



## Research Article

# PERSONAL AND SOCIO-ECONOMIC CHARACTERISTICS OF COMMERCIAL DAIRY FARMERS AND THEIR ASSOCIATION WITH ECONOMICS OF COMMERCIAL FARMS IN ARAVALLI DISTRICT OF GUJARAT

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**Abstract:** The present study was conducted in Aravalli district of Gujarat state to find out the personal and socio-economic status of the commercial dairy farmers and the variable influencing economics of milk production. The four talukas namely Modasa, Malpur, Bayad, Dhansura were selected purposively for the study. Total 40 commercial farmers who had at least 30 Adult livestock Unit at the time of investigation were selected as respondents. Study revealed that majority of farmers belonged to medium personal and socio-economic status. Result of multiple regression analysis indicated that extension participation, milk production and economic motivation had positive and significant effect on economics of milk production.

**Keywords:** Commercial dairy farm, Personal characteristic, Socio economic characteristic, Economics of milk production

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## Introduction

In India, dairy farming is an integral part of rural families which plays key role in the socio-economic development of farmers. It is one of the most important economic activities and provides supplementary income to most of the families in rural areas. In India dairy farming has traditionally been carried out on small scale often by landless farmers, marginal farmers and small farmers. But the demand for milk and milk product is increasing rapidly; commercial dairy farming has been taken up as an entrepreneurial activity on commercial basis as a chief occupation in rural as well as suburban centres wherein the demands of dairy products are high. The farmers put in all efforts to increase milk production capacities and adopt dairy farming on commercial lines to tap the market opportunities. As a result many commercial dairy farms have grown up in the country and the state. The personal and socio-economic status of commercial dairy farmers is very much important to judge the real position of commercial dairy farms and farmers and its impact on profitability of farms that reflects their livelihood. With the broad objective of economics of milk production of commercial dairy farms and the personal and socio-economic attributes of farmers influencing the economics of commercial dairy farms, the present study was undertaken.

## Methodology

The study was conducted in Aravalli district of Gujarat. The four Talukas namely Modasa, Malpur, Bayad and Dhansura were selected purposively. From each taluka, ten commercial dairy farms with at least 30 AU were selected by simple random sampling, thus making sample size of total 40 respondents. Ex-post facto research design was used for the study. The respondents were contacted individually and information was collected with the help of well-structured and pre-tested interview schedule.

To find out knowledge and adoption level of commercial dairy farmers, teachers made test was used. The data collected through interview schedule and direct observations were transferred on the master sheet. To describe personal and social-economical characteristics of the respondents and its impact on economics of farms the data were put to statistical tests *viz.*, Percentage, Arithmetic Mean, Standard deviation, *etc.* To ascertain the influence of independent variables on dependent variable, multiple regression analysis was carried out.

## Results and Discussion

### Personal and socio-economic characteristic of commercial dairy farmers

The major findings of personal and socio-economic characteristic of commercial dairy farmers are presented in [Table-1].

### Age

Age influences the behaviour of an individual by exposing to varied situations. The data presented in [Table-1] indicated that majority (85.00 percent) of the commercial dairy farm owners were in middle age group (31 to 55 years) and the average age of respondents was only 42 years. The probable reason might be that this age is considered to be an actively working age and so as the commercial dairy farm owners in this group would also have responsibilities of earning for their families, leading to findings that majority were in middle age group. This finding is supported by the findings of other scientists [4,12,21,16,27, 23, 24].

### Education

For commercial dairy farmer's Level of education increases their ability to acquire information and skill on innovations easily.

