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Research Article

AN ECONOMIC ANALYSIS OF MILK PRODUCTION ON DIFFERENT FARM SIZES IN JUNAGADH DISTRICT OF GUJARAT

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Abstract- The economics of cow and buffalo milk production in Junagadh district of Gujarat during 2014 was worked out for 144 milk producers selected randomly from twelve villages of three talukas. The analysis of cost, return and input-output ratio were separately carried out using tabular analysis for indigenous buffalo, *Jafarabadi* buffalo, indigenous cow and *Gir* cow maintenance and milk production. The average holding of sample farmers was revealed about 3.11 ha and about 79 per cent reported under irrigation. Among the surveyed 144 households, 155 have indigenous and 17 possess *Jafarabadi* buffaloes, besides 80 farmers have indigenous and 22 possess *Gir* cows. The average cost of per day per animal maintenance was reported about Rs. 223, Rs. 242, Rs. 194 and Rs. 213 respectively. It was noticed that the cost of maintenance of buffaloes and cows was found increasing with an increase in the size of farm. It found that buffalo and cow milk production was remunerative for all categories of farms, even if the cost-C_2 is to be considered.

Keywords- Milk, *Gir* cow, *Jafarabadi* buffalo, maintenance, cost.

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Introduction

Milk is a leading agricultural produce contributing about 4 per cent to GDP of India. It is very important food for vegetarian people as, it is a source of animal protein, carbohydrates, fats, calcium, phosphorus and iron, which are essential for proper growth, and tissue repairs of body. The foregoing discussion indicates that dairy farming is emerging as an important commercial agricultural enterprise in India. In spite of overwhelming importance of dairy farming in Gujarat, no systematic attempts have been made at micro level, except a few studies. Hence the present study was under taken with the objectives *viz.,* (i) To estimate the cost of maintenance of a cow and a buffalo per year and per day (ii) To estimate the per liter cost of milk production, returns over different cost concepts, input-output relationship and resource use efficiency in milk production [1].

Materials and Methods

Out of total 33 districts of Gujarat, Junagadh is one of the important milk producing district has about 400 co-operative dairy village societies are engaged for giving a greater share of the consumer's rupee to the farmers. Besides co-operative marketing structure, private marketing structure also developed in the district. Therefore, Junagadh district was selected for the study. In view of resources and time constraints, it was decided to select three talukas from Junagadh district and four villages from each selected talukas for enquiry. Thus, in all 12 villages from the three selected talukas were pick up for the study, and from each selected villages 12 farmers were selected randomly with size categories constituting total sample size 144. To study the economics of milk production required information was collected for the year 2014. The selected respondents were personally interviewed at their farm and the information was collected by re-call method as per designed schedule.

The tabular analysis was employed to work out the cost and returns of milk production, *etc.* Cost– A, B, C_1 and C_2 were calculated as laid down in the different farm management studies.

To work out the per litre cost of milk production the following formula was used.

$$\text{Per Litre Cost} = \frac{\text{Total expenditure – Receipt from dung}}{\text{Litres of milk produced}}$$

(Total expenditure i.e., cost-A or cost-B or cost-C_1 or cost-C_2)

Results and Discussion

Socio-economic characteristics of the respondent

The sample milk producer were categorized into three age groups, *viz.,* young (up to 30 years), middle (30 to 60 years) and old aged (above 60 year). [Table-1] gives distribution of the respondents on the basis of their age. Out of 144 farmers, 9 farmers (6.25 %) were found from young age group, while 59 farmers (40.98 %) were found from old age group. Majority of the sample farmers (52.77 %) were middle aged. The reason for this might be that the parental occupation was taken up by the middle-aged group, whereas, old ones were unable to do dairy farming and the young ones were not capable of taking the responsibility.

Farm size and irrigated area

Farm size and irrigated area also affect the milk production as it fulfills the need of green and dry fodder sufficiently. Therefore, details about average size of farms and irrigated area in different farm size groups are given in [Table-2].

