



Examining Profitability and Viability of Urban and Peri-Urban Dairy Farms

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Authors' contributions

This work was carried out in collaboration among all authors. Author ALR has collected the data. Author DNG has helped in data collection and data entry of data. Author LMS has guided whole project and analyzed data and writes the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Cost benefit analysis in 20 each urban and periurban dairy farms nearby Navsari city of Gujarat, India were studied. The required information from selected farms was collected through personal interview. The collected and derived data were subject to statistics as per standard technique in Statistical Package for Social Sciences (SPSS) software. Total fixed cost in urban and peri urban area was Rs. 2.27±0.36 and 2.05±0.33 lakh, respectively. Among total cost, fixed cost was 11.42%, further; it was nonsignificant among urban and peri-urban farms. Total variable cost was looked higher in urban farms i.e. Rs.18.97±2.47 and 14.50±2.33 in urban and periurban farms, respectively, however, it was nonsignificant between two areas. The proportion of variable cost was major (88.58%) among total cost. Among total cost feed-fodder cost was highest i.e. 70.10% followed by labour cost i.e. 17.13%. Gross total income was found higher in urban farms but it was nonsignificant between two regions. Pooled gross total income was Rs. 23.05 lakh. Average total income from sale of milk was Rs. 21.70 lakh (92.72%). Sale of animals (4.31%) and sale of dung (2.98%) was also having some contribution in return. The average net profit in urban farms was

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found nonsignificant higher i.e. Rs. 5.52 and 3.48 lakh, in urban and peri urban farms, respectively. When farms was compared based on net return per adult unit the urban farms was significantly more profitable (US\$ 172 v/s 136). The net profit per litre of milk was Rs. 9.20 and 6.80 in urban and periurban farms, respectively. The overall benefit cost ratio was found 1:1.20. It was also higher in urban area. Thus, it can be concluded that urban and periurban dairy farms are profitable and viable enterprise.

Keywords: Benefit cost ratio; dairy farm; economics; peri urban; profitability; urban; viability.

1. INTRODUCTION

The population growth, urbanization, income growth, high income elasticity of demand and changes in food habits are largely seen in many states of India. It will promote demand of milk particularly in cities. It is expected to continue well into the new millennium [1]. To get the benefits of city consumers many dairy farms have been established in and around many cities in India. As net profit from dairy farms was estimated higher in semi-urban areas [2], thus, the concept of urban periurban dairy farms near small towns may also profitable. Generally commercial dairy farm having herd strength 80-180 is profitable enterprise with excellent benefit cost ratio [3], small farms with herd strength 20-40 in urban-peri-urban areas are popular as large farms are very difficult in this area due to high cost of land and inadequate fodder storage. They always need to purchase green fodder which leads to high cost of production. These types of factors lead to increase per liter cost of milk production in urban areas in comparison to rural and semi-urban areas. On other hand urban farms are near to consumers, hence, they enjoying easy milk marketing. Both types of farms have their own pros and cons. Thus, cost benefit aspects of such farms needs to be studied to provide basis for delineating possibilities of controlling costs of milk production and increasing returns to make it a viable enterprise [4]. Therefore, attempts were made to study cost benefit analysis in urban and periurban dairy farms around Navsari city of Gujarat.

2. MATERIALS AND METHODS

The area fall in 8 km radius to Navsari city was consider as urban area whereas, the areas falls in 16 km radius minus said urban area was considered as peri-urban area. A list of all farms having minimum 20 adult units of cattle or buffaloes was prepared. From list 20 urban farms (UF) and 20 peri-urban farms (PUF) were selected randomly. The needed information was