Table-1 Distribution of Personal and socio-economic characteristic of commercial dairy farmers, N=40

A. Independent variable					
A(a). Personal variables					
SN	Category	Mean	S.D.	Freq.	Per cent
1	Age				
	Young age (up to 30 years)	41.6	9.86	03	07.50
	Middle age (31 to 55 years)			34	85.00
	Old age (above 55 years)			03	07.50
2	Education				
	Illiterate	3.80	0.96	00	00.00
	Literate (can read and write 1-4 std.)			00	00.00
	Primary school to middle school (5-7std.)			02	05.00
	High school (8-10 std.)			16	40.00
	Higher Secondary School (11-12 std.)			11	27.50
	College level (graduate)			10	25.00
	Above graduation			01	02.50
	Occupation				
3	Commercial dairy farming	2.30	0.46	00	00.00
	Commercial dairy farming + Agriculture Farming			28	70.00
	Commercial dairy farming + Agriculture Farming + Any other			12	30.00
	4	Commercial dairy farming experience			
Short experience (up to 4 years)		8.20	5.38	05	12.50
Medium experience (in between 4 to 8 years)				17	42.50
Long experience (above 8 years)				18	45.00
5	Training received				
	No training received	0.1	0.30	36	90.00
	One training received			04	10.00
	More than one training received			00	00.00
6	Knowledge				
	Low level of knowledge	68.15	7.35	08	20.00
	Medium level of knowledge			25	62.50
	High level of knowledge			07	17.50
7	Adoption				
	Low level of adoption	71.40	9.88	09	22.50
	Medium level of adoption			25	62.50
	High level of adoption			06	15.00
8	Extension participation				
	Low extension participation	4.12	1.15	04	10.00
	Medium extension participation			30	75.00
	High extension participation			06	15.00
A(b). Socio-economic variables					
1	Herd size				
	Small herd size (Less than 40 AU)	62.63	53.39	15	37.50
	Medium herd size (40.1 - 80 AU)			19	47.50
	Large herd size (More than 80.1 AU)			06	15.00
2	Milk production				
	Small producers' group (Less than 200 lit/day)	337.56	222.02	10	25.00
	Medium producers' group (In between 200 - 400 lit/day)			21	52.50
	large producers' group (More than 400 lit/day)			09	22.50
3	Land holding				
	Landless labourer (No land)	6.65	4.65	00	00.00
	Marginal farmer (Up to 1hectare land)			01	2.50
	Small farmer (1.01 to 2hectare land)			02	5.00
	Medium farmer (2.01 to 4hectare land)			13	32.50
	Big farmer (Above 4 hectare land)			24	60.00
4	Economic motivation				
	Low economic motivation	22.80	2.57	07	17.50
	Medium economic motivation			27	67.50
	High economic motivation			06	15.00
B. Dependent variable					
1	Economics of milk production-Profitability (Per liter of milk production)				
	Low profitability (Less than Rs. 1.96)	4.96	3.34	05	12.50
	Medium profitability (Rs. 1.97 to 8.30)			30	75.00
	High profitability (above Rs. 8.30)			05	12.50

With the high literacy level, farmers would be more likely to aggressively participate in seeking knowledge and acquiring skills regarding the occupations-dairy cattle or buffalo management practices as a means of improving productivity of dairy animals and thereby increasing profitability. Education also enables the farmers to keep farm records on production and reproduction, so that they would be able to quantify their performance and lay down targets for improvement. Data in the above [Table-1] revealed that 100.00 percent commercial dairy farm owners were literate and no respondent was illiterate. This clearly indicated that among

the people engaged with commercial dairy farming, majority had higher level of education. Reflecting the fact that commercial dairy farming demands sufficient knowledge for its survival and development. The finding is in line with the findings reported by earlier workers [12,27,23]. However, it is in contradiction to the findings of other workers [3,4,13,20,16].

#### Occupation

It can be concluded from [Table-1] that all the commercial dairy farm owners were

engaged in commercial dairy farming along with agriculture farming. The possible reason might be that the commercial dairy farming emerged out from agriculture farming and/or mixed farming as an interdependent business enterprise. They also have continued agriculture and other business as a security point of view in case of failure of commercial dairy farming and might have found them as a potential source of additional income or vice versa. Furthermore, the respondents were highly literate and educated enough to get aware of market trends for running independent business, independent profession or engaging in service. These findings are essentially similar to the findings of several scientists [19,20,16,27,24].

