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Production Function Analysis of Non member of dairy Cooperative Society for Milch Buffalo in District Etawah of U.P.

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Abstract— *This study covered Cobb douglas production function, Tukey and Kramer analysis on Non members dairy cooperative society for milch Buffalo in district Etawah of U.P. In study researchers have taken post-stratified into Landless, Marginal, small, medium and large herd size categories. The study effect of various factors of production in (Rs.) like Feeding cost included (dry fodder + green fodder), expenditure of concentrate included (grain + khali + mineral material and chunni / choker) and miscellaneous expenses included (labor charge and fixed cost) on milk produced by the Buffalo of dairy cooperative society non members in annual in different categories of farmers. Further, the researchers have found out the comparative analysis of all the categories of dairy cooperative society non members. At last Tukey and Kramer test was applied on all the category of dairy cooperatives society members in milchBuffalo to get into the depth of the problem under investigation. This study is helpful to find out the elasticity of different factors of milk production and comparative analysis in all categories of members dairy cooperative society in milchBuffalo by Cob douglas production function analysis.*

Keywords— Elasticity of fodder, Elasticity of concentrate, Elasticity of miscellaneous, Return to scale, Classification Code: Agriculture Management.

I. INTRODUCTION

FAO predicting a 2% increase of world milk production from 805 million tonnes in 2015 to 827 million tons in 2020. Most of this increase is expected to come from developing countries such as India, China, Pakistan and Turkey, where it will be used to meet growing demand. The FAO forecasts also show some supply growth in Europe, Australia and the US, although at much lower rates while they predict New Zealand"s 2015 production to be roughly the same as last year. As consumption levels in developed countries such as Europe, Oceania and North America are unlikely increase fast enough to use up the additional milk supplies, this will lead to an increase in exports during 2015.

Uttar Pradesh is the highest milk producing state 23.33 Million Tonnes and hold a share of more than 17% in the total milk production in India. Apart from being the largest milk producer, Uttar Pradesh also has the largest number of cows and buffaloes, which is more than 1.8 Crore. in 2014-15. Kherigarh, Ponwar, Gangatiri and Kenkatha are some of the cow breeds found in Uttar Pradesh. These cow breeds are mainly found in Uttar Pradesh and known for producing milk in high quantity. Uttar Pradesh has more than 40 dairy cooperatives, which supply milk to many states in the country. On the basis of per capita milk consumption, Uttar Pradesh continued to remain the leading milk producer, followed by Rajasthan and Gujarat, and whereas, the per capita demand was maximum in Punjab followed by Haryana.

Milk is an essential as well as popular food of the Indian diet. It is highly nutritious and occupies 15 percent of the total consumed dietary protein in the industrialized world. Grossly speaking milk constitutes 3.1 percent protein 4.0 percent fat, 5.0 percent lactose 0.74 percent minerals and sizeable amount of vitamins, milk is also a close substitute for nonvegetarian food.

"As per an assessment made by the Planning Commission Report- 2012, the domestic demand for the milk by 2020-21 is expected to be 172.20 million tons. India would have sufficient production to meet such demand. The international body on the farm sector in its latest „Food Outlook" report also estimates global milk production in 2020 grow by 2% to 827 million tones. The National Dairy Development Board (NDDB) had published a report in "Perspective 2010" in which to enable the co-operatives to meet the new challenges of globalization and trade

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liberalization. Like other major dairying countries of the world, the Indian co-operatives are expected to play a predominant role in the dairy industry in future as well. However, India is in the meantime, attaining its past glory and is once again becoming "DoodhKaSagar". But what percentage of this Sagar is handled by the co-operatives is just a little over 7 per cent. Since liberalization of the dairy sector in 1991, established of the dairy factories in the country but their share of total milk is hardly 5 per cent. Therefore, the total share of the organized sector in India, both co-operatives as well as the private sector is hardly 12 per cent. Besides, growth in milk production is likely to continue at present * (Department of Animal Husbandry, Dairying& Fisheries, Ministry of Agriculture, GOI-2014-15) rate of 4.4 % in the near future. Who will handle this increment in milk production in India? Demand for milk at current rate of income growth is not sufficient; India needs to grow at-least 7 per cent per annum to full fill the demand. The study analyzed various factors of production in (Rs.) like Feeding cost included (dry fodder + green fodder), expenditure of Concentrate included (grain + khali + mineral material and chunni / choker) and miscellaneous expenses included (labor charge and fixed cost) on milk produced by the cow of dairy cooperative society members in annual in different categories of farmers i.e, landless, marginal, small, medium and large on the basis of land holding capacity. Analyses of Cobb Douglas production function, researchers find out elasticity of fodder, concentrate and miscellaneous factors of milk production. Further, the researchers have identified percentage of data variation on different category members of dairy cooperative society. At last Tukey and Kramer test was applied on all the category of dairy cooperatives society members in milch cow to get into the depth of the problem under investigation. This study is helpful to find out the comparative analysis in all categories of members dairy cooperative society in milch Cow.