collected by questionnaire. Cost of feed and fodder was worked based on expenditure made for purchase of feed and fodder for last 12 months. The purchase price was assumed Rs 2 and 4 for Kg green and dry fodder, respectively for fodder grown at home or cut and carry grass. Herd strength were converted to adult units by multiplying factors 1, 0.67, 0.50 and 0.33 to adults, stock more than 2 years, between 1-2 years and less than 1 year, respectively. Cost benefit analysis of commercial dairy farm was calculated as per the standard procedures. Prevailing market value of shed, livestock and equipments were used for calculation of interest and depreciation. The interest on fixed capital was calculated at 8 per cent per annum. Depreciation on fixed capital was worked out separately for milch animals (8% per anum), shed (5% per anum), machinery and equipment's (10% per anum). Labour cost included family as well as paid hired labour. Actual expenditure toward paid wages to labours plus prevailed minimum wages (Rs. 178/day) was taken for calculation of working family labour cost. Net profit was calculated by gross total income minus total cost i.e. fixed plus variable. Net Returns Rs./AU was obtained by average net profit dividing by average adult unit. Net Returns Rs./AU/day was obtained net return divided by 365 days. The collected and derived data were tabulated and analyzed for ANOVA in Statistical Package for Social Sciences (SPSS) 25 software. Most important figures in Indian Rupee were converted to US \$ as per prevailing exchange rate for convenience.

3. RESULTS AND DISCUSSION

3.1 Herd Composition

The herd composition of selected farms is depicted in Fig. 1. It shows that all farms are keeping cattle along with buffaloes. Share of buffaloes were higher in the herd in both regions. However, number of buffaloes was more than thrice of cattle in UF. The young stock of buffaloes was more in UF.

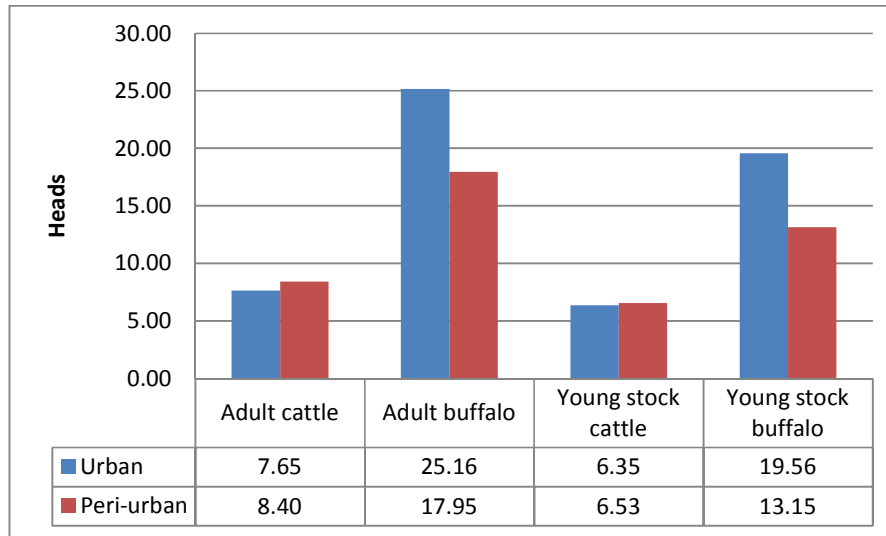


Fig. 1. Herd composition in urban and peri urban dairy farms

3.1.1 Investment in dairy farms

The investment pattern is presented in Table 1. Total annual fixed cost, variable cost and return from the dairy farms depicts in Table 2. Proportion of various cost and return parameters has been calculated and depicted in said table along with significance level between two regions. Investment made by dairy farm owners of both regions toward livestock, shed and equipment is presented in Table reveals that they have invested Rs 4.60-6.20 lakh (6107-8280 US\$) toward construction of shed. The cost of livestock was 6-7.50 lakhs equal to 7920-10107 US\$. They were having equipments of Rs 2-2.75 lakh (2573-3667 US\$). Table depicts that cost of shed and livestock is higher in UF, whereas, cost of equipments was higher in PUF. Detailed survey indicated that sixteen each farms of both region were having chaff cutter. The milking machine was possessed by only five PUF. Tractor was owned by 5 and 12 UF and PUF, respectively. More numbers of PUF were having land for agriculture, thus they were having more farms with tractor facility which resulted in increased cost of equipment in that region. UF were keeping more numbers of buffalo and more

numbers of adult animals; hence cost of livestock is also higher compare to PF. Construction cost for shed in UF was higher than PUF. Looking to above facts, UF were needed more investment in their farms.