### Commercial dairy farming experience

It is rightly quoted that "experience makes men perfect". Experience helps in developing maturity and ability to face and adjust varied situations and challenges. With experience, a commercial dairy farm owner could manage their resources and they would be more market vigilance. It is obvious from [Table-1] that majority of commercial dairy farm owners had long to medium experience in dairy farming. In North Gujarat, the livestock keeping or the dairy farming is a way of life in rural areas. The farmers' all family members are involved in routines of livestock activities since their adolescent stage. This would have helped them to run commercial dairy farm since their young age, resulting in medium to long experience in commercial dairy farming. The present finding gets support from the findings reported by earlier workers [12, 23]. However, these findings are not in line with other earlier workers [4, 20, 16,22]

### Training received

Training of any kind makes a person competitive enough to perform his job with more skill and better performance and it enables him to prepare himself to perform duty with better output. The data in [Table-1] show that large majority (90.00 percent) of the respondents did not receive any training pertaining to dairy farming before engaging themselves in commercial dairy farming. Even after their quite a long period in the business they hadn't thought of it. This may adversely affect profitability and sustainability of the farm. Their performance would have further been improved if they had been exposed to training. Khode, *et al* [12] observed that most of the respondents did not receive any training related to dairy farming. The findings are in line with the findings of one scientist [12]. However, it is contradiction to findings of other scientists [9,5,2,20].

### Knowledge

In the present study, knowledge refers to know-how about recommended animal husbandry practices possessed by the commercial dairy farm owners. Adequate knowledge of recommended animal husbandry practices is essential for successful management of the enterprise and to run the business in profit. It is clear from [Table-1] that majority (62.50 percent) of the commercial dairy farm owners had medium level of knowledge regarding recommended practices of animal husbandry. The mean score of knowledge was 68.15 out of total score of 86. It led to a conclusion that commercial dairy farm owner possesses high level of knowledge about scientific dairy farming practices which they may have acquired from different sources. Earlier workers also reported that majority of the respondents had medium level of knowledge of improved animal husbandry practices [4,8,12,20,16].

### Adoption

Adoption is a decision to make full use of an innovation as the best course of action available. Adoption in the present study was operationalized as improved animal husbandry practice actually put into practice by commercial dairy farm owners in their dairy farming. It is clear from [Table-1] that 62.50 per cent of commercial dairy farm owners had medium level of adoption. The study further revealed that out of 40 respondents, 32 respondents were using milking machine available in two types either 2 cups or 4 cups, 26 respondents were having chaff cutter, 12 respondents had silage pit and 15 respondents were using bypass fat in animal feed. The average adoption index was 71.40 per cent leading to a conclusion that most of the commercial dairy farm owners made extensive efforts

to strengthen their knowledge for success of the dairy farm business and had put quiet a good number of improved practices in to operation on their farms. This finding is supported by the findings of other scientists [10,4,20,16].

### Extension participation

Extension participation helps the farm owners to acquire detailed knowledge about scientific practices in animal husbandry occupation and to solve their problems with the help of extension personnel and experts from various fields. Sharing the experience by interacting with experts may increase confidence, which may result in high rate of adoption of advanced dairy farming technology that leads to higher profitability. It is apparent from the data in [Table-1] that vast majority (75.00 percent) of the commercial dairy farm owner had medium level of extension participation. The probable reason for this might be various effective transfer of technology approaches applied by extension functionaries of Sabar Dairy, Co-operative Milk Society, State Veterinary department and Veterinary college would have motivated the commercial dairy farm owners to participate in various extension activities. Bhatt [7], Mohammad [17], Patel [20], Adhiti Bhanotra, *et al.*[1] and Gopi, *et al.* [22] revealed similar findings that majority of the respondents had medium level of extension participation.

