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Comparative Profitability Analysis of Specialized Cattle and Buffalo Farms

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ABSTRACT

Background: Economic analysis in 20 specialized cattle and buffalo dairy farms of Gujarat was comparatively studied. The required information from selected farms was collected through personal interview.

Methods: It was studied by working annual fixed and variable cost. Gross total income was obtained by sum of all the income generated in dairy farm by selling milk, dung and animals. The collected and derived data were subject to nonparametric test in SPSS software.

Result: Total fixed cost was consisted of 19.06% of total cost and it was nonsignificant between cattle and buffalo farms. Total variable cost was higher in buffalo farms. The proportion of variable cost was major (80.94%) among total cost. Among total cost, feed and fodder cost was highest *i.e.* 63.69% followed by labour cost *i.e.* 15.72%. Buffalo farms were spending significantly higher amount toward dry fodder and labours. Average total income from sale of milk was Rs. 48.44 lakh (86.59%). Sale of ghee (9.81%), dung (2.72%) and animals (0.90%) was also having some contribution in return. The average net profit was Rs. 16.06 lakh per farm which was nonsignificant. Similarly, yearly overall net return per adult unit (AU) and per man day was 0.16 and 2.35 lakh, respectively. The net profit per liter of milk was Rs. 17.36 and 8.84 lakhs in buffalo farms and cattle farms, respectively. The overall benefit cost ratio was 1:1.35. Thus, it can be concluded that specialized dairy farm of crossbred cattle or buffaloes with herd strength 80-180 were profitable and viable enterprise in Gujarat.

Key words: Benefit cost ratio, Economics, Fixed cost, Labour cost, Specialized dairy farm, Variable cost.

INTRODUCTION

Increasing urbanization in modern era have opened new avenue for specialized dairy farming with large herd size in India. Gujarat is developing state where industrial development around major cities is growing very fast. The population growth in city with income growth, increasing demand of milk and its products, increase in milk consumption are expected to continue well into the new millennium (Kumawat *et al.,* 2014). At present there are many specialized dairy farms of either cattle or buffaloes around many cities of India. Generally crossbred cattle farms due to known milk production efficiency are most popular in Gujarat. However, peoples still prefer buffalo milk, hence, buffalo farms are also found in some areas particularly where there is direct milk marketing scope. Generally, farmers are keeping mixed herd comprising both cattle and buffaloes. Preferences of people are not good enough to tell about either buffalo or cattle farms are best. As the profit level of cow or buffalo farms cannot predict without studying it in detail. Profitability in dairy farms is influence by many factors like cost of feed ingredients, cost of labours, selling price of milk, disposal of surplus animals *etc*. It is also varying from farm to farm and region to region. North Gujarat having well feed and fodder resources available whereas, south Gujarat is dependent on poor quality crop residue like sugarcane tops and paddy straw (Rathva *et al.,* 2020). Further, in north Gujarat crossbred cattle and in south Gujarat keeping Mehsani buffaloes is most popular. However, no much systemic studies have been carried out so far for having economic analysis of crossbred cow or buffalo farms. Thus, present study was conducted to study comparative cost benefit aspects of predominating crossbred cow and buffalo specialized farms in Gujarat. As these types of studies needs to provide basis guidelines to entrepreneurs for better planning of dairy farm for good returns to make it a viable enterprise (Gomatee and Khan, 2017).

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MATERIALS AND METHODS

The dairy farms with use of modern technology which contributed more than 50 per cent in total income of farm owners were considered specialized dairy farms. Present study was focused on comparative aspects among two species (cattle and buffaloes) in two agro-climatic zones of

Gujarat *i.e.* North Gujarat semi arid region (NG farms) for crossbred and south Gujarat heavy to medium rainfall zone (SG farms). The sample farms from both regions were collected by following procedure.

Selection of farms

A list was prepared for all such farms in selected districts *i.e.* Surat, Navsari, Bharuch, Banaskantha and Sabarkantha which were having minimum 40 heads of either cattle or buffalo. Banaskantha and Sabarkantha districts of north Gujarat was selected from semi arid zone as they were having 30 specialized farms. From this both district 10 farms were selected randomly as a sample of north Gujarat semi arid zone. To study specialized farms in heavy to medium rainfall zone, 10 specialized dairy farms were selected randomly from Surat, Bharuch and Navsari districts of south Gujarat from available 31 farms. The NG farms were keeping mostly crossbred cows whereas SG farms were keeping predominantly Mehsani buffaloes. Thus, NG farms were considered as crossbred cattle farm whereas SG farms were considered as buffalo farms.

Data collection

The information was collected by interviewing farm owners of all selected farms by using questionnaire during June to August 2019. Prevailing market value of shed, livestock and equipments were asked from owner and was note down for calculation of interest and depreciation.