Table-1 *Distributions of the respondents according to the age groups* (Year)

Age of the head of the family	Farm size groups				
	Marginal	Small	Medium	Large	All farms
Young (Up to 30)	2 (5.56)	4 (11.11)	1 (2.78)	2 (5.55)	9 (6.25)
Middle (30 to 60)	19 (52.78)	19(52.78)	24 (66.67)	14 (38.89)	76 (52.77)
Old (Above 60)	15 (41.67)	13 (36.11)	11 (30.55)	20 (55.56)	59 (40.98)
Total	36 (100)	36 (100)	36 (100)	36 (100)	144 (100)
Average age	**47.69**	**46.39**	**48.50**	**53.83**	**49.10**

Note: Figures in parentheses indicate the percentage of the total number of respondents in each size group.

Table-2 *Farm size and irrigated area*

Farm size groups	Farm area of household (ha)			Average farm size (ha)
	Irrigated	Un-irrigated	Total	
Marginal	23.60 (79.95)	5.92 (20.05)	29.52	0.82
Small	50.48 (89.25)	6.08 (10.75)	56.56	1.57
Medium	97.36 (85.52)	16.48 (14.48)	113.84	3.16
Large	183.60 (73.98)	64.56 (26.02)	248.16	6.89
All farms	355.56 (79.24)	93.04 (20.76)	448.08	3.11

Note: Figures in parentheses indicate the percentage.
Source: Field survey.

Herd size of buffalo and cow

The data presented in [Table-3] indicates average herd size and distribution of the respondents according to possession of number of buffaloes. It was noticed that out of 144 sample farmers a majority, 115 (79.86 %) had indigenous buffalo. In case of *Jafarabadi* buffalo, it was possessed by only 11.81 per cent of respondents. Out of 144 respondents of which 80 *i.e.* majority of the respondents (55.56 %) had indigenous cows. In case of *Gir* cow, only 15.28 per cent of respondents (*i.e.* 22 farmers) possessed *Gir* cows.

Table-3 *Average herd size and distribution of the respondents according to number of buffaloes*

Particular	Farm size groups				
	Marginal	Small	Medium	Large	All farms
(1) No. of households who had Indigenous buffalo					
Zero-buffalo	10	7	5	7	29
One-buffalo	17	11	13	7	48
Two-buffalo	3	11	12	14	40
Three-buffalo	2	3	3	6	14
> Three -buffalo	4	4	3	2	13
Total sample size	36	36	36	36	144
Average herd size of buffalo	1.44	1.67	1.67	1.72	1.62
(2) No. of households who had *Jafarabadi* buffalo					
Zero-buffalo	32	34	31	30	127
One-buffalo	4	1	4	5	14
Two-buffalo	-	1	1	1	3
Total sample size	36	36	36	36	144
Average herd size of buffalo	0.11	0.08	0.17	0.19	0.14

Table-4 *Average herd size and distribution of the respondents according to number of cows*

Particular	Farm size groups				
	Marginal	Small	Medium	Large	All farms
(1) No. of households who had Indigenous cow					
Zero-cow	12	15	18	19	64
One-cow	15	11	17	10	53
Two-cow	8	8	1	6	23
Three-cow	1	2	-	1	4
Total sample size	36	36	36	36	144
Average herd size of cow	0.94	0.92	0.53	0.70	0.77
(2) No. of households who had *Gir* cow					
Zero-cow	31	31	31	29	122
One-cow	5	5	5	7	22
Total sample size	36	36	36	36	144
Average herd size of cow	0.14	0.14	0.14	0.19	0.15

Maintenance cost of a milch cow and buffalo per year and per day

The [Table-5] reveals that average total maintenance cost for an indigenous buffalo and *Jafarabadi* buffalo per year was Rs. 81571 and Rs. 88344, respectively in 2014. On reviewing the farm size-wise total average cost per year for indigenous buffalo rearing, it can be seen that it was highest, Rs..86457 on large farms, followed by Rs. 83856 on medium farms, Rs. 79591 on small farms and Rs. 76382 on marginal farms. In case of *Jafarabadi* buffalo, similar trend was observed as the total average maintenance cost per year was highest on large farms (Rs. 94089), followed by medium farms (Rs. 89245), small farms (Rs. 85100) and marginal farms (Rs. 84940).