### Herd size

The interest and involvement of an individual in dairy farming increases with increase in number of animal holdings and vice versa. The data regarding herd size in terms of Adult Unit owned by the commercial dairy farm owners are presented in [Table-1]. The data show that 47.50 percent commercial dairy farm owners had medium sized herd (40.1-80 AU), followed by 37.50 percent commercial dairy farm owners who had small sized herd (less than 40 AU) and only 15.00 percent commercial dairy farm owners had large sized herd (More than 80.1 AU). This finding is similar to the findings of earlier workers [4,12,20,27], while it is contradicted the results of Bashir, *et al.* [6] and Mevada, [16].

### Milk production

Total milk production on commercial dairy farm is an important factor since it is directly concerned with profitability. As the herd size increases the milk production also increases and the profitability of commercial dairy farm may also increase. Milk contributes around 96.00 percent of total profitability of commercial dairy farm. It is clear from the data in [Table-1] that majority (52.50 percent) of commercial dairy farm owners were in medium producers' group. It is obvious from the [Table-1] that 75.00 percent commercial dairy owners have more than 200 litre milk production per day on their dairy farm. Raut and Sankhal, [23] revealed similar findings that majority of the medium dairy farmers were in medium producers' group.

### Size of land holding

Land holding is an important factor that determines the economic status and potentiality of commercial dairy farm owners for adoption of new practices in commercial dairy farming. It is believed that big land holder takes some calculative risk to manage dairy farming with better plan and utilize the available resources. Such possibility is less in case of small and marginal farmers. Data in table-1 indicate that 100.00 percent commercial dairy farm owners were landholders. Among the landholders, majority (60.00 percent) were in big farmer category. Probable reason may be that commercial dairy farming needs more capital and resources as well as also require risk taking ability which may not be within the capacity of small farmers, marginal farmers or land less labourers that resulted in more number of farmers in medium to big farmers category.

### Economic motivation

It indicates occupational success in terms of profit maximization and relative value an individual place on economic ends. The data pertaining to economic motivation of commercial dairy farm owners are presented in table-1. It was quite evident that majority (67.50 percent) of the respondents were in medium economic motivation group. In present scenario, majority of the people aspire quality life with better amenities.

Thus, they are always in search of opportunities for enhancing income which is reflected as 82.50 percent commercial dairy farm owners were in medium to high economic motivation group. These findings are in line with other scientists [25, 26]

### Economics of commercial dairy farm

In this study the economics of commercial dairy farm was referred to as the net profit per litre of milk production per day. It is apparent from table-1 that majority (75.00 percent) of respondents were in medium profitability group. The average profit gained by commercial dairy farm owners per litre of milk was Rs. 4. These findings are in line with Khode, *et al.* [12].

### Multiple regression analysis

To ascertain the influence of independent variables on dependent variable, multiple regression analysis was carried out. The findings are presented in [Table-2]

Table-2 Multiple regression analysis of respondents' economics of commercial dairy farms with independent variables

SN	Independent Variable	Regression coefficient	't' value
1	Age	-0.064	-1.420
2	Education	0.283	0.687
3	Occupation	0.932	0.991
4	Commercial dairy farming experience	-0.085	-1.098
5	Training received	2.278	1.677
6	Knowledge	0.006	0.077
7	Adoption	0.115	1.955
8	Extension participation	0.824	2.118*
9	Herd size	-0.037	-1.754
10	Milk production	0.012	2.423*
11	Size of land holding	-0.012	-0.134
12	Economic motivation	0.418	2.461*

Multiple R = 0.827, R<sup>2</sup> = 0.684

\* Significant at 0.05 level of probability \*\* Significant at 0.01 level of probability