3.2 Cost and Return

3.2.1 Fixed cost

The cost and returns from commercial dairy farms is depicted in Table 2. Mean adult units were higher (42.81) in UF than PUF (34.23). Total fixed cost was at par in UF (Rs. 2.27 lakh) and PUF (2.05 lakh). Further, it consisted of 11.42% of total cost.

Total fixed cost observed in our study was near to ideal i.e. 11.42% of total cost. One previous study revealed 13.62% total fixed cost among total cost in crossbred cattle farms which is little higher than present study; might be due to keeping of crossbred cattle [5]. Another study also reported little higher (13.64%) fixed cost, however, they have included herd replacement cost (7.37%) in fixed cost [6]. Herd replacement

Table 1. Details of investment pattern in urban and periurban commercial dairy farms

Particular	Urban		Periurban		Pooled		P
	Rs (Lakh)	Equi. to Us \$	Rs (Lakh)	Equi. to Us \$	Rs (Lakh)	Equi. to Us \$	
Cost of shed	6.21±1.40	8280	4.58±1.08	6107	5.33±0.87	7107	0.355
Cost of livestock	7.58±1.07	10107	5.94±0.98	7920	6.76±0.73	9013	0.268
Cost of equipment	1.93±0.69	2573	2.75±0.62	3667	2.34±0.46	3120	0.381

is not included as cost in present study as all the selected farms were running for more than 10 years, hence, they are having their farm born replacement stock which is advantage of older farms. The newer farms are advised to control fixed cost by staying away from unnecessary extra investment in shed or implement.

3.3 Variable Cost

Total variable cost was comes to around Rs. 18.97 and Rs. 14.50 lakh in UF and PUF, respectively which was nonsignificant between both regions. It comes to around 22316 US\$. Overall total cost was found around 18.89 lakh (25187 US\$) which was nonsignificant between UF and PUF. The proportion of variable cost was major (88.58%) among total cost. Among them feed and fodder cost was accounts 70.10 percent of the total cost followed by labour cost (17.13%). The detail feed and fodder cost is depicted in Fig. 2. It reveals that cost of concentrate and green fodder was higher in UF particularly cost of concentrate was much more in UF (10 lakh v/s 7 lakh). Both types of farms were not spending much money to buy dry fodder. Detail analysis of labour cost is depicted in Fig. 3 shows that it was little higher in UF. Further, family members were also working in both types of farms. The veterinary cost and miscellaneous cost was less than 1%.

The proportion of variable cost was major (88.58%) among total cost. Among them feed and fodder cost was accounts 70.10 percent of the total cost followed by labour cost (17.13%). One similar study on crossbred cattle farms in Karnataka state in India revealed higher feed cost (76.46%) and little lower (13.26%) labour cost [5]. Another study found 69% and 83.63 % feed and total variable cost, respectively [7]. Similarly finding from western Maharashtra shown that per farm feeding cost shared 70.23 and 68.24 per cent of the total cost for cow and buffalo herd, respectively in commercial dairy farms [6]. Thus, the feed cost observed in present study is more or less in accordance with all discussed previous findings across many states of India. However, total feed cost of 70% observed in present study is considered ideal and less in urban farm category. It might be due to less expenditure in green and dry fodder in studied farms. As study area is well known sugarcane growing belt, hence, sugarcane tops are available in plenty at cheaper rate for 7-8 months in a year which might be responsible for less feed cost in studied farms [8]. The

expenditure incurred for dry fodder was meager compare to similar study on crossbred cattle herd revealed 33, 21 and 46 percent expenditure towards green, dry fodder and concentrate, respectively [7]. Another similar study in periurban area of Karnataka, India also revealed low dry fodder cost (19%) in rearing of crossbred cattle [5]. Therefore, urban-periurban dairy farms are advised to use dry fodder in required quantity by periodic buying of baled dry grass or baled straw for better profitability and better health of animals.

