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Economics of Milk Production Among Dairy Farmers (Gujjars) in Intermediate Zones of Jammu Region of J&K State

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Abstract

The study was undertaken in two intermediate zone districts namely Rajouri and Poonch of Jammu region. About 100 household was studied in different districts of Jammu region. Cobb-Douglas production function was used to study input-output relationship. Inputs like green fodder and concentrates had significant impact on milk production in both the districts. Further t statistic revealed that difference between MVP of green fodder and concentrate and its unit price was lower and significant in both district, which means that additional rupee spent on feeding of the these inputs to milking animal can increase the gross return.

Keywords: Input-output relation ship, resource use efficiency, milk production, dairy farmers (Gujjars-Tribals)

The study on economics of milk production becomes still more important for a country like India, where vast majority of the people are vegetarian. Milk is regarded complete of all the individual food stuffs containing the desired nutrient required for proper physical and mental development of mankind at all stages (Birader *et al*. 2012). Dairy has been inherent in Indian culture for centuries. Milk and milk products have always been an integral part of our food consumption habits. India is endowed with the largest livestock population in the world. It accounts for 57 per cent (9.7 crore) of the world's buffalo population and 15 per cent (18.52 crore) of cattle population (Anonymous, 2003). The milk production in India is growing at the rate of 4 per cent whereas in the world it is increasing at the rate of 1 per cent only, therefore. India is the world's largest milk producer touching the heights of 121 million tones milk production during 2010-11. At present India contributes 17 per cent of the total global milk production. Out of this, 55 per cent is contributed by buffalo milk (Anonymous, 2011).

India is known to posses many semi-nomadic pastoral communities, which are involved in rearing of indigenous breeds of cattle, buffaloes, goats and sheep. These pastoral communities inherit with them the rich cultural diversity and still majority of them are dependent on nature and natural resources for their livelihood.

In Jammu and Kashmir, the concentration of Gujjars is observed in the districts of Rajouri and Poonch, followed by, Ananatnag, Udhampur and Doda districts. But the Gujjars dealing in milk production are residing mostly in the Jammu region and major population was in the two intermediate zone districts Rajouri and Poonch (Anonymous, 2009).

The present investigation is an attempt to study the input output aspects of dairying of one of the well known pastoral communities- the Dairy Gujjars of intermediate zone of Jammu region.

Materials and Methods

Two districts from the intermediate zone of the Jammu division (locate between 1000 meters and 1500 meter above the mean sea level (MSL)) were selected purposively and from each district two blocks were also selected purposively. One village was selected purposively from each block, where the population of the Gujjars involved in dairy was highest. From each block 25 Gujjar dairy farmers were selected randomly to constitute a total sample size of 100 farmers. Primary data on input-output relationship and resource use efficiency in milk production was collected by personal interview method with the help of structured and pre-tested schedule. The Cobb-Douglas production function was found best suited for the present study, hence was preferred for further, economic analysis.

Cobb-Douglas $$Y = a\prod_{i=1}^{n} X_i^{b_i} e^{u}$$

Where, Y is output, X_i is the i^{th} input used, a = constant term,

- b_i = partial regression co-efficient of the i^{th} input to be estimated
- u = random error distributed normally with zero mean & constant variance.
- e = base of natural log.

In order to examine the resource use efficiency, the marginal value productivity of various inputs was worked out for significant regression coefficients in the estimated milk production function.

$$MVP_i = b_i \frac{\bar{Y}}{\bar{X}_i}$$

Where,

- $\bar{Y}$ = Geometric means of output Y
- $\bar{X}_i$ = Geometric means of i^{th} input
- b_i = Regression co-efficient associated with i^{th} input.

Further, t-statistic was used to test the statistical significance of the difference between the MVP of an input and its unit price.