In multiple regression analysis, all the 12 independent variables and one dependent variable were fitted to explain the variation in economics of commercial dairy farms. All the independent variables mentioned in [Table-2] explained as much as 68.40 percent of total variation in economics of commercial dairy farms. The 'F' value was found to be highly significant (probability <0.01). The unexplained variation of 31.60 percent may be due to factors beyond purview of the study. It is also revealed that the 't' values of three variables viz., economic motivation, extension participation and milk production were found to be positively significant (probability <0.05). It could be concluded that 68.40 percent variations in economics of commercial dairy farm was explained by a set of 12 independent variables taken together. Furthermore, out of 12 variables, three variables viz., economic motivation, extension participation and milk production had significant contribution in economics of commercial dairy farm. This study provided evidence about the important role played by these three significant variables in improving economics of commercial dairy farms. The present results are in line with the findings of earlier workers [14, 18, 11, 28, 15, 26].

### Conclusion

It is concluded from the present study that commercial dairy farmers of Aravalli district belonged to medium personal and socio-economic status, had high level of education that possibly led to better knowledge and adoption of scientific dairy farming, ultimately resulted in better profitability of the farm. Commercial dairy farmers earned average 18 percent return with a profit of Rs.4 per litre of milk production. Regression coefficient had clearly indicated that economic motivation, extension participation and milk production had exerted positive influence and were the crucial variables in the economics of commercial dairy farm. So, economic motivation may be utilized positively to further improve economics of commercial dairy farm. So as extension participation can also be strengthening and quantity of milk produced should also be increased to make commercial dairy farms more economically viable and self-sustained.

**Application of research:** In this study it was found that commercial dairy farm owner who had high extension participation also had high profitability. Farmer's extension participation and information seeking behaviour could be influenced by intensifying extension activities in villages. Therefore, there is a need to conduct extension activities like field trips, farmers day, trainings, cattle exhibitions, demonstrations, Krishimela to ensure higher extension participation which in turn will also amplify the profitability. The average return from all commercial dairy farms was found to be high, about 18.00 per cent. So, we would encourage small holder dairy farmers and new dairy farmers to start a commercial dairy farm.

**Research category:** Veterinary Science

### Abbreviations:

S.D. – Standard Deviation

Std.-Standard

Lit. – Litre

Freq. – Frequency

AU – Adult Unit

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### References

- [1] Adhiti Bhanotra, Jancy Gupta and Minu Singh (2016) *International Journal of Farm Sciences*, 6(1), 37-42.
- [2] Alam S.M. (2012) *Multivariate analysis of attitude of dairy farmers towards rearing crossbred cows in Purina district of Bihar*. M.V.Sc. Thesis (unpublished), National Dairy Research Institute, Karnal, Haryana.
- [3] Arora A. (2002) *To study the degree of adoption of improved animal husbandry practices among the livestock farmers of Tarai area of U.S.Nagar (Uttarakhand)*. M.V.Sc. Thesis (unpublished), GovindBallabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.
- [4] Ashwar B.K. (2005) *Determinants of attitude and adoption of improved animal husbandry practices of dairy farmers of North Gujarat*. Ph.D. Thesis (unpublished), Sardarkrushinagar Dantiwada Agricultural University, Dantiwada.
- [5] Baindha A. (2011) *Entrepreneurial behaviour of milk processors in Karnal district of Haryana*. M.V.Sc. Thesis (unpublished), National Dairy Research Institute, Karnal, Haryana.
- [6] Bashir B.P., Rajkamal P.J., Reesha G.P., Rajeev T.S. and Mercey K.A. (2011) *Journal of Indian Veterinary Association*, 9(2), 16-20.
- [7] Bhatt P.M. (2006) *Effect of mass media exposure on dairy farmers regarding animal husbandry practices*. Ph.D. Thesis (Unpublished). Anand Agricultural University, Anand.
- [8] Chaudhary H. and Panwar J.S. (2005) *Indian Journal of Social Research*, 46(3), 183-190.



