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RESEARCH ARTICLE :

Cost, returns and resource use efficiency in milk production by the members of milk producers co-operative societies in Dharwad district of Karnataka

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SUMMARY : An attempt has been made in this study to estimate the costs and returns in milk production and to analyze resource use efficiency in milk production in Dharwad district. Multistage sampling procedure was followed for selection of 120 sample Dairy farmers. The data pertained to the agricultural year 2014-15. Budgeting technique and Functional Analysis **(**Cobb-Douglas production function) were used to analyze the data. The total cost was Rs. 42342.85.The gross return obtained per animal per year was Rs. 52875.00 in which the sale of milk contributed the maximum share, the B:C ratio obtained was 1.25. The net returns per animal per year were Rs. 10532.15.The regression co-efficients of all the resources used in milk production were positive except grains (-0.113). In this production function the regression co-efficients of concentrates and green fodder were found to be statistically significant at 5 per cent level of significance and for other resources like grains and dry fodder they were found to be non-significant. The co-efficient of multiple determination (R^2) was 0.802 indicating good fit of the model. The returns to scale (0.818) were found to be decreasing. The MVP to MFC ratio indicated that the ratio was greater than unity for concentrates and green fodder. Ratio was less than unity and negative in grain cost (-1.21). And also in case of dry fodder the ratio was found to be less than unity (0.17). Thus, the results of the study brings that, the net returns in milk production can be increased by reducing the cost of inputs and farmers are advised to use of these resource optimally in production of milk.

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BACKGROUND AND OBJECTIVES

Dairying in India, in general, is closely interwoven as an integral part of agriculture, and it has also been recognized as an instrument of economic and social change especially of the weaker sections of the rural community. In dairying, a change that is taking place is shift from the maintenance of dairy animals on homegrown feed inputs to purchased feed inputs, due to the decreasing size of land holding and shrinking common property resource base. Cost plays an important role in portraying economic viability

of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Generally, a milk producer can increase his dairy income in two ways either by increasing the milk production or by reducing cost of milk production. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are getting does not cover cost of milk production.The dairy sub-sector occupied an important position in the agriculture economy of India, as milk is the second largest agriculture commodity contributing to the Gross National Product (GNP), next only to rice. Dairy sector in India provides regular employment to 9.8 million people in subsidiary status, which together constitutes 5 per cent workforce. The share of livestock output to the agriculture is 25 per cent and 6 per cent to the total GDP. Milk alone contributes Rs. 450 billion to the GNP of the country. The strength of Indian dairy sector lies in the fact that in spite of limited investment, it has shown consistent and sustainable growth (Kadirvel, 2002). Due to continuous and intensive cultivation of land for meeting the objective of food security, the natural resources are drastically degrading and degraded over time. Many a times, this process is irreversible. Hence, such an alarming loss/ degradation of natural resources must be prevented in future at all cost, otherwise the costs of recovery would be too high to imagine if left unattended. So far, studies conducted on Milk Producers Co-operative Societies in betterment of dairy farmer's economy have been few and far between. Analysis of Milk Producers Co-operative Societies in betterment of dairy farmer's economy is gaining lot of importance in recent years. Such a study would throw light on the problems associated with Milk Producers Co-operative Societies in betterment of dairy farmers' economy and enable the academicians and policy makers to formulate and implement appropriate policies for a balanced, integrated agricultural development.Keeping the above problems in view, it is planned to understand the various components of the cost and return structure in milk production and Resource use efficiency in milk production. In the process, the study would enlighten the potential solutions. Hence present study was an attempt in this direction with following specific objectives.1) To estimate the costs and returns in milk production and 2) To analyze resource use efficiency in milk production.