The labour cost was second highest cost after feed cost. Much more variation has been observed in labour cost among many studies mostly due to herd size only; however, mostly labour cost was around 15% in most of above said studies [5,3]. Recent study indicate that farm mechanization using of various modern equipments also reducing labour cost, thus, increasing profitability [3]. Higher labour cost in UF was in proportion to number of animals kept compare to PUF [7]. The farm owners mostly hires labour for routine dairy farm operations, however, some of labour work is also shared by family labours also. During study it was observed that husband was working for full day and spouses were working for about 4 hours a day. The dairy farms are giving opportunity to family member to work as per their free time with good return.

3.4 Returns

The income generated from studied commercial dairy farms includes sale of milk, sale of animal and sale of dung. The results of Table 2 indicated that average total income from selling of milk were Rs. 21.70 lakh (92.72%). Nonsignificantly higher receipt was observed from UF i.e. Rs. 24.86 v/s 18.54. Table 2 revealed that average income from selling of dung in UF and PUF were 0.77 and 0.62 lakh, respectively. Overall it was Rs. 0.70 lakh (2.98%). Average income (Rs in lakh) from sale of animal in UF was Rs. 1.13, in PUF it was Rs. 0.87. The overall receipt from selling of animals was 4.31% among total income. The more income in UF was attributed with selling of more number of animals particularly buffaloes. Pooled gross total income was Rs. 23.05 lakh in which UF includes Rs. 26.75 lakh and PUF includes Rs. 20.04 lakh. More gross total income in UF was associated with higher herd strength and presence of more number of buffaloes in their herd. Average net profit in was Rs. 5.52 and 3.48

lakh in UF and PUF, respectively. Overall net profit per AU was observed Rs. 12000 (156 US\$). It was significantly higher in UF. The net profit per litre milk was Rs. 9.20 and 6.80 in UF and PUF, respectively. The overall benefit cost ratio was found 1:1.20.

The share of milk in total income generated was 92.72%. This finding is supported previous study showing similar average total income from milk which was 97 per cent of the total income [1]. More proportion of income (98.46-99.50%) was received from sale of milk in dairy farms in Karnataka [6]. Average income from selling of dung in UF and PUF were 0.77 and 0.62 lakh, respectively which is in agreement with report of dairy farms in Rajasthan showing average total income was Rs. 0.60 lakh, however, they

reported share of income by selling of dung was 2% among total income which was less than present finding [9]. The overall receipt from selling of animals was 4.31% among total income. It was higher in UF attributed with selling of more number of animals particularly buffaloes. Said study from Rajasthan reported comparatively less receipt from sell of animal's particularly surplus male stock [6]. More gross total income in UF was associated with higher herd strength and presence of more number of buffaloes in their herd. Previous study found total income Rs. 29.21 which was higher than present gross total income [9]. Average net profit observed in present study (Rs. 3.48-5.52 lakh) was in agreement with similar sized commercial dairy farms in Maharashtra where annual net profit Rs. 3.12 lakh was seen [7]. Overall net

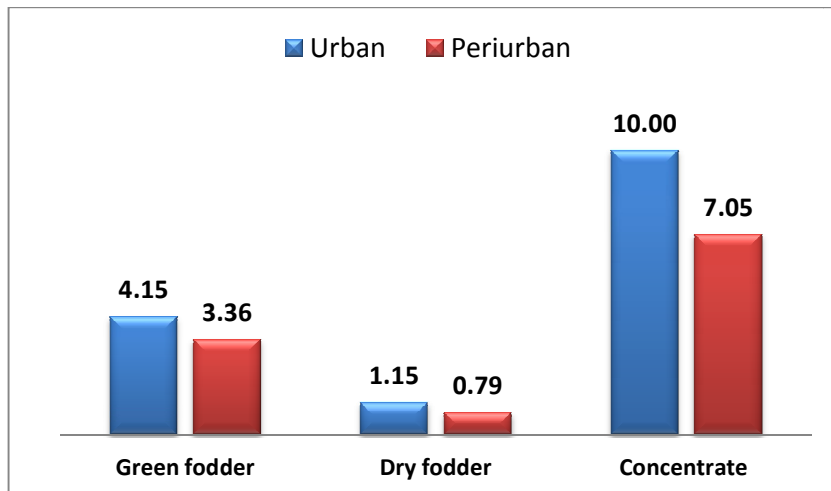


Fig. 2. Mean feed and fodder cost (Rs in lakh/Farm)