- [9] Gaikwad (2010) *Dairy animal productivity enhancement programme in Ahmednagar district of Maharashtra: An exploratory study*. M.Sc. (Agri) Thesis (unpublished), National Dairy Research Institute, Karnal, Haryana.
- [10] Gour A.K. (2002) *Factors influencing adoption of some improved animal husbandry practices of dairying in Anand and Vadodara districts of Gujarat State*. Ph.D. Thesis (unpublished). Sardarkrushinagar Dantiwada Agricultural University, Dantiwada.
- [11] Kashfi H., Yazdani A.R., Bidabad F.S. and Latif M. (2012) *International Journal of Agricultural Management and Development*, 12(4),137-142.
- [12] Khode N.V., Sawarkar S.W., Banthia V.V., Nande M.P. and Basunathe V.K. (2009) *Indian Research Journal of Extension Education*, 9(2), 80-84.
- [13] Khokhar S. R. (2007) *A study on adoption of dairy innovations by dairy farm women in Anand district*, M.Sc. (Agri.) Thesis (unpublished), Anand Agricultural University, Anand.
- [14] Kumar R. and Tripathi, H. (2011) *Indian Research Journal of Extension Education*, 11(1), 32-38.
- [15] Masuku M. B. (2014) *Journal of Agricultural Studies*, 2(2), 132-146.
- [16] Mevada V. K. (2013) *The factors affecting the degree of adoption of improved animal husbandry practices among the tribal livestock farmers of the Banaskantha Gujarat*. M.V.Sc. Thesis (unpublished). Sardarkrushinagar Dantiwada Agricultural University, Dantiwada.
- [17] Mohammad A. (2006) *Study of perceived training needs of the dairy entrepreneurs of Murshidabad district (West Bengal)*. M.Sc. (Agri.) Thesis (unpublished). National Dairy Research Institute, Karnal (Haryana).
- [18] Nyekanyeka T. (2011) *Analysis of profitability and efficiency of improved and local smallholder dairy production: a case of Lilongwe milk shed area*. M. Sc.(Agricultural and applied economics). Thesis (published), University of Malawi, Bunda College.
- [19] Patel B. S. (2005) *A study of peasantry modernization in integrated tribal development project area of Dahod district of Gujarat state*. Ph.D. Thesis (unpublished), Anand Agricultural University, Anand.
- [20] Patel K.L. (2013) *Entrepreneurial behaviour of dairy farm women in Banaskantha district of North Gujarat*. M.V.Sc. Thesis (unpublished). Sardarkrushinagar Dantiwada Agricultural University, Dantiwada.
- [21] Patel K. S. (2011) *Privatization of extension services as perceived by the farmers, researchers and extension workers of Gujarat state*. Ph.D. Thesis (unpublished). Sardarkrushinagar Dantiwada Agricultural University, Dantiwada.
- [22] Gopi R., Narmatha N., Sakthivel K. M., Uma V. and Jothilakshmi M. (2017) *Asian Journal of Dairy and Food Research*, 36 (1), 16-20.
- [23] Raut A. A. and Sankhala G. (2014) *Indian Journal of Dairy Science*, 67(6), 535-540.
- [24] Rewendra Kumar Sahu, Shambharkar Y. B. and Sharma M. L. (2017) *Agriculture Update*, 12, 1688-1691.
- [25] Sarita, Singh S.P., Anika Malik., Monika Sharma and Rakesh Ahuja (2016) *International Journal of Science, Environment and Technology*, 5(5), 3466 – 3472
- [26] Sheikh Umair Minhaj, Khandi S.A., Rayees Ahmed Bafanda, Bharat Bhushan and Farzana Choudhary (2017) *International Journal of Current Microbiology and Applied Science*, 6(12), 2758-2770.
- [27] Tekale V.S., Bhalekar D.N. and Shaikh J.I. (2013) *International Journal of Extension Education*, 9, 32-36.
- [28] Winsten J.R., Parsons R.L. and Hanson J. D. (2012) *Agricultural and Resource Economics Review*, 29(2), 220-228.