Results and Discussion

Milk production is affected by several explanatory variables such as feed, labour, order and stage of lactation etc. Hence, the selection of suitable variables is very essential. The milk production function has been estimated for milking buffaloes in two subtropical districts of Jammu region using expenditure on feeds and fodders, labour cost and miscellaneous expenditure on dairying as explanatory variables. Cobb-Douglas function was found best fit keeping in view the significance, sign of explanatory variables and value of R^2 and simplicity, hence was preferred for further economic analysis. Yield of milk production was regressed on various factors of production viz green fodder, dry fodder, concentrate, labour and miscellaneous (veterinary charges, minor repairs of cattle sheds, electricity charges, utensils-buckets, milk canes and ropes, etc.). These variables were taken as the explanatory variables. In the mathematical model, value of milk was taken as dependable variable. The actual daily yield per animal per day in the previous day of visit was recorded. The same was multiplied by price realized by milk producer's households from the different agencies. It was done to transform the physical quantity to monetary value. The monetary value of fodders (green and dry fodder), concentrates, human labour and miscellaneous expenses per day per animal were considered.

In order to examine the resource use efficiency the Marginal Value Productivities (MVP) of inputs whose regression coefficients were found statistically significant in milk production function were compared with their acquisition cost i.e. Marginal factor cost (MFC). To test the significance of deviation of MVP of an input from its unit price, t-statistics was used. A significant higher difference of MVP of an input from its unit price shows that more of that input can be used to increase productivity, while a significant lower MVP of an input than its unit price indicates that the input is used in excess and needs curtailment.

Input-output relationship in milk production in Rajouri district

The perusal of the data as depicted in Table 1 revealed that production function for milk in Rajouri district with R^2 value at 0.881 was statistically significant meaning that 88.08 per cent of the total variation in milk production was explained by the independent or explanatory variables under consideration. The functional analysis for Rajouri production revealed that green fodder and concentrate were found to be significant at 1 per cent and 5 per cent level of probability, respectively. The value of regression coefficient for green fodder and concentrate was 0.425 and 0.336, respectively. The regression coefficient for dry fodder (0.016) and labour (0.125) to the milk production was, however, positive but not significant, whereas for miscellaneous variable it was negatively non-significant (-0.001).

Table 1: Estimated regression coefficients of various factors and their standard errors of milk production in Rajouri district

Variable	Regression coefficients	Standard error
Intercept	2.005**	0.504
Green fodder (X_1)	0.425**	0.131
Dry fodder (X_2)	0.016	0.044
Concentrate (X_3)	0.336**	0.044
Labour (X_4)	0.125	0.096
Miscellaneous (X_5)	-0.001	0.022
R^2 (%)	88.08**	

Note: ** Significant at 1 per cent level

In Rajouri district (Table 1), the value obtained for the regression coefficients of milk production showed that the values of regression coefficients of green fodder and concentrates were positive indicating thereby that one percent increase in the use of these inputs after keeping the use of all other inputs constant, the return to milk production could increase by 0.425 per cent in case of green fodder and 0.336 per cent in case of concentrates. These findings are supported by Desai (2005). The table further revealed that the regression coefficient for dry fodder and labour were positive but not significant, hence no interpretation comes out. The negative sign of coefficient of miscellaneous, though non-significant, indicated that use of miscellaneous items in milk production in Rajouri district might be greater than optimal.

Resource-use efficiency in milk production in Rajouri district

The marginal value productivity (MVP) of significant inputs for milk production in Rajouri district, their difference with unit price of respective inputs (MFC) and their t-statistics are given in Table 2. The marginal value productivity of green fodder and concentrate was positive with its value at 1.48 and 0.59, respectively. The difference between the marginal value product and marginal factor cost for concentrate was positive (0.21) and significant. In case of green fodder, the difference between the marginal value product and marginal factor cost was positive (0.77) but not significant.

