the upland area (Rs.130.40) (Table 4).

The average cost of milk production per litre was higher in the delta area (Rs.14.18) than that in the upland area (Rs. 13.78). It was also observed that the average gross income was significantly ($p \leq 0.01$) higher in the Godavari delta area (Rs.249.15) than that in the upland area (Rs. 219.46). The average net income in crossbred cows was also higher in the delta area (Rs.101.14) than that in the upland area (Rs. 89.06). It might be due to higher milk production and sale price of milk in the delta area than that in the upland area. It was also found that the share of overall feed cost (56.74%) and labour cost (20.27%) was higher than other costs in the overall total maintenance cost (gross cost) of the crossbred cow. The same trend was also observed in delta and upland areas in the study area.

The average maintenance cost/gross cost per day in local cow was significantly ($p \leq$ 0.01) higher 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 average cost of milk production per litre was higher in the Godavari delta (Rs. 20.14) than that in upland (Rs. 18.85) and agency area (Rs. 17.86). It was also found that the average gross income per day was significantly ($p \leq 0$ .01) higher in the delta area (Rs. 90.53) than that in upland (Rs. 79.01) and agency area (Rs. 56.36). The average net income per day in local cow was significantly ($p \leq 0$ .01) higher in delta (Rs.15.15) and agency area (Rs.15.21) than that in agency area (Rs. 11.30). It might be due to higher milk production and sale price of milk in delta and upland area than that in the agency area.

Table 5: Cost and returns of milk production in local cows per animal per day (in Rupees) in different areas of East Godavari district

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 (24.11)	15.00 (23.49)	10.00 (22.25)	13.57 (23.27)
6	Hired labour	2.38 (3.17)	0.00 (0.00)	0.00 (0.00)	0.65 (1.11)
7	Total labour cost	20.48 (27.28)	15.00 (23.49)	10.00 (22.25)	14.22 (24.38)
8	Misc. Expenses	5.14 (6.85)	5.00 (7.83)	4.00 (8.90)	4.58 (7.85)
9	Total variable cost (TVC)	57.18 (76.17)	50.22 (78.64)	33.77 (75.13)	44.64 (76.54)
10	Depreciation on fixed assets	9.37 (12.48)	7.90 (12.37)	6.89 (15.33)	7.84 (13.44)
11	Interest on fixed capital	8.52 (11.35)	5.74 (8.99)	4.29 (9.54)	5.84 (10.01)
12	Total fixed cost (TFC)	17.89 (23.83)	13.64 (21.36)	11.18 (24.87)	13.68 (23.46)
13	Gross cost (TVC+TFC)**	75.07[a] (100.00)	63.86[b] (100.00)	44.95[c] (100.00)	58.32 (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 litre milk **	20.14[a]	18.85[b]	17.86[c]	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[a]	79.01[b]	56.36[c]	71.45
21	Net income (20-13)**	15.46[a]	15.15[b]	11.41[c]	13.13

N= No of animals

**Means with different superscripts row wise differ significantly at ($P \leq .01$)

4. CONCLUSION

The average cost of milk production per litre was significantly lower in crossbred cows followed by local cows, graded Murrah buffaloes and local buffaloes in the study area. The average gross income and net income were significantly higher in graded Murrah buffaloes followed by crossbred cows, local buffaloes and local cows. The average cost of milk production, gross income and net income of graded Murrah buffaloes, crossbred cows and local cows were significantly higher in the Godavari delta of the study area. The average cost of milk production, gross income and net income of local buffalo were significantly higher in the upland area than that in the agency area.

The study suggested that technical inputs, services and assured milk marketing facilities should be provided particularly to the milk producers 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 increasing the returns from milk production in the East Godavari district.

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