RESOURCES AND METHODS

Multistage sampling technique was adopted for selection of farmers for the study. Dharwad district under University of Agricultural Sciences Dharwad jurisdiction has the highest number of dairy cooperatives and is one of the livestock rearing district which has got favourable condition for production of different food and fodder crops. Hence Dharwad district was selected for the study. There are totally five taluks in Dharwad district, *viz.*, Dharwad, Hubballi, Kalaghatagi, Kundagol and Navalagund and all these taluks were selected for the study. Two villages from each selected taluk, where the Dairy farming is widely practiced were selected randomly for the study. From each selected village, 12 dairy farmers were selected randomly. Thus, the total sample size for the study was 120 farmers. The primary data on input use pattern, cost and returns in milk production was collected from the sample farmers. The data so collected pertained to the year 2014-15.To estimate the costs and returns in milk production by the members of milk producers co-operative societies. Budgeting technique was used and to analyze resource use efficiency in milk production in the region and Functional Analysis **(**Cobb-Douglas production function) was adopted.

The Cobb-Douglas type of production function was used to study the effect of various inputs on milk production on account of its well-known properties like its computational simplicity that justify its wide application in analysing production relations (Handerson and Quandt, 1971) and it being a homogenous function provided a scale factor enabling one to measure the returns to scale. The estimated regression co-efficients represented the production elasticities.

The form of Cobb-Douglas production function used in the present study is as follows.

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}e^{u} \quad (1)$$

where,

Y= Gross returns

a = Intercept

x_1= Concentrates

x_2= Grains

x_3= Dry fodder

x_4= Green fodder

e^u = Random error term

bi's = Output elasticity's of respective factor inputs, i = 1, 2, 3,4

The Cobb-Douglas production function was

converted into log linear form and parameters (co-efficients) were estimated by employing Ordinary Least Square Technique (OLS) as given below.

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + u \log e \quad (2)$$

The returns to scale were estimated directly by getting the sum of 'bi' co-efficients. The returns will be increasing, constant or diminishing based on whether value of summation of 'bi' is greater, equal or less than unity, respectively.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Cost and returns structure for milk production :

Cost involved in milk production (per animal/annum):

The costs incurred on various inputs in milk production are presented in Table 1 and are discussed here. Dairy farmers incur cost on inputs such as green fodder, dry fodder, concentrates, grains, veterinary medicines and labour charges. The results with respect to cost of various items of dairy farming are presented in Table 1.

The total variable cost incurred by dairy farmer per animal per year was Rs. 38421.77. The major items of variable costs incurred per animal were feed which includes green fodder, dry fodder, concentrates and grains. The cost incurred on grains contributed the maximum *i.e.* Rs. 11968.00 followed by concentrates cost (Rs. 8232.00). It is because of high milk productivity, the cross breed cow requires more concentrates as compared to other breeds. The cost incurred on dry fodder was Rs. 3384.60, for the green fodder it was Rs. 3170.00. The main objective of dairy farming is to maximize the milk production; this was fulfilled by feeding the animal with the green and dry fodder, grains as well as concentrates. Thus the feed charges formed more than half of the costs incurred in rearing.

The major fixed cost of dairy farm is depreciation on animals and depreciation on building. In case of dairy

Table 1 : Cost involved in milk production (per animal/annum)

Sr. No.	Particulars	Unit	Quantity/year	Cost/year (Rs.)
1.	Variable cost			
	Green fodder	kg	6340.00	3609.60
	Dry fodder	kg	2256.40	2945.00
	Concentrates	kg	686.00	8232.00
	Grains	kg	1408.00	11968.00
	Labour	MDs	32.50	7500.00
	Veterinary medicines	Rs.	-	1321.12
	Interest on working cost (8%)			2846.05
	Total variable cost	Rs.		38421.77
2.	Fixed cost			
	Depreciation on Buildings	Rs.		1850.00
	Depreciation on animals	Rs.		1666.66
	Interest on fixed cost (11.5%)			404.42
	Total fixed cost	Rs.		3921.08
	Total cost (I + II)	Rs.		42342.85

Table 2 : Returns from milk production (per animal/annum)

Sr. No.	Particulars	Unit	Quantity/year	Returns/year (Rs.)
1.	Sale of milk	kg	1565	39125.00
2.	Sale of manure	Tonn	3	3750.00
3.	Sale of young ones	Nos.	1	10000.00
	Gross returns	Rs.		52875.00
	Net returns	Rs.		10532.15
	B:C ratio			1.25

farm the cost incurred on depreciation of animals was Rs. 1666.66 and depreciation on building was Rs. 1850.00. Adding interest on these the total fixed cost was Rs. 3921.08 and the total cost was Rs. 42342.85.The expenditure on various inputs showed that the farmers have very little scope to reduce the variable costs by altering the breed of animal or feeding charges or veterinary medicines.