In case of milk production in Rajouri district (Table 2) difference between MVP of green fodder and concentrate and their unit price were positive and significant for milk production which means that green fodder and concentrate were underutilized in this district. Thus an additional rupee one spent on feeding of the green fodder and concentrate to milking animal can increase the gross return by ₹ 2.48 and ₹ 1.59 per animal per day respectively. Mangesh (2003) and Singh (2008) had the similar views

Table 2: Resource-use efficiency on dairy farms in Rajouri district

Input statistics	Green fodder	Concentrate
MVP	2.48	1.59
Input pice (MFC)	1.00	1.00
Difference	1.48	0.59
S.E. of MVP	0.77	0.21
t- value	1.92***	2.81**

Note: ** Significant at 1 per cent level

*** Significant at 10 per cent level

Input-output relationship in milk production in Poonch district

The perusal of the data depicted in Table 3 revealed that production function for milk in Poonch district

with R^2 value at 0.896 was statistically significant meaning that 89.63 per cent of the total variation in milk production was explained by the independent or explanatory variables under consideration.

The functional analysis for Poonch district milk production revealed that green fodder and concentrate were found to be significant at 1 per cent and 5 per cent level of probability, respectively. The value of regression coefficient for green fodder and concentrate was 0.455 and 0.369, respectively. The regression coefficient for labour (0.126) and miscellaneous (0.011) to the milk production was, however, positive but not significant, whereas for green fodder it was negatively non-significant (-0.019).

The result of regression coefficients of milk production in Poonch district (Table 3) showed that the values of regression coefficients of green fodder and concentrates were positive indicating thereby that one percent increase in the use of these inputs after keeping the use of all other inputs constant, the return to milk production could increase 0.455 per cent in case of green fodder and 0.369 per cent in case of concentrates. These findings are also supported by Mangesh (2003). The table further revealed that the regression coefficient for labour and miscellaneous were positive but not significant, hence no interpretation comes out. The negative sign of coefficient of dry fodder, though non-significant, indicated that dry fodder use in milk production in Udhampur district might be greater than optimal.

Table 3: Estimated regression coefficients of various factors and their standard errors of milk production in Poonch district

Variable	Regression coefficients	Standard error
Intercept	1.925**	0.452
Green fodder (X_1)	0.455**	0.118
Dry fodder (X_2)	-0.019	0.023
Concentrate (X_3)	0.369**	0.041
Labour (X_4)	0.126	0.097
Miscellaneous (X_5)	0.011	0.020
R^2 (%)	89.63**	

Note: ** Significant at 1 per cent level

Resource-use efficiency in milk production in Poonch district

The marginal value productivity (MVP) of significant inputs for milk production in Poonch district, their difference with unit price of respective inputs (MFC) and their t-statistics are given in Table 4. The marginal value productivity of green fodder and concentrate was positive with its value at 3.05 and 1.20, respectively. The difference between the marginal value product and marginal factor cost for green fodder (1.69) and concentrate (0.97) were positive and significant.

In case of milk production in Poonch district (Table 4) difference between MVP of green fodder and concentrate and their unit price were positive and significant for milk production which means that green fodder and concentrate were underutilized in Poonch district. Thus an additional rupee one spent on feeding of the green fodder and concentrate to milking animal can increase the gross return by ₹ 2.69 and ₹ 1.97 per animal per day respectively. Mangesh (2003) and Singh (2008) had the similar views.

Table 4: Resource-use efficiency on dairy farms in Poonch district

Input statistics	Green fodder	Concentrate
MVP	2.69	1.97
Input price (MFC)	1.00	1.00
Difference	1.69	0.97
S.E. of MVP	0.70	0.22
t- value	2.41*	4.41**

Note: ** Significant at 1 per cent level

* Significant at 5 per cent level

Conclusion

It s concluded that the Inputs like green fodder and concentrates had significant impact on milk production in both the districts. Further t statistic revealed that difference between MVP of green fodder and concentrate and its unit price was lower and significant in both district, which means that additional rupee spent on feeding of the these inputs to milking animal can increase the gross return.

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