The average total maintenance cost for an indigenous cow and *Gir* cow per year was Rs. 70857 and Rs. 77605, respectively [Table-6]. On reviewing the farm size-wise total average cost per year for indigenous cow rearing, it can be seen that it was highest, Rs. 74228 on large farms, followed by Rs..73593 on medium farms, Rs. 67633 on small farms and Rs. 67972 on marginal farms. In case of *Gir* cow, similar trend was observed as the total average maintenance cost per year was highest on large farms (Rs. 83012), followed by medium farms (Rs. 79987), marginal farms (Rs. 75284) and small farms (Rs. 72139)

Basavarajappa and Talathi (2012) [2] in their study of cost of milk production in Shimoga district of Karnataka also found similar results, as a category wise analysis of farmers revealed that total cost increased with increased in farm size.

Table-5 *Maintenance cost of a buffalo per year*

Farm size groups	Different costs (Rs. per milch animal)			
	Cost-A	Cost-B	Cost-C_1	Cost- C_2
Indigenous buffalo rearing				
Marginal	50096 (65.59)	55872 (73.15)	71372 (93.44)	76382 (100)
Small	55022 (69.13)	61372 (77.11)	74089 (93.09)	79591 (100)
Medium	58294 (69.52)	64970 (77.48)	78027 (93.05)	83856 (100)
Large	60985 (70.54)	67691 (78.29)	80358 (92.95)	86457 (100)
All farms	**56089 (68.77)**	**62476 (76.59)**	**75962 (93.12)**	**81571 (100)**
***Jafarabadi* buffalo rearing**				
Marginal	56660 (66.71)	63990 (75.74)	79274 (93.33)	84940 (100)
Small	58284 68.96)	65979 (77.53)	79232 (93.10)	85100 (100)
Medium	62548 (70.09)	69925 (78.35)	82990 (92.99)	89245 (100)
Large	66652 (70.84)	74301 (78.97)	87424 (92.92)	94089 (100)
All farms	**61136 (69.20)**	**68549 (77.59)**	**82230 (93.08)**	**88344 (100)**

Note: Figures in parentheses indicates the percentage of cost C_2.

The results obtained by working out the maintenance cost of a milch animal per year were further substantiated by converting the cost data of per year into per day basis. It was found that on an average total per day per animal maintenance cost for indigenous buffalo and *Jafarabadi* buffalo rearing was Rs. 223 and Rs. 242, respectively. In case of cow rearing, for indigenous cow and *Gir* cow an average total per day per animal maintenance cost was Rs. 194 and Rs. 213, respectively during 2014.

Per liter production cost and price of milk

The overall total cost of production (cost C_2) per liter of Indigenous buffalo milk and *Jafarabadi* buffalo milk were Rs. 37.55 and Rs. 34.48, respectively. On an average the total milk production cost (cost C_2) per liter was incurred Rs. 34.17 and Rs. 32.79 in case of indigenous cow and *Gir* cow, respectively. Kumar *et al.* (2010) [3] in Faizabad district of U.P. and Vintode *et al.* (2010) [4] in their study of an economic analysis of dairy enterprises in Maharashtra reported the similar results and indicated that buffalo was overall more profitable than cow.

In case of indigenous cow milk and Gir cow milk; on an average market price was Rs. 35.95 and Rs. 37.14 per litre, respectively. This was higher than overall total cost of production of cow milk. Thus, it revealed that buffalo and cow milk production was remunerative for all categories of farms, even if the cost-C_2 is to be considered.

Table-6 *Maintenance cost of a cow per year*

Farm size groups	Different costs (Rs. per milch animal)			
	Cost-A	Cost-B	Cost-C_1	Cost- C_2
Indigenous cow rearing				
Marginal	42564 (62.62)	46021 (67.71)	63716 (93.74)	67972 (100)
Small	46070 (68.12)	50165 (74.17)	63026 (93.19)	67633 (100)
Medium	50099 (68.08)	54468 (74.01)	68583 (93.19)	73593 (100)
Large	52490 (70.71)	56495 (76.11)	68979 (92.93)	74228 (100)
All farms	**47806 (67.47)**	**51787 (73.09)**	**66076 (93.25)**	**70857 (100)**
***Gir* cow rearing**				
Marginal	46480 (61.74)	50865 (67.56)	70636 (93.83)	75284 (100)
Small	49735 (68.94)	54360 (75.35)	67165 (93.10)	72138 (100)
Medium	55920 (69.91)	60342 (75.44)	74395 (93.01)	79987 (100)
Large	58805 (70.84)	63574 (76.58)	77131 (92.92)	83012 (100)
All farms	**52735 (67.95)**	**57285 (73.82)**	**72332 (93.21)**	**77605 (100)**

Note: Figures in parentheses indicates the percentage of cost C_2.

