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A Study on Prevailing Level of Milk Production in Pratapgarh District of Uttar Pradesh

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ABSTRACT

Keeping in view the importance of dairy enterprises as feed as well as industrial enterprises as feed as well as industrial material this study was conducted to find out the Prevailing Level of Milk Production in Pratapgarh district of Uttar Pradesh. One hundred respondents was selected from Sangipur Block of Pratapgarh district. The annual average maintenance cost of Indigenous cow, Cross-breed cow and buffalo was found to be 34768.56, 46828.81 and 44292.58, respectively. The annual return on an average from Indigenous cow, Cross-breed cow and Buffalo was found to be 44685.43,130201.22 and 75602.31, respectively. Per liter cost of milk production and break-even point was found to be an average of 16.78 rupees and 213.98, respectively. Return to scale of Indigenous cow, Cross breed cow and Buffalo was found to be 0.91, 1.91 and 1.05, respectively.

Keywords Livestock, Dairy, Break- even point, Production function analysis.

INTRODUCTION

When we talk about agriculture as a whole livestock comes in our mind because livestock production and agriculture are intrinsically linked. They both are dependent on the other, and both crucial for overall food security. For Indian economy the livestock sector is an important subsector of the agriculture. It acts as a supplementary and complementary enterprise. Livestock also serves as an insurance substitute, especially for poor rural households as it can easily be sold during time of distress.

Improvements in resource use efficiency will contribute to efficient economic conversion by way of higher productivity, lower cost per unit of output and sustainability. Utilising the resources in agriculture to the most optimal level possible, not only makes the agricultural value system more effective, but also makes the system efficient and sustainable (RCDFI 2017). When we talk about agriculture as a whole livestock comes in our mind because livestock production and agriculture are intrinsically linked.

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They both are dependent on the other, and both crucial for overall food security. For Indian economy the livestock sector is an important subsector of the agriculture. It acts as a supplementary and complementary enterprise. Livestock also serves as an insurance substitute, especially for poor rural households as it can easily be sold during time of distress.

Livestock constitutes 30% of total income from agriculture sector. This sector has experienced growth rate of 4.5% during 2000-01 to 2013-14. Maintaining the same growth rate in livestock sector in the coming years will raise total farm income by 10.8% in seven years and 16.6% in ten years period (Sirohi *et al*. 2017). Livestock employed 8.8% of the agricultural work force though it varied widely from 3% in North-Eastern states to 40- 48% in Punjab and Haryana (Dinani *et al*. 2018).

MATERIALS AND METHODS

The study was conducted in Pratapgarh district of Uttar Pradesh, the same name (Pratapgarh) district is also one of the 31 districts of Telangana. A list of all the 17 blocks in Pratapgarh district was arranged in ascending order according to the number of cattle reared in the region and one block namely Sangipur was purposively selected from the bottom A list of all the villages of the selected block was prepared and 5 villages out of them were selected randomly. A list of all the farmers involved in above mentioned enterprises of the selected villages was prepared. Further these farmers were arranged in ascending order on the basis of land holding and divided into three size groups viz., marginal farmers (below 1 ha), small farmers (1-2 ha) and medium (above 2 ha) during 2019-20. Samples of 20 respondents from each selected village were taken randomly, making a total sample of 100 farmers. The number of respondents in each size group of holding was in proportion to their number in the universe. Thus study was based on intensive inquiry of 100 farmers selected randomly from 5 villages of the Sangipur block of Pratapgarh district.

Data cover all the aspect viz., bovine population, milk production, milk marketing channel, different costs and returns of dairy enterprise.