"Etawah" in Uttar Pradesh is famous for its Bhadawari breeds of buffalo and Jamunapari breed of goats. The said breed of buffalo were also known for consuming less fodder relative to production of high fat content milk. However, all the milch animals such as buffalo, cow and goats are grazed in the ravines and the forest area between Jamuna and Chambal rivers of Etawah district of U.P. The numbers of milch livestock of Etawah district during 2012 were reported as total number of female adult cows 1, 10,825 total number of adult females' buffaloes 92065 and total female adult goats were 2, 41, 61.

II. REVIEW OF LITERATURE

Murithi, Festus Meme,(2002), study was motivated by the need to find means of increasing milk supply in Kenya in order to meet an expected rise in demand. The study was concerned with the efficiency of resource use in smallholder milk production. The major objective of the study was to determine whether tnere are possibilities of increasing milk production through re-allocation of the resources used in milk production~ The problems encountered by farmers involved in milk production were also examined. The data used in the study were collected from 60 smallholders who are members of five Dairy Co-operative Societies which are affiliated to the Meru Central Farmers Co-operative Union. A Cobb-Douglas milk production function was fitted using the inputs used in milk production. The results showed that concentrates significantly

Influenced milk yields. The test for efficiency of resource use revealed that there was inefficiency in the use concentrates. Profit maximization I~equires that the marginal value product of an input be equated to the price. If this condition is fulfilled in the study area with respect to concentrates, the average milk yeild per animal per year would increase by 73% above the current levels. An important conclusion of the study is that there could be substantial in milk output and consequently gains in farm profits if the amount of concentrates fed to the animals is increased above the cur-r-errt level s. It is recommended that:- (i) effot'ts be intensified to educate the benefits of increased feeding of concetrates to the (ii) animals, constraints which contribute to the unavailability of concentrates when farmers need them be removed, (iii) farmers be educated on how they can the excess animal feeds which is produced in the winter season to feed the animal and educated on how best season, they can utilize the farm by-products while they are of high nutrition value to feed the animals.

Sharma, P.K. & Singh, C.B. (1984), conducted a study in the intensive cattle development project and observed an increasing trend of human labor employment per household. The dairy enterprise on an average generated 250 days of employment on both category of beneficiary and non-beneficiary households . The family labor income of Rs.1076 obtained from cross bred cow was much higher than that of a buffalo and local cow. Further the beneficiary households recorded higher income from different types of milch animal as compared to that of non beneficiary households. Therefore, they concluded that the project has been able to generate additional gainful employment in the

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study area and thus it can go a long way in boosting up income and employment levels specially an small cattle holdings.

Sharma, P.K. & Singh, C.B. (1986), studied the impact of I.C.D.P. Karnal on production, consumption and marketed surplus of milk in rural Karnal. The study revealed that production of milk was relatively higher on the beneficiary households than that of nonbeneficiary households of cattle owners with rise in production of corresponding increase in milk being marketed by the beneficiary households. The overall marketed surplus of milk on beneficiary and non beneficiary households was about 44 and 28 per cent respectively. The project could, therefore be expected to provide a better source of income through milk production. Interestingly a positive impact of project was seen as consumption of milk. The per capita per day milk consumption of 729 and 623 gm on beneficiary and non beneficiary households respectively. It was much higher than the national average of 121 gm only