Table-7 *Farm size-wise production cost and price of buffalo milk per litre*

Farm size groups	Different Costs (Rs. per milch animal)				Price per litre (Rs.)
	Cost-A	Cost-B	Cost-C_1	Cost- C_2	
Indigenous buffalo rearing					
Marginal	23.55 (61.54)	26.88 (70.25)	35.46 (92.68)	38.27 (100)	40.52
Small	22.37 (65.00)	25.50 (74.10)	31.75 (92.25)	34.41 (100)	39.75
Medium	25.49 (65.96)	28.96 (74.93)	35.72 (92.42)	38.65 (100)	41.82
Large	26.24 (67.54)	29.57 (76.10)	35.87 (92.32)	38.86 (100)	42.00
All farms	24.41 (65.02)	27.73 (73.85)	34.70 (92.42)	37.55 (100)	41.02
***Jafarabadi* buffalo rearing**					
Marginal	21.49 (65.35)	24.73 (72.89)	31.42 (92.62)	33.93 (100)	42.61
Small	21.15 (65.39)	24.22 (74.87)	29.86 (92.30)	32.35 (100)	42.00
Medium	22.72 (66.60)	25.87 (75.84)	31.45 (92.21)	34.11 (100)	42.51
Large	25.63 (68.29)	28.95 (77.13)	34.61 (92.21)	37.53 (100)	42.77
All farms	22.75 (65.97)	25.94 (75.24)	31.84 (92.33)	34.48 (100)	42.47

Note: Figures in parentheses indicates the percentage of cost C_2.

Table-8 *Farm size-wise cost and price of cow milk per litre*

Farm size groups	Different Costs (Rs. per milch animal)				Price per litre (Rs.)
	Cost-A	Cost-B	Cost-C_1	Cost- C_2	
Indigenous cow rearing					
Marginal	19.19 (58.13)	21.06 (63.81)	30.74 (93.12)	33.01 (100)	36.04
Small	22.07 (64.28)	24.40 (71.08)	31.79 (92.60)	34.33 (100)	35.54
Medium	21.87 (64.95)	24.07 (71.49)	31.18 (92.62)	33.67 (100)	36.25
Large	24.15 (67.72)	26.28 (73.72)	32.94 (92.37)	35.66 (100)	35.96
All farms	21.82 (63.86)	23.95 (70.11)	31.66 (92.67)	34.17 (100)	35.95
***Gir* cow rearing**					
Marginal	18.44 (58.84)	20.40 (65.07)	29.20 (93.16)	31.35 (100)	37.00
Small	21.02 (66.34)	23.21 (73.26)	29.31 (92.50)	31.69 (100)	36.50
Medium	22.43(67.13)	24.40 (73.03)	30.87 (92.40)	33.41 (100)	37.78
Large	23.69 (68.24)	25.84 (74.45)	32.04 (92.32)	34.71 (100)	37.27
All farms	21.39 (65.25)	23.46 (71.56)	30.36 (92.58)	32.79 (100)	37.14

Note: Figures in parentheses indicates the percentage of cost C_2.

Conclusions

The study revealed that rearing of *Jafarabadi* buffaloes and *Gir* cows were found to be more remunerative to the farmers as compared to indigenous buffaloes and cows, respectively. In study area dairy was only supplementary income to the farmers. Therefore, it is needed to make dairy business as a main source of income by encouraging dairy enterprise through bank loans and extension agencies. *Jafarabadi* buffalo and *Gir* cow were found to be more remunerative in study areas, but its population is very small, hence farmers should advise to adopt these breeds. There are need to create awareness regarding importance of local high milking breeds like *Jafarabadi* buffalo and *Gir* cow.

Conflict of Interest: None declared

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