Per liter cost of milk production

To work out the per liter cost of milk production the following formula was used-

$$\text{Per liter cost of milk} = \frac{\text{Total" expenditure" - Receipts other than from milk}}{\text{Litres of milk produced}}$$

(*Total expenditure i.e., cost-C)

Computation of income

Following farm management concepts were implied to compute the income level of the respondents

$$\text{Gross income} = (\text{Quantity of milk} \times \text{Price of milk}) + (\text{Quantity of dung} \times \text{Price of dung})$$

$$\text{Farm business income} = \text{Gross income} - \text{Cost A}$$

$$\text{Family labour income} = \text{Net profit} + \text{Value of family labor}$$

$$\text{Net income} = \text{Gross income} - \text{Cost } C_3$$

Estimation of break–even point

Break-even point in general terms is the point where there is no profit or loss i.e. the cost of production is equal to revenue generated. In case of milk the break-even level is that level of milk production where the farmers neither gain profit nor incur loss. To estimate the break-even level of milk production per animal per year, following formula was used.

$$\text{Break-even point} = \frac{\text{Total fixed cost per animal}}{\text{Price per liter of milk - Variable cost per liter of milk}}$$

Production function analysis

Production function shows the relationship between output and input used in the production process. In order to determine the efficiency of each variable used in the production of milk, the following Cobb-Douglas production function was fitted.

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} e^{\mu}$$

Where,
Y= Gross income per animal per annum
X_1= Cost of green and dry fodder per animal per annum
X_2= Cost of concentrates per animal per annum
X_3= Cost of health care per animal per annum
X_4= Cost of human labor per animal per annum
a = Intercept and
eμ= Random variable
b1, b2, b3 and b4 are regression coefficients
Log form of the Cobb Douglas was used for estimating the parameters of the function based on sample data. The formula used was-

$$\text{Log } Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + \ldots\ldots\ldots b_n \log X_n + \mu \log e.$$

Estimation of marginal value product

The marginal value product of inputs was estimated by following formula:

$$MVP\ (X_j) = b_j \frac{\bar{Y}}{\bar{X}_j}$$

Where,
MVP = Marginal value product
b_j = Production elasticity with respect to X_j
$\bar{Y}$ = Geometric mean of the dependent variable (Y)
$\bar{X}_j$ = Geometric mean value of Xj independent variable
j = 1,2,3,4 and others variable.

Significance tests

Reliability of the estimates was worked out using 't' test to ascertain whether the sample's production elasticity coefficient i.e. bj is significantly different from zero or not at some specified probability level

$$\text{'t' cal} = \frac{b_j}{\text{S.E. of } b_j}$$

If calculated 't' value was greater than tabulated 't' value at specified probability level at 'n-k-1' degree of freedom, bj was said to be statistically and significantly different from zero. Here 'k' is number of independent factors and 'n' is sample size.

RESULTS AND DISCUSSION

The study was conducted in Pratapgarh district of Uttar Pradesh. The necessary data were collected from the sample farmers spread over one block in the above-mentioned district. The present chapter is going to talk about the results and discussion for

Table 1. Per liter cost of milk production of sample households.

Particulars	Farm groups			All farms
	Marginal	Small	Medium	
		Indigenous cow		
Total cost (₹)	38531.33	37915.08	37942.02	38245.41
Returns from dung (₹)	3935.29	4128.26	4028.57	4041.84
Milk yield (liters)	1803.53	1745.65	1772.86	1779.38
Per liter cost (₹)	16.69	15.92	14.18	16.14
		Crossbred Cow		
Total cost (₹)	50147.68	45396.59	68927.84	51511.69
Returns from dung (₹)	3856.25	4100.00	4025.00	4031.08
Milk yield (liters)	4015.00	4120.68	5110.00	4311.74
Per liter cost (₹)	10.23	8.82	11.54	9.71
		Buffalo		
Total cost (₹)	50551.43	42740.90	67693.24	48721.85
Returns from dung (₹)	3840.79	4122.97	4122.50	3992.77
Milk yield (liters)	2247.63	2328.11	3376.25	2392.29
Per liter cost (₹)	18.48	15.02	16.84	16.78

Table 2. Break-even point of different households.

