

Returns from dairy farming: A critical analysis

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Abstract

A major percentage of India's population stays in rural India and is engaged in agriculture and dairy farming. But, the size of the farm held by a majority of these dairy farmers is small, and the number of animals that they rear for dairy is very few. This marginal holding of land and cattle has led to unprofitable and unattractive prospects of dairy farming, as the contribution from the same is meagre. However, the income generated and the return from the dairy farm is dependent upon multiple input and output factors. The current study is an attempt to examine the contribution of dairy income to total income, and the impact of various inputs on the returns from the dairy farm.

Keywords: dairy farming, landless, marginal and large farmers, regression

Introduction

India is a country of villages. 75% of the Indian population lives in the villages. According to the World Bank estimates ^[1] about 75 per cent of India's 940 million people are in 5.87 million villages, cultivating over 145 million hectares of cropland. Average farm size is about 1.66 hectares. Among 70 million rural households, 42 per cent operate up to 2 hectares and 37 per cent are landless households. These landless and small farmers have in their possession 53 per cent of the animals and produce 51 per cent of the milk.

India ranks First in Milk Production in the world, accounting for 18.5 Per Cent of World Production in 2015-16. It achieved an annual output of 146.3 million tonnes during 2014-15 ^[2]. The Indian Dairy Industry has achieved this strength of a producer-owned and professionally-managed cooperative system, despite the facts that a majority of dairy farmers are illiterate and run small, marginal operations and for many farmers, selling milk is their sole source of income.

Thus, small/marginal farmers and land less agricultural laborers play a very important role in milk production of the country. Dairy farming can also be taken up as a main occupation around big urban centres where the demand for milk is high. However, inadequate loan facility, lack of veterinary dispensary nearby, lack of skilled veterinary personal, non-existence of credit institutions in the locality, inadequate information sources are the major problems expressed by the farmers both in the urban and the rural areas. Moreover the quality of milk is low due to unscientific maintenance of the cattle shed and other reasons. The production of milk is also very low, in India because of feeding system and substandard methods of management.

The country's milk supply comes from millions of small producers, who are dispersed throughout the rural areas. All these farmers maintain an average herd of one or two

milch animals, comprising cows and/or buffaloes. Mostly ample labour and a small land base encourage farmers to practice dairying as an occupation subsidiary to agriculture. As income from crop production is seasonal, dairying provides stability which is year-round income and also an important economic incentive for the small farmer.

The Indian farmers still following primitive methods. They are small farmers, or laborers who work on someone else's land, and probably own no more than one or two cows or buffaloes. They are not adopting modern technology in dairy farming. To increase the milk production and to increase the quality of milk efforts are to be made to increase the production per unit of cow. If the production of milk is increased the income and employment of rural people will also increase.

Livestock production is the vital sector which action a major source of income to the impoverished rural households throughout the world. Livestock equip people with food, income, draught power and fertilizer and act as the major livelihood means of millions of our country, where crop farming faces challenges of land and finance. Dairying is acknowledged as the major instrument in bringing about socio-economic transformation of rural poor in our country.

Dairy farming involves a group of interaction of many factors that influence production and reproduction, environment and management. The major advantage of dairy farming is its minimum land dependency and resource flexibility.

Dairy farms producing milk have numerous sources of income: milk, cull cows, calves, crop sales, CCC milk assessment refund, cooperative dividends, property tax credit on income taxes, crop-related government payments and more. In addition, on most dairy farms the cost of producing crops sold for cash cannot be separated from the cost of producing crops fed to the dairy herd.

This large number of income sources makes determining the cost of producing milk more difficult than just dividing costs by the hundred weight of milk sold (Gary G. Frank) [3]. In general, the cost involved in maintaining a dairy unit with primary purpose of milk production are cost for feeds and fodders, veterinary aid, breeding of animals, insurance, labour and other overheads and other miscellaneous items etc.