Calculations

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 of feed and fodder was worked based on expenditure made for purchase of feed and fodder for last 12 months. Price for farm grown fodder/ cut and carry grass was assumed Rs. 2 and 4 for green and dry fodder, respectively. Actual expenditure toward paid wages to labours plus prevailed minimum wages (Rs. 178/day) was taken for calculation of family labour cost against working of family members in dairy farm. Economics of commercial dairy farm was calculated as per the standard procedures. 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). Miscellaneous costs include cost of repairs, electricity, water charges, bucket, rope, *etc*. Gross cost was obtained by adding all the cost components included in the fixed and variable costs. Gross total income was obtained by sum of all the income generated in dairy farm by selling milk, ghee, dung and animals. Net returns Rs./AU was obtained by average net profit dividing by average adult unit. Net return/ labour was calculated by dividing net return by no of total labours worked on farm. Similarly, net return per liter milk was worked by dividing net profit by milk sold.

Statistical analysis

The collected and derived data were compared between two category farms by using IBM SPSS 26 software. Means and standard error of means were worked by using tab compare means in SPSS. Normality in data was tested by Kolmogorov-Smirnov and Snapiro-Wilk test in SPSS. It shows the data of some parameters were not found in normal distribution. Therefore, data were tested for significance across both studied regions by using nonparametric independent samples Mann Whitney U test.

RESULTS AND DISCUSSION

Herd composition

Selected crossbred cattle farms of NG were keeping average 78 adult crossbred cows with few heads of buffaloes. Similarly, buffalo farms of SG were also keeping average 114 adult female buffaloes with few crossbred cows. It shows that all farms are keeping cows along with buffaloes.

Economics of dairy farms

The investment pattern is presented in Table 1. Total annually fixed cost, variable cost and return from the dairy farms described in below (Table 2). Proportion of various cost and return parameters has been calculated and depicted in said table along with significance level between two regions and two species.

Labour management practices

Number of labours hired, number of family labours worked, working hours of labours, expenditure toward labours *etc*. is important to determine efficient labor management on a dairy farm. Mean of number of labours hired in crossbred

Table 1: Comparative labour management practices in specialized dairy farms.

Particulars	Crossbred cattle (NG) farms (n_1=10)	Buffalo (SG) farms (n_2=10)	All farms (n=20)	p (Man Whitney)
Labors hired	5.20±1.03	8.00±0.78	6.60±0.70	0.029*
Family labours worked	1.50±0.16	1.30±0.15	1.40±0.11	0.481
Working hour of labours	7.00±0.21	7.5±0.16	7.25±0.14	0.074
No. of labours /AU	11.59±1.66	10.80±0.88	11.20±0.92	0.796
Cost of hired labour Rs./AU	1237.98±163.26	1058.30±101.96	1148.14±96.06	0.190
Cost of family labour Rs./AU	467.04±57.91	306.58±38.71	386.81±38.58	0.035*
Total labour cost Rs/AU	1705.02±217.40	1364.88±128.83	1534.95±129.02	0.165
Wages of hired labours Rs/d	210.52±18.22	269.60±22.75	240.06±15.72	0.089

Table 2: Annual cost and return in specialized dairy farms (Rs in lakh).

Factors	Parameters	n	Crossbred cattle (NG) farms (n_1=10)	Buffalo (SG) farms (n_2=10)	All farms (n=20)	% among total	p (Man Whitney)
Herd size	Total AU	20	73.3±10.1	98±8	85.6±6.9		0.052
Fixed cost	Interest on FC	20	3.24±0.68	3.85±0.31	3.54±0.37	8.88	0.218
	Depreciation on FC	20	3.83±0.7	4.28±0.38	4.06±0.39	10.18	0.218
	Total FC	20	7.07±1.35	8.13±0.66	7.6±0.74	19.06	0.143
Variable cost	Cost of green fodder	20	6.31±0.83	7.27±1.28	6.79±0.75	17.03	0.529
	Cost of dry fodder	20	3.21±0.47	5.31±0.51	4.26±0.41	10.68	0.009*
	Cost of Concentrate	20	12.25±1.58	16.45±1.66	14.35±1.22	35.98	0.089
	Total feed cost	20	21.77±2.86	29.03±2.75	25.4±2.1	63.69	0.143
	Total labour cost	20	4.59±0.94	7.95±0.55	6.27±0.66	15.72	0.043*
	Veterimary expenses	20	0.38±0.05	0.51±0.04	0.44±0.04	1.1	0.052
	Miscellanious expenses	20	0.14±0.02	0.2±0.02	0.17±0.01	0.43	0.052
	Total variable cost	20	26.88±3.38	37.68±3.22	32.28±2.59	80.94	0.063
Total cost	Fixed+Variable cost	20	33.96±4.54	45.81±3.79	39.88±3.18	100	0.075
Return	Sale of dung	20	1.21±0.25	1.82±0.36	1.52±0.22	2.72	0.105
	Sale of milk	20	41.19±6.74	55.68±5.44	48.44±4.53	86.59	0.063
	Sale of ghee	4	27±0	27.6±1.83	27.45±1.3	9.81	1.000
	Sale of animals	6	1.88±0.38	1.56±0.42	1.67±0.29	0.90	0.800
	Gross total income	20	45.48±9.55	66.41±8.95	55.94±6.81	100	0.063
Profit	Net profit (Lakh/farm)	20	11.52±6.28	20.6±5.57	16.06±4.22		0.063
	Net Returns (Lakh Rs./AU)	20	0.13±0.05	0.19±0.04	0.16±0.03		0.529
	Net return/labour Rs. (Lakh) /year	20	2.42±1.41	2.28±0.57	2.35±0.74		0.436
	Net income Rs/liter	20	8.84±3.13	17.36±4.17	13.1±2.72		0.075
	Benefit:cost ratio	20	1:1.29	1:1.40	1:1.35		0.353