Particulars	Farm groups			(Per animal per annum) All farms
	Marginal	Small	Medium	
		Indigenous cow		
Milk yield (liters)	1803.53	1745.65	1772.86	1779.38
Variable cost (₹)	32273.14	30625.16	27884.15	31200.85
Fixed cost (₹)	2755.34	3834.09	6608.64	3567.71
Price/liters (₹)	29.29	30.31	31.96	31.10
Break-even point	241.79	300.33	407.15	263.00
		Crossbred cow		
Milk yield (liters)	4015.00	4120.68	5110.00	4311.74
Variable cost (₹)	42417.79	38575.18	59637.18	43960.04
Fixed cost (₹)	3171.01	2694.44	3024.15	2868.77
Price/liters (₹)	30.25	32.14	33.25	31.88
Break-even point	161.08	118.29	140.14	132.30
		Buffalo		
Milk yield (liters)	2247.63	2328.11	3376.25	2392.29
Fixed cost (₹)	40415.68	35595.51	54230.66	39598.50
Variable cost (₹)	5540.16	3259.85	7308.65	4694.09
Price/liters (₹)	37.59	38.37	39.5	38.49
Break-even point	282.54	141.24	311.83	213.98

various objectives. The chapter is arranged in different sub-section according to objectives of the study.

To find out the prevailing level of milk production in Pratapgarh district of Uttar Pradesh.

It can be concluded that for indigenous cow per liter cost of milk production incurred by marginal farmers was ₹16.69, while that of small and medium farmers it was ₹15.92 and ₹14.18. The average per liter cost of milk production for crossbred cow was ₹9.71. The cost incurred by marginal farmers to produce one liter of milk in case of crossbred cow was found to be ₹10.23, for small farmers it was ₹8.82 and for medium farmers it was ₹11.54. For buffalo the per liter cost of milk production was ₹18.48 for marginal farmers, ₹15.02 for small farmers and ₹16.84 for medium farmers (Table 1).

It is evident from the Table 2 that break-even point of indigenous cow was 241.79 liters, 300.33 liters and 407.15 liters for marginal, small and medium households, respectively. For crossbred cow the break-even point for marginal household was 161.08 liters while for small household it was 118.29 liters and for medium household it was 140.14 litres. In case of buffalo, break-even point was found to be 282.54 liters for marginal household, 141.24 liters for small household and 311.83 litres for medium household.

It is evident from the Table 3 that in case of indigenous cow the production elasticities of green and

Table 3. Production elasticity of returns from different bovine. Note: Figures in parentheses indicate standard error of corresponding elasticities. (*Significance at 5% level, **Significance at 1% level).

Farm groups	Independent variables				Returns to scale	R^2
	X1 Green + Dry fodder	X2 Concentrates	X3 Health care	X4 Labor		
Indigenous	0.33	0.29*	0.40	-0.11	0.91	0.89
Cow	(0.19)	(0.17)	(0.22)	(-0.09)		
Crossbred	0.41	0.39**	0.46**	-0.07	1.19	0.93
Cow	(0.21)	(0.13)	(0.16)	(-0.04)		
Buffalo	0.36	0.33**	0.45**	-0.09	1.05	0.94
	(0.20)	(0.11)	(0.15)	(-0.79)		

dry fodder, concentrates, healthcare and labor were 0.33, 0.29, 0.40 and -0.11, respectively. The returns to scale of indigenous cow were 0.91 which shows decreasing returns to scale i.e. returns from indigenous cow were less than the average money spent on them. The R^2 value of indigenous cow was 0.89 i.e. the considered independent variable explains 89.00 % of the variation in depending variable i.e. return from milk. The cost of concentrate at 5 % significance level was found to significantly influence the returns from indigenous cow. It was noticed that the elasticity of labor was negative. This shows that there was high degree of over employment in indigenous cow rearing in the study sample.