In the words of a dairy farmer in Parth Shah’s research [4], “If the costs are closer to what I estimate, then it is likely that many of these animal owners will exit the business in the upcoming years. Interestingly, a couple of farmers commented on the fact that if one had to buy all the ingredients at the prevailing market price, they would not make any money”.

With this background, the current study is an attempt to focus on factors influencing the income and employment in rural areas.

The objectives of this study are

1. To get an insight into the incomes of rural dairy farmers.
2. To study the impact of various inputs on returns from dairy farming.

Hypotheses

1. H₀: The type of farmer and contribution of income from dairy farming to the total income are independent

H₁: The type of farmer and contribution of income from dairy farming to the total income are not independent

2. H₀: The inputs to the dairy farm (Number of milch animals (X₁), Average yield per cow per day (X₂), Total man days of labour during lactation (X₃) and Total input cost (X₄)) have no impact on the returns from the dairy (Y) farm.

H₁: The inputs to the dairy farm (Number of milch animals (X₁), Average yield per cow per day (X₂), Total man days of labour during lactation (X₃) and Total input cost (X₄)) have an impact on the returns from the dairy (Y) farm.

The data was collected from 350 respondents. But only 289 responses were retained based on completeness of information. MS excel and SPSS was used to analyze the data. The findings relating to the objectives are presented in the following pages.

Table 1: Total monthly income of the respondent's family * Type of farmer Cross tabulation

Total monthly income of the respondent's family	Type of farmer			Total
	Landless farmers	Marginal farmers	Large farmers	
Less than Rs. 15000	72	43	11	126
	57.1%	34.1%	8.7%	100.0%
Rs. 15000-Rs. 30000	25	38	42	105
	23.8%	36.2%	40.0%	100.0%
Greater than Rs. 30000	0	16	42	58
	.0%	27.6%	72.4%	100.0%
Total	97	97	95	289
	33.6%	33.6%	32.9%	100.0%

The table 1 indicates that most (57.1%) of those who earned less than Rs. 15000 a month were landless farmers, followed by the marginal farmers. Among those who earned Rs. 15000-Rs. 30000, 40% were large

farmers, and 36.2% were marginal farmers. 23.8% were landless farmers. Among those who earned greater than Rs. 30000, 72.4% were large farmers, while none were landless. This is a clear picture of the situation in India.

Table 2: Total monthly income of the respondent's family * size of the dairy farm Cross tabulation

Total monthly income of the respondent's family	Size of the dairy farm			Total
	Less than 2 milch animals	2-3 Milch animals	4 or more milch animals	
Less than Rs. 15000	61	56	9	126
	48.4%	44.4%	7.1%	100.0%
Rs. 15000-Rs. 30000	31	56	18	105
	29.5%	53.3%	17.1%	100.0%
Greater than Rs. 30000	16	29	13	58
	27.6%	50.0%	22.4%	100.0%
Total	108	141	40	289
	37.4%	48.8%	13.8%	100.0%

Table 2 indicates that most (48.4%) of those who earned less than Rs. 15000 a month had less than 2 milch animals, followed by 2-3 milch animals. Only 7.1% had 4 or more milch animals. Among those who earned Rs. 15000-Rs. 30000, 53.3% had 2-3 milch animals, 29.5%

had less than 2 milch animals, while 17.1% had 4 or more milch animals. Among those who earned greater than Rs. 30000, half of them owned 2-3 milch animals. 27.6% had less than 2 milch animals, while 22.4% had 4 or more milch animals in their dairy farm.

Results of Hypothesis 1

Table 3: Contribution of income from dairy farming to total income * Type of farmer Cross tabulation

Count		Type of farmer			Total
		Landless farmers	Marginal farmers	Large farmers	
Contribution of income from dairy farming to total income	Less than 25%	36	55	75	166
	25%-50%	55	32	18	105
	50%-75%	3	9	2	14
	Greater than 75%	3	1	0	4
Total		97	97	95	289

The above table indicates that in more than 90% of the cases, dairy contributes to less than 50% of the total earnings, with contribution being less than 25% in around 56% cases. It indicates that Dairy farming is not taken as

the primary occupation seriously. It is done as an additional source of earnings. It can also be seen that large farmers depend the least on dairy income with 75 respondents showing income less than 25% from Dairy.