Note: (1) All figures are in lakh rupees unless specified in Table (2) *Significant.

cattle and buffalo farms is presented in (Table 1). Table revealed that significantly less numbers of labours were hired in crossbred cattle farms. The important aspects of dairy farm management were working of family members for routine activities of farms seen in both type of farms. Working of family labours in dairy farm is generally makes farm profitability in many parts of India (Bardhan *et al.,* 2005). Working hours of labours in both regions were similar. However, working hours found in studied farms was higher than previous findings (Kumar 2009). It is general guideline of state agricultural university farms in Gujarat to employ, 14 labours/AU. However, Labour requirement per adult unit (AU) was less in studied specialized farms particularly crossbred cattle farms were more labour efficient. Expenditure toward labours per adult unit including family labours in crossbred cattle farms was around ` 1705.02 and in buffalo farms was ` 1364.88. It was higher in crossbred cattle farms; however, statistically it was at par. The labour cost incurred in present study was lower than reported by Sahu (2010). The farms were mostly employed couples as labour on monthly salary. It was practice to provide free accommodation, electricity, milk to their labours in both regions. The monthly payments when calculated per day basis revealed nonsignificantly higher in buffalo farms (Rs. 269.60/day v/s 210.52). The costlier labours in buffalo farm in SG region was accordance to Sorathiya *et al.* (2016).

Economics of dairy farms

Fixed cost

Mean cost and returns from studied specialized dairy farms is depicted in (Table 2). It is showing that total fixed cost was nonsignificant higher in buffalo farms. The share of interest in fixed capital, depreciation was 8.88 and 10.18 percents, respectively was almost double that Patil *et al.* (2019). Kaware and Yadav (2014) reported 13.64% share of fixed cost, however, they have included herd replacement cost (7.37%) in fixed cost. Herd replacement 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. More fixed cost in present study was attributed with more costlier equipments and expensive shelter in selected farms being specialized type whereas, previous farms were mostly traditional types.

Variable cost

Total variable cost was significantly higher (37.68 lakh) in specialized buffalo farms. It was about 11 lakh less in crossbred cattle farms. It might be associated with more need of concentrate in buffalo farms. The proportion of

variable cost was major (80.94%) among total cost. Among variable cost total feed and fodder cost was accounts for 63.69% percent of total cost followed by labour cost (15.72%). Feed cost was nonsignificant between studied farms, whereas, labour cost was significantly higher in buffalo farms. Patil *et al.* (2019) revealed 76.46% feed cost and 13.26% labour cost in crossbred cattle farms in Karnataka. Relative expenditure of green fodder, dry fodder and concentrate is depicted in (Fig 1). It revealed that concentrate was major source of expenditure particularly in buffalo farms. It was having 36% share among total cost. The expenditure incurred for dry fodder was about 11%, it was significantly higher in buffalo farms. Similarly, Ghule *et al.* (2012) revealed 33, 21 and 46 percent expenditure towards green, dry fodder and concentrate, respectively in crossbred cattle farm. Patil *et al.* (2019) also revealed 76.46% share of feed-fodder cost among total cost, further, they reported that cost of concentrate was highest (54%) and cost of dry fodder was lowest (19%) in rearing of crossbred cattle at Karnataka state. The veterinary expenses included treatment cost, AI cost and other veterinary service cost. The miscellaneous costs included light bill, petrol-oil-lubricants, repairs of equipments *etc*. Both types of cost was meager in total cost was agreement with Ghule *et al.* (2012) and Patil *et al.* (2019).