Returns from milk production (per animal/annum):

The returns from dairy farming are received by selling of different dairy outputs. The maximum returns are from the sale of milk, followed by sale of young ones and sale of manure. The details of the returns from the dairy farming by the sample farmers are presented in Table 2. It can be seen from the table that the main share of returns is from the sale of milk.

The gross return obtained from per animal per year was Rs. 52875.00, in which the sale of milk contributed the maximum share, the return from sale of milk was Rs. 39125.00, followed by Rs. 10000.00 obtained from sale of young ones and Rs. 3750.00 from sale of manure The B:C ratio obtained was 1.25.

The net returns per animal per year was Rs. 10532.15. This trend of net income with the dairy animal could be attributed mainly to the economies of scale on the large farms. The production efficiency of dairy animals has increased with selection of cross breed animal due to better milk production as compared to other dairy animal breeds. On the basis of B : C ratio, dairy farming has been found profitable. Thus, in nutshell, the dairy farming is a profitable venture and has a bright future in the study area for improving economic status of the farming community.

Resource use efficiency in milk production:

In order to maximize the profits from milk production, optimum use of resources is imperative. This was examined based on the productivity of resources used in the production activity. The technique of Cobb-Douglas production function was used to measure the resource use efficiency (allocative efficiency) in milk production in the study area (Table 3 and 4).

Cobb-Douglas production function estimates in milk production :

The regression co-efficients of various resources used in milk production presented in the Table 3 are discussed here. It is found that regression co-efficients of all resources were positive except grains (-0.113). In this production function the regression co-efficients of concentrates (0.610) and green fodder (0.200) were found to be statistically significant at 5 per cent level of significance and for other resources like grains and dry fodder they were found to be non-significant. A one per cent increase in cost of concentrates would increase gross returns by 0.61 per cent and one per cent increase in cost of green fodder would increase the gross returns by 0.20 per cent. Thus increase in allocation of resources to the green fodder and concentrates would increase the

Table 3 : Cobb-Douglas production function estimates

Sr. No.	Particulars	Parameters	Co-efficients
1.	Intercept	A	3.629
2.	Concentrates (x_1)	b1	0.611**
3.	Grains (x_2)	b2	-0.113
4.	Dry fodder (x_3)	b3	0.120
5.	Green fodder (x_4)	b4	0.200**
6.	Returns to scale		0.818
7.	R^2		0.802

Note: ** indicates significance of value at P=0.05

Table 4 : Allocative efficiency of resources in milk production

Sr. No.	Particulars	MVP	MFC	MVP:MFC
1.	Concentrates	2.94	1	2.94
2.	Grains	-1.21	1	-1.21
3.	Dry fodder	0.17	1	0.17
4.	Green fodder	1.35	1	1.35

returns.

The co-efficient of multiple determination (R^2) was 0.802 indicating good fit of the model. The returns to scale (0.818) were found to be decreasing.

Allocative efficiency of resources in milk production :

The resource use efficiency in milk production by the sample dairy farmers was analysed by calculating the MVP:MFC ratios. These ratios are presented in Table 4. The MVP to MFC ratios indicated that the ratio was greater than unity for concentrates and green fodder. This indicates that there is ample scope for increasing the use of these resources to increase the gross income of farmer. In other words effective management and timely use of these resources can increase gross income. The ratio was less than unity and negative in grain cost (-1.21) indicating that it has been over utilized and farmers need to be advised to reduce the use of this resource in production. And also in case of dry fodder the ratio was found to be less than unity (0.17) and hence, here also farmer need to be advised to reduce the use of this resource in production of milk. Aslam and Kaushik (2004) studied on economic analysis of buffalo dairy farmer. Bairaw *et al*. (2013) studied on economic appeariscal on livestock sector. More or less similar results were also obtained by Dixit *et al*. (2004); Ingrid and Guido (1999) and Priyandarshini (2015).

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