Table 4: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.386 ^a	6	.000
Likelihood Ratio	44.091	6	.000
Linear-by-Linear Association	26.666	1	.000
N of Valid Cases	289		

A chi-square test of independence was performed to examine the relation between the type of farmers and the contribution of income from dairy farming to total income. The relation between these variables was highly significant, $\chi^2 (6, N = 289) = 43.386, p < 0.05$. We reject the null hypothesis that the type of farmer and contribution of income from dairy farming to the total income are independent and conclude that type of farmer is directly associated with the contribution of income from dairy farming to the total income.

Results of Hypothesis 2

The return from the dairy (Y) farm was treated as dependent variable.

The inputs-Number of milch animals (X₁), Average yield per cow per day (X₂), Total man days of labour during lactation (X₃) and Total input cost (X₄) were considered as independent variables.

The dependent and independent variables were calculated as follows:

$$Y = \text{Revenue from milk} + \text{Revenue from sale of manure} + \text{Value of calf}$$

$$X_1 = \text{number of cows} + \text{Number of buffaloes}$$

$$X_2 = \text{Average yield per cow per day (as given by the respondent)}$$

$$X_3 = \text{Number of males, females and children from the family} + \text{Number of males, females and children hired from outside}$$

(One day work of female was taken as equivalent to 0.67 man days (3 female = 2 male) and children (girl and boy) were considered equivalent to 0.5 man days (2 children = 1 man) (Ganga and Jain, 2012, pp.337-341) [5].

$$X_4 = \text{Cost incurred in fodder (dry and wet)} + \text{cost of concentrates} + \text{Cost of other inputs}$$

Standard multiple regression analysis was used to predict the returns from the dairy (Y), based on the influence of the following factors: Number of milch animals (X₁), Average yield per cow per day (X₂), Total man days of labour during lactation (X₃) and Total input cost (X₄)

The preliminary analyses ensured that there was no interference of the assumptions for normal distribution and multicollinearity (tables attached). The initial analysis also indicated that there were around 16 outliers in the data. These cases were removed in order to maintain normality, and regression analysis was run for 273 respondents.

"Tolerance" and "VIF" values for each independent variable were used as a check for multicollinearity. The "tolerance" is an indication of the percent of variance in the independent variable that cannot be accounted for by the other predictors, hence very small values indicate that an independent variable is redundant, and values that are less than 0.10 may merit further investigation. The VIF, which stands for *variance inflation factor*, is (1 / tolerance) and as a rule of thumb, a variable whose VIF values is greater than 10 may merit further investigation (which means that the current model is not a good fit). The "tolerance" and "VIF" values in this study are all quite acceptable (table attached).

Analysis was performed using IBM SPSS REGRESSION. Descriptive statistics, ANOVA, Regression coefficients and graphs (to check normality) can be found in Tables below.

Table 5: Anova

Descriptive Statistics			
	Mean	Std. Deviation	N
Returns per lactation period	66140.2839	33043.59547	273
Number of milch animals	1.9927	1.03609	273
Average yield per cow per day	4.4930	1.97420	273
Total man-days during lactation	106.1527	49.86034	273
Total input cost	16338.6667	7694.38180	273

The descriptive table shows that the returns per lactation period has a mean of 66140.2839, indicating that the dairy farmer earns around that amount in one lactation period by owning around 2 milch animals, which give an average yield of 4.5 litres of milk per cow per day with

106 man-days of labour during lactation and other input costs amounting to Rs. 16338.67. The graphs of residuals and probability are presented below.