Hirevenkanagoudar, L.V. et .al., (1988), studied the impact of dairy development programmes of the Karnataka Dairy Development Cooperation (KDDC) on the selected economic aspects of small and marginal farmer and agricultural labours. The study revealed that over 56 per cent of KDDC beneficiaries were getting 50-75 per cent of their family income from dairy enterprises whereas, 60-87 per cent of non KDDC farmers getting 25 per cent of their income from dairy enterprises. All KDDC farmers were selling milk to dairy co-operative societies. Mostly small farmers, marginal farmers and agricultural labors in the KDDC programme and 60 per cent of the non KDDC category through that dairy co-operative societies were the best agencies for milk marketing. More than 64 per cent of KDDC farmers had repaid 75 per cent to 100 per cent of the dairy loan, whereas only 10-25 percent at nonKDDC farmer had repaid 75-100 per cent of their dairy loan.

Dass, B. et. al., (1990), studied performance of dairy co-operative. involved in production of dairy co-operative involved in production and distribution of milk in Tarai region of district Nainital (Uttar Pradesh) during the year 1986. The study revealed that the co-operative societies had a positive and significant impact on the size of milch breed, level of milk production and marketed surplus of milk per member household. The size of milch herd increased by 55 per cent, the level of milk production by 65 per cent and marketed surplus of milk by 72 per cent in the societies group as compared the non-societies group. The income generated through dairying was 30 per cent of the total cash income in the societies group as against 21 per cent in the non-societies group.

Jitendra, K. &Shankara, M. (1992), studied the impact of dairy co-operative and income and employment in chittordistrict,Andhra Pradesh. It was found that agricultural labour and non-agricultural labour earned more income from dairying than small farmers who were earned more in crop production. The employment created to members (121.5 days in area-I and 112.2 days in area-II) was significantly more compared in non-members (76 days in area-I and 53.5 days in area-II) in the study area. Thus, the dairy co-operative have contributed in generating more income and employment to the dairy farmers.

Prajneshu,(2008), the set of Cobb-Douglas production functions is usually fitted by first linear zing the models through logarithmic transformation and then applying the method of least squares. However, this procedure is valid only when the underlying assumption of multiplicative error-terms is justified. Unfortunately, this assumption is rarely satisfied in practice and accordingly, the results obtained are of doubtful nature. Further, nonlinear estimation procedures generally yield parameter estimates exhibiting extremely high correlations, implying thereby that the parameters are not estimated independently. In this paper, use of expected-value parameters has been highlighted and the advantages of their use have also been discussed. Finally, the developed methodology has been illustrated by applying it to the wheat yield time-series data of Punjab.

Venkatesh P. and Sangeetha V.,(2011), a study was conducted to examine the cost structure and resource use efficiency of dairy farms in the Madurai district of Tamil Nadu. The dairy farmers were selected by using multi stage random sampling technique. Tabular analysis and Cobb-Douglas production function were used in this study. Total costs per lactation per animal estimated were of the order of Rs.12776.09, Rs 11791.20 and Rs.12079.28 and returns per rupee of investment 0.78, 1.08 and 0.95 respectively on small, large and pooled farms. Feed cost was the higher input cost in dairy farming (61.6%). The cost of production milk per litre was less in case of large farms (Rs. 4.62) compared to small farms (Rs. 5.39). Results indicated the inverse relationship with the size and the herd of the total costs, due to economies of scale. Functional analysis showed barring human labour on small farms all the selected input variables such as green fodder, dry fodder, concentrates and health care were positive and significant

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impact on the production of milk indicating the potentiality of their further use.

Meena G. L. et.al.,(2012), study was undertaken in Alwar District of Rajasthan with the objectives to examine the input-output relationships and assess the resource use efficiency in milk production. The study covered 75 cooperative member milk producers and 75 non-cooperative member milk producers. The results of Cobb-Douglas production function revealed that concentrate had positive and significant influence on returns from buffalo milk across all the household categories for both the member and non-member groups. Green fodder and dry fodder were also influenced the returns from milk significantly across all the household categories for both the member and non-member groups with the sole exception of large category of non-member group. D_1 (winter) and D_2 (Rainy) dummy variables were found to be positive and statistically significant. The results of Chow's test clearly revealed that the production functions between member and non-member groups differed significantly. The results of the resource use efficiency revealed that green fodder was over-utilized in small and medium categories for both the member and non-member groups, dry fodder was over-utilized by medium category of member group, concentrate was over-utilized by only medium category of member group and by small & medium categories of non-member group while it was under-utilized by large category of non-member group and labour was over-utilized by only small category of member group.