Returns

The income generated from studied dairy farms includes sale of milk, sale of animal and sale of dung. Ghee a traditional milk product was also sold by 4 farms. The return and profit parameters shown in Table 2 depicts that all of them were statistically nonsignificant between cattle and buffalo farms. The results of Table 2 indicated that average total income from selling of milk were Rs.48.44 lakh (86.59%) which is major source of income. Kumawat *et al.* (2016) also revealed that income from milk was chief among all income of dairy farm. Kaware and Yadav (2014) reported more proportion of income than present study from sale of milk in dairy farms in Karnataka. The buffalo farms have earned about 15 lakh more from milk than cattle farms. It was associated with more selling price of buffalo milk particularly in SG. Buffalo farms have more return from milk than cattle farms might be due to fetching more price of milk for buffalo milk. Average buffalo milk selling price was Rs 52.56/liter in SG farms whereas, selling of cow milk was observed Rs. 36.75/liter. The return from sale of ghee was second after return from milk. One farms in NG and three farms of SG was selling organic ghee at premium rate about Rs 800-1000/Kg. The income received from dung was similar to previous findings (Kumawat *et al.,* 2016). Kaware and Yadav (2014) reported about 8% return from dung due to less production of milk in animals they have studied. The return from sale of animals was meager (<1%) which is about half than return observed in buffalo farms and similar to cattle farms in Maharashtra (Kaware and Yadav, 2014). Male calves has little or no value as draft animal now a days, further, slaughter is strictly prohibited in Gujarat rendered male offspring useless and difficult to even disposed off. Gross total income was found higher in buffalo farms of SG was attributed with more numbers of buffaloes in herd (Ghule *et al.,* 2012). The results presented in Table 2 observed that average net profit in cattle farms of NG was ` 11.52 lakh, in buffalo farms of SG it was ` 20.60 lakh. It was higher than result of Ghule *et al.* (2012) who found that in similar sized farms annual net profit from large commercial dairy farms was ` 3.12 lakh. However, Mawase *et al.* (2018) revealed higher net profit in small size dairy farms. Further, overall average net returns / AU was ` 16 thousand. Buffalo farms having higher return per AU than cattle farms, which is, however, nonsignificant. It is less than earlier report of Jadav *et al.* (2016). Overall yearly net returns /labour was ` 2.35 lakh. It means the earning in farms were equal to monthly salary about 20000 per person worked in farm. It is positive finding for inspiration among entrepreneurs who want to start dairy farms. The overall net return per litre of milk produced was Rs 13.10 which was similar to findings of Ghule *et al.* (2012). It was higher in SG farms, but nonsignificant. The benefit cost ratio was 1:1.35 considerably

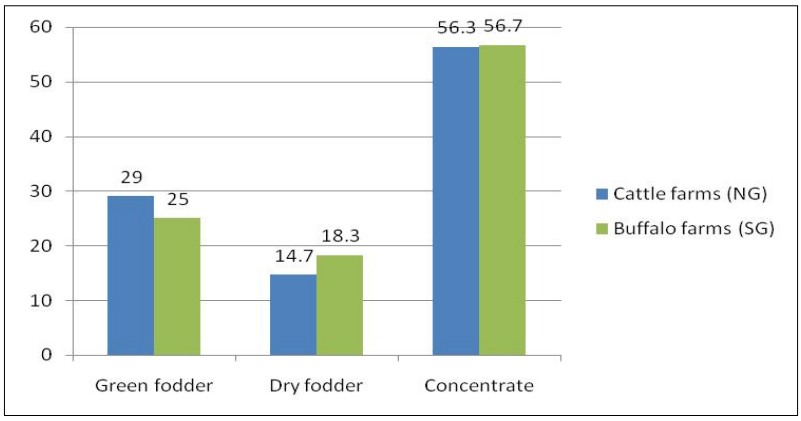

Fig 1: Relative expenditure (%) in feed and fodder in selected farms.

higher than previous findings (Patil *et al.* 2019). However, Kaware and Yadav (2014) revealed higher benefit cost ratio from in-housed dairy farms in western Maharashtra. Fetching of more milk selling price in buffalo farms of SG was reflected in more net return, return/AU, benefit cost ratio and return/liter milk.

CONCLUSION

It can be concluded that specialized dairy farm of crossbred cattle or buffaloes with herd strength 80-180 were profitable and viable enterprise in north and south Gujarat regions. It is capable to generate yearly Rs 16 thousand per adult unit which is equal to Rs. 16.06 lakh per year and Rs. 2.35 lakh per full time labour engaged yearly. The benefit cost ratio was also excellent in studied specialized dairy farms.

Cometing interests

Authors have declared that no competing interests exist.

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