The production elasticity of green and dry fodder for crossbred cow was 0.41, while that of concentrate was 0.39, healthcare was 0.46 and labor was -0.07. The returns to scale of crossbred cow were 1.19 which shows increasing returns to scale i.e. returns from crossbred cow were more than the average money spent on them. The R^2 value of marginal household was 0.93 i.e. the considered independent variable explains 93.00 % of the variation in depending variable i.e. return from milk. In case of crossbred cow cost of concentrate and cost of health care at 1 % level of significance were found to be significant variables adding to the total returns. It was noticed that the elasticity of labor was negative. This shows that there was over employment in crossbred cow rearing in the study sample.

For buffalo the production elasticities of green and dry fodder was 0.36, concentrate was 0.33, healthcare was 0.45 and labor was -0.09. The returns to scale of buffalo were 1.05 which shows increasing returns to scale i.e. returns from buffalo were more than the average money spent on them.

Table 4. Marginal Value Productivity of Included Factors in Milk Production.

Farm Groups	Marginal Productivity of Input/Factors			
	X1Green + Dry Fodder	X2 Concentrates	X3Health Care	X4 Labour
Indigenous Cow	2.07	1.40	17.32	-0.52
Crossbred Cow	3.90	2.75	52.46	-1.30
Buffalo	2.73	1.87	31.20	-0.60

The R^2 value of marginal household was 0.94 i.e. the considered independent variable explains 94.00 % of the variation in depending variable i.e. return from milk. For buffalo the cost of concentrate and cost of healthcare at 1 % level of significance were found to significantly influence the returns. It was noticed that the elasticity of labor was negative. This shows that there was over employment in crossbred cow rearing in the study sample.

In case of indigenous cow the MVP of green and dry fodder was 2.07, concentrates was 1.40, healthcare was 17.32 and labor was -0.52 (Table 4). This signifies that by investing one addition rupee in independent variable the returns gained from them are equal to the respected MVP. In case of labor the negative MVP shows over employment and signifies that if labor investment is increased by one rupee there would be a loss of 0.52 rupees in returns *ceteris paribus*.

The MVP of green and dry fodder in case of crossbred cow was 3.90, concentrates was 2.75, healthcare was 52.46 and labor was -1.30. This signifies that by investing one addition rupee in independent variable the returns gained from them are equal to the respected MVP. In case of labor the negative MVP shows over employment and signifies that if labor investment is increased by one rupee there would be a loss of 1.30 rupees in returns *ceteris paribus*.

For buffalo, the MVP of green and dry fodder, concentrates, healthcare and labor were 2.73, 1.87, 31.20 and -0.6. This signifies that by investing one addition rupee in independent variable the returns gained from them are equal to the respected MVP. In case of labor the negative MVP shows over employment and signifies that if labor investment is increased by one rupee there would be a loss of 0.60 rupees in returns *ceteris paribus*.

CONCLUSION

The average per liter cost of milk production for crossbred cow was ₹9.71. The cost incurred by marginal farmers to produce one liter of milk in case of crossbred cow was found to be ₹10.23 and for small farmers it was ₹8.82 and for medium farmers

it was ₹11.54. For buffalo the per liter cost of milk production was ₹18.48 for marginal farmers, ₹15.02 for small farmers and ₹16.84 for medium farmers.

The break-even point analysis found that break-even point of indigenous cow was 241.79 liters, 300.33 liters and 407.15 liters for marginal small and medium households, respectively. For crossbred cow the break-even point for marginal household was 161.08 liters while for small household it was 118.29 liters and for medium household it was 140.14 liters. In case of buffalo, break-even point was found to be 282.54 liters for marginal household, 141.24 litres for small household and 311.83 liters for medium household.

The cobb douglas production function analysis showed that for indigenous cow the production elasticities of green and dry fodder, concentrates, healthcare and labor were 0.33, 0.29, 0.40 and -0.11, respectively. The returns to scale of indigenous cow was 0.91 which shows decreasing returns to scale i.e. returns from indigenous cow were less than the average money spent on them. The R^2 value of indigenous cow was 0.89 i.e. the considered independent variable explains 89.00 % of the variation in depending variable i.e. return from milk. It was noticed that the elasticity of labor was negative. This shows that there was high degree of over employment in indigenous cow rearing in the study sample.

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