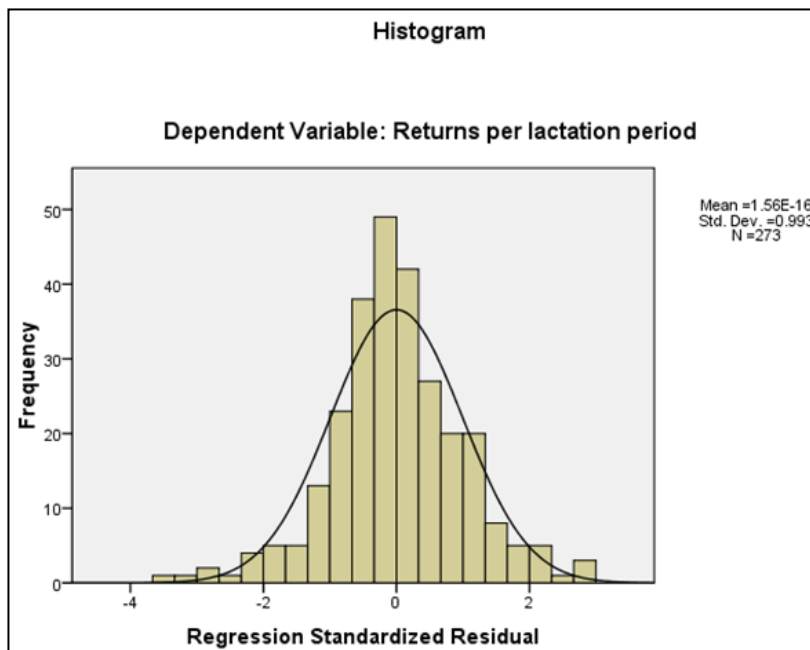


Fig 1: Histogram of Regression standardised residual

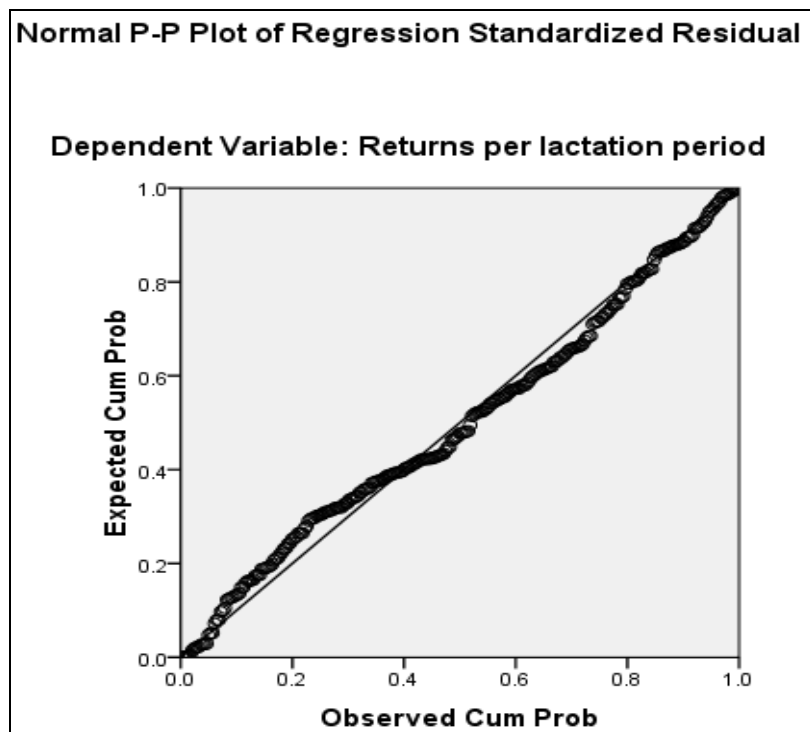


Fig 2: Normal P-P plot of regression standardized residual

The assumption of normality was met, as assessed by the histogram of the standardised residuals and P-P Plot.

