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 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 (Rs/-) 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 ($p \leq .01$) higher in 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 ($p \leq .01$) higher in upland area (23.73 and 71.77, respectively) than that in agency area (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 Godavari delta and upland area. The average cost of milk production and net income per litre in local cow was significantly ($p \leq .01$) higher in Godavari delta (20.14 and 15.46, respectively) than that in upland and agency area.

Key words: 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 annual production of 15.04 MMT of milk production and with 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. Agri-Dairy-Horticulture farming system is predominant in the district. The information on cost of milk production of dairy animals in the district is limited. Therefore, a study was carried out in East Godavari district on cost and returns of milk production of dairy animals so as to suggest the milk producers to 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 Godavari delta area, 100 from upland area and 100 from 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 ($p \leq .01$) lower in crossbred cow (Rs.14.02) followed by local cow (Rs.18.89), graded Murrah buffalo (Rs. 22.75) and 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 ($p \leq .01$) higher in graded Murrah (Rs.125.61) followed by 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 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 Vidarbha region of Maharashtra. PremChand *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 Malwa region of M.P. Michael Khoveio *et al.* (2012) found that the average 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 crossbred cow while it was negative for local cow. RachitVishnoi *et al.* (2014) reported that the cost of milk production per litre of milk for buffalo was Rs. 27.19 in UttaraKhand state and Mahin sharif 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 was 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 local cow was 56.62, 56.74, 52.89 and 44.31 per cent, 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 per cent, respectively, in the total maintenance cost(gross cost). Wani *et al.* (2010) reported that feed cost accounted more than 60 per cent of the total gross cost followed by labour cost and depreciation on building and animal in Jammu and Kashmir. PremChand and SmitaSirohi (2012) reported that the share of total feed cost and labour cost in gross cost was 72.51 and 17.06 per cent, respectively, in Rajasthan. RachitVishnoi*et al.*

(2014) reported that the share of total feed cost and labour cost in gross cost was 64 and 21 per cent, respectively, in buffaloes in UttaraKhand state. Mahin Sharif and Dixit (2015) found that the share of total labour cost in gross cost ranged from 18.54 to 30.02 per cent in south Karnataka.

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 milk production per litre**	**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

The average maintenance cost/gross cost per day in graded Murrah buffalo was significantly ($p \leq .01$) 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 ($p \leq .01$) 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 assignificantly higher ($p \leq .01$) inGodavari delta area (Rs.335.05) than that in upland (Rs.263.28) andagency area (Rs.217.69). The average net income per day from graded

Murrah buffalo was also significantly ($p \leq .01$) higher in Godavari delta area(Rs.146.85) than that in upland (Rs. 109.29) and agency area (Rs. 94.58). It might be due to higher milk yield per animal and higher sale price of milk in Godavari delta area than that in upland and agency area. It was also found that the share of overall feed cost (56.62%) and labour cost (15.92%) were higher than other costs in the overall total maintenance cost(gross cost) of graded Murrah buffaloe. The similar trend was also observed in Godavari delta upland and agency area in the study area.

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 milk production per litre** **	**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 ($P \leq .01$)

The average maintenance cost/gross cost per day in local buffalo was significantly ($p \leq .01$) 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 agency area (Rs.22.28) than that in upland area (Rs.23.73). The average gross income (Rupees/day) from local buffalo was significantly ($p \leq .01$) higher in upland area (Rs.185.00) than that in agency area (Rs. 139.36). The average net income (Rupees/day) from local buffalo was significantly ($p \leq .01$) higher in upland area (Rs.71.77) than that in agency area (Rs. 52.12). It might be due to

higher milk yield and higher sale price of milk in 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. The similar trend was also observed in upland and agency areas in the study area.

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 milk production per litre** **	**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 ($P \leq .01$)

The average maintenance cost/gross cost per day in crossbred cow was higher in delta area (Rs.148.01) than that in upland area (Rs.130.40) (Table 4). The average cost of milk production per litre was higher in delta area (Rs.14.18) than that in upland area (Rs. 13.78). It was also observed that the average gross income was significantly ($p \leq .01$) higher in Godavari delta area (Rs.249.15) than that in upland area (Rs. 219.46). The average net income in crossbred cow was also higher in delta area (Rs.101.14) than that in upland area (Rs. 89.06). It might be due to higher milk production and sale price of milk in delta area than that in upland area. It was also found that the share of overall feed cost (56.74%) and labour cost (20.27%) were higher than other costs in the overall total maintenance cost(gross cost) of crossbred cow. The same trend was also observed in delta and upland areas in the study area.

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 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 milk production per litre**	**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 cow was significantly ($p \leq .01$) higher in Godavari delta area (Rs. 75.07) than that in upland area (Rs. 63.86) and agency area (Rs. 44.95) (Table 5). The average cost of milk production per litre was higher in 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 ($p \leq .01$) higher in 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 ($p \leq .01$) 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 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 milk production per litre****	**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 (Rs/-) of milk production per litre was significantly ($p \leq .01$) lower 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 average gross income and net income was

significantly ($p \leq .01$) 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 was significantly ($p \leq .01$) higher in Godavari delta of study area. The average cost of milk production, gross income and net income of local buffalo was significantly ($p \leq .01$) higher in upland area than that in 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 East Godavari district.

REFERENCES:

Bulbul GN, Datta KK, Shiv Raj Singh. cost of milk production in Vidarbha region of Maharashtra. Indian Journal of Dairy Science 2011;64: 514-518.

DAHD, 2019. Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, GoI., retrieved from https://www.nddb.coop/information/stats/milch

Mahin Sharif, Dixit PK. Dairy farming in southern Karnataka: An economic analysis under varying groundwater regimes. Indian Journal of Dairy Science 2015; 68:65-72.

Michael Khoveio LL, Jain D K, Chauhan A K. Economics of milk production and its constraints in Nagaland. Indian Journal of Dairy Science 2012 ;65:520-526.

Prem Chand, Smita Sirohi. Dairying in Semi-arid Eastern plain zone of Rajasthan: Input productivity and net returns. Indian Journal of Dairy Science 2012;65: 79-82.

Prem Chand, Smita Sirohi, Anupam Mishra and Chahal V P. Estimation of costs and returns from dairying in Malwa region of Madhya Pradesh.Indian Journal of Dairy Science 2017; 87: 381-386.

RachitVishnoi, Dixit PK Umamageswari M. Economics of milk production in plain and hill regions of Uttarakhand state.Indian Journalof Dairy Science 2014 ;67,523-530.

Snedecor G M and Cochran W G 1994 Statistical methods, 8th Ed. IOWA State University Press, Ames, IOWA.

Umamageswari M, Dixit PK, Sivaram M Economics of milk production in Tamil Nadu – A comparative study.Indian Journal of Dairy Science 2017;70: 221227.

Wani SA, Mattoo FA, Shaheen FA, HumaSehar and RehanaRasool. Economics of milk production by smallholders across agro-climatic zones of Jammu and Kashmir. Indian Journal of Dairy Science 2010 ;63: 401-407.