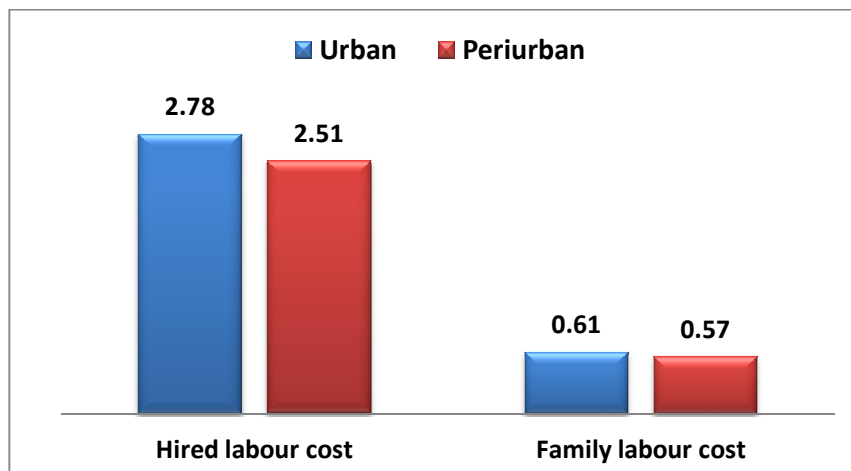


Fig. 3. Expenditure toward labours (Rs in lakh/Farm)

Table 2. Mean cost and return in UF and PUF (in lakh Rs.)

Particulars	Particulars	UF (n=20)	PUF (n=20)	Over all (n=40)	% among total cost/ return	P value
<i>A.U.</i>	Mean Adult Unit	42.81	34.23	38.52	-	-
<i>Total fixed cost</i>		2.27±0.36	2.05±0.33	2.16±0.24	11.42	0.658
<i>Variable cost</i>	Feed- fodder cost	15.29±1.94	11.19±1.81	13.24±1.35	70.10	0.131
	Labour cost	3.39±0.65	3.08 ±0.56	3.24±0.43	17.13	0.724
	Veterinary cost	0.21±0.03	0.18±0.02	0.20±0.02	1.03	0.264
	Miscellaneous cost	0.07±0.01	0.05±0.01	0.06±0.01	0.32	0.263
	Total <i>Variable cost</i>	18.97±2.47	14.50±2.33	16.74±1.72	88.58	--
Total <i>Variable cost</i> equi. to US \$		25292	19339	22316	-	-
<i>Fixed+Variable</i>	Total Cost	21.24±2.84	16.55±2.66	18.89±1.96	100	0.210
Total Cost equi. to US \$		28320	22067	25187	-	-
<i>Return</i>	Sale of dung	0.77 ± 0.10	0.62±0.09	0.70±0.07	2.98	0.277
	Sale of milk	24.86±3.39	18.54±3.08	21.70±2.32	92.72	0.176
	Sale of animals	1.13±0.12	0.87±0.15	1.01±0.10	4.31	0.201
	Gross total income	26.75±3.62	20.04±3.26	23.40±2.46	100	0.175
	Net profit	5.52±0.83	3.48±0.60	4.51±0.53	-	0.093
	Rs./AU	0.13±0.01	0.10±0.01	0.12±0.01	-	0.008
	US \$/AU equi.	172	136	156	-	-
	Benefit: cost ratio	1:1.22	1:1.18	1:1.20	-	-