Table 6: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.942 ^a	.887	.886	11168.52825	1.964
a. Predictors: (Constant), Total input cost, Average yield per cow per day, Total mandays during lactation, Number of Milch animals					
b. Dependent Variable: Returns per lactation period					

Table 7: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.636E11	4	6.589E10	528.239	.000 ^a
	Residual	3.343E10	268	1.247E8		
	Total	2.970E11	272			
a. Predictors: (Constant), Total input cost, Average yield per cow per day, Total man-days during lactation, Number of milch animals						
b. Dependent Variable: Returns per lactation period						

Table 8: Coefficients

Model		Coefficients										
		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF	
1	(Constant)	-40684.554	2647.875		-15.365	.000						
	Number of Milch animals	22654.816	1454.049	.710	15.580	.000	.738	.689	.319	.202	4.949	
	Average yield per cow per day	9263.439	402.120	.553	23.036	.000	.252	.815	.472	.728	1.374	
	Total man-days during lactation	16.793	19.193	.025	.875	.382	.628	.053	.018	.501	1.997	
	Total input cost	1.119	.172	.260	6.506	.000	.797	.369	.133	.262	3.817	

a. Dependent Variable: Returns per lactation period

There was no evidence of multicollinearity in any variable, as assessed by tolerance values greater than 0.1 and VIF values lesser than 10.

The multiple regression model with four predictors: Total input cost, Average yield per cow per day, Total man-days during lactation, Number of Milch animals statistically significantly predicted Returns per lactation period, $F(4, 273) = 528.239, p < .05$.

$R^2 = 0.887$ and adjusted $R^2 = .886$ indicated that these four predictor variables explained 88.7% of the variance. All four variables added statistically significantly to the prediction with $p < .05$.

Thus, the regression equation is given by

$$\text{Returns per lactation period}(Y) = -40684.554 + 22654.816 \text{Number of Milch animals } (X_1) + 9263.439 \text{ Average yield per cow per day } (X_2) + 16.793 \text{ Total man-days during lactation } (X_3) + 1.119 \text{ Total input cost } (X_4)$$

This means that all factors contribute positively to the Returns per lactation period

Thus we reject the null hypothesis

The inputs to the dairy farm (Number of Milch animals (X_1), Average yield per cow per day (X_2), Total man days of labour during lactation (X_3) and Total input cost (X_4)) have no impact on the returns from the dairy (Y) farm.

And accept the alternative hypothesis

The inputs to the dairy farm (Number of Milch animals (X_1), Average yield per cow per day (X_2), Total man days of labour during lactation (X_3) and Total input cost (X_4)) have an impact on the returns from the dairy (Y) farm.

Thus, it can be summarized that the after considering no interference of the assumptions for normal distribution and multi Collinearity, the initial analysis also indicated that there were around 16 outliers in the data. These cases were removed in order to maintain normality, and

regression analysis was run for 273 respondents. The results of ANOVA confirmed the hypothesis that: The inputs to the dairy farm (Number of Milch animals (X_1), Average yield per cow per day (X_2), Total man days of labour during lactation (X_3) and Total input cost (X_4)) contribute positively to the returns from the dairy (Y) farm per lactation period.

Conclusion

This study has made it clear that the returns from dairy farming are not so great, more so for landless and marginal farmers. Their monthly incomes are very low and also the number of Milch animals they own. This impacts their earnings. The dairy farmers have to take dairy farming on a large scale, by owning more animals and adopting modern and efficient methods in order to improve the productivity and thereby their incomes.

References

1. <http://www.keralaagriculture.gov.in/html/bankableagriprojects/ah%5Cdairyfarming.htm>
2. Press Information Bureau, Government of India-Ministry of Finance
3. Website: <http://pib.nic.in/newsite/PrintRelease.aspx?relid=136849>
4. <http://cdp.wisc.edu/pdf/fresults.pdf>
5. http://repository.upenn.edu/cgi/viewcontent.cgi?article=1096&context=wharton_research_scholars
6. Ganga and D.K. Jain, Impact of Dairy Financing Through Self-help Groups on Economic and Employment Generation in Jaipur District of Rajasthan. Indian J. Dairy Sci. 2012; 65(4):337-341.