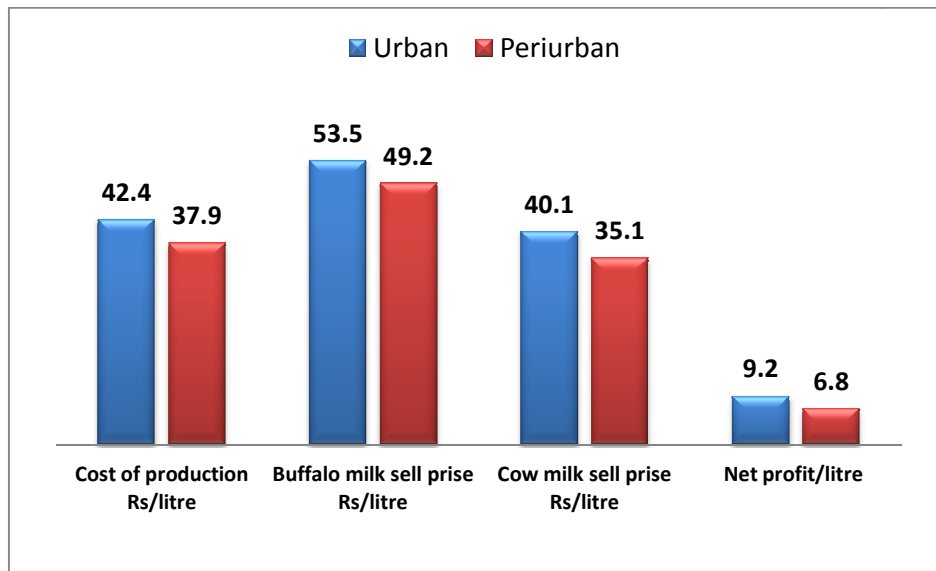


Fig. 4. Cost and return analysis per liter basic

profit per AU was significantly higher in UF. Study conducted in nearby Surat district observed net return per adult unit Rs. 39.02 in rural and Rs. 32.97 in periurban areas, respectively which are agreement with present finding [10]. However, some research findings observed higher net profit than present finding [9,11]. They have studied economics in dairy buffaloes in Faizabad district- a well known belt for Murrah buffaloes in U.P. One such study in Rajasthan also found net return of Rs 8.28/litre against cost Rs 14.27/liter [9]. They also observed higher benefit cost ratio than present study (1:1.58) [9]. Micro analysis of cost return depicts more return from milk in UF even though more cost per liter, might be due to keeping more buffaloes and fetching more price of milk. Cost of production were also affected by species as per one study stated that net cost per litre milk production was Rs. 9.12 and 15.08 in buffalo farm, and cow farms, respectively [6].

Micro analysis of cost return is depicted in Fig. 4. It depicts more return from milk in UF even though more cost per liter, might be due to keeping more buffaloes and fetching more price of milk than PUF. It also showing that buffalo milk selling price was Rs 53.50 and 49.20 in UF and PUF, respectively. Similar trend in selling of cow milk was also observed (Rs 40.10 v/s Rs 35.10). Fetching of more milk selling price in UF was reflected in more net profit (Rs 9.20 v/s 6.80 per litre) even though higher cost of production in UF (Rs 42.40 v/s 37.90 per litre).

4. CONCLUSION

Comparative aspects of profitability study in two category dairy farms i.e urban and periurban farms in Gujarat (India) region shown that both fixed and variable cost was found more in urban dairy farms compare to periurban farms. Among proportion of cost the feed and fodder cost was highest i.e. 70.10% followed by labour cost i.e. 17.13% among total cost in studied dairy farms. Share of income by selling milk, animals and dung were 93.72%, 4.31% and 2.98%, respectively. The gross total income, net profit, net profit per adult unit was found higher in Urban farms. The overall benefit cost ratio (1:1.20) revealed that urban and periurban dairy farms are profitable enterprise. Hence, the entrepreneurs who wants to start dairy farm in study areas are recommended to establishing either urban or periurban dairy farms.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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