Makwana D. Girish et.al.(2016), suggested the dairy sub-sector occupies an important place in agricultural economy of India. As milk is the second largest agricultural commodity in contributing to GNP. Currently, more than 80 % of the milk produced in the country is marketed by the unorganized sector (private organization) and less than 20 % is marketed by the organized sector. But, both organized and unorganized sector in the dairy industry of the district face a lot of constraints relating to production and marketing constraints as well as – infrastructural , technical , socio-psychological, economical with high or low severity to expansion of milk production in the district, availability of green fodder and concentrate , knowledge of balance feeding, irregular sale of milk ,lack of time of marketing, less knowledge about of marketing strategies, no or less provision for advance payment for milk by society or vendors, delay in payment by unorganized sector, in ability to market for value added products, transportation. Processing availability of veterinary facilities , lack of awareness of animal health care and training facilities for scientific dairying etc. facing by cooperative and non-cooperative members in Kheda district of Gujarat.

Mahida D. et.al.(2018),suggested thatdairying has been a prominent supplementary enterprise and regular source of income to the farmers. Indian dairy sector has progressed commendably well with seven-fold increase in milk production since independence, but progress in terms of yield per animal is still low which is quite unsustainable. Literature suggests two approaches for productivity growth viz., through technical progress and improved efficiency. The present study is an attempt to determine the factors affecting the technical efficiency of dairy farmers in Gujarat state with a special emphasis on the role of milk cooperatives. Multiple regression analysis and regression tree approach were used for arriving valid conclusions. Results indicated that socio-economic factors i.e. membership in dairy cooperative society, non-farm annual income, access to information, and herd size significantly influenced the technical efficiency of farmers. Dairy cooperatives provide several inputs in the form of dairying resources as well as technical information to the farmers which significantly influenced their efficiency. The study concludes with policy prescriptions for enhancing milk production and shift towards sustainable dairying.

III. RESEARCH METHDOLOGY

District Etawah milk producers' cooperative union was purposively selected from the state of Uttar Pradesh. Exhaustive lists of all the milk producers' cooperative societies in Etawah district milk producers' cooperative union were prepared. Researchers have selected randomly 150 non member of dairy cooperative society & 150 members of dairy cooperative society from 10 Villages of 2 blocks selected in district Etawah. All the milk producing household members and non members were classified into five categories, viz., Landless, Marginal, Small, Medium and Large farmers on the basis of land holding capability. Thus, in all, 300 households were interviewed during the year 2008-09. The primary data were collected to help of well structured pre-tested schedule by the personal inquiry method. The data collected were subjected to tabular analysis in order to study the comparative economics of milk production. Cobb-Douglas type Production Functional analysis was applied on cow milk production with three variables like-fodder, concentrate and miscellaneous of different categories landless, marginal , small, medium and large member farmers of dairy cooperative society.

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The study effect of various factors of production in (Rs.) in case of milk cooperative societies non members in annual in different categories.

$$y = a x_1^{b_1} x_2^{b_2} x_3^{b_3} \quad \ldots\ldots (1)$$

$$\log y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 \quad \ldots(2)$$

Where

Y = Production of milk in (Rs.)

X_1 = Feeding cost included (dry fodder + green fodder)

X_2 = Expenditure of Concentrate included (grain + khali + mineral material and chunni / choker)

X_3 = Miscellaneous expenses included a labor charge and fixed cost.

b_i = Respective elasticity's of milk production

a = constant

Having estimated the cost of milk production, it is desirable to ascertain the reliability of these fodder costs, concentrate cost and miscellaneous expanses estimates. The most commonly used "t" test was applied to ascertain whether the cost of milk is significantly different from zero or not at some specified probability level.

"t" cal=b_j / standard error of b_j..

If calculated "t" value is greater than the table value of "t" at a specified probability level and "n-k-1" degree freedom, bj is said to be statistically significant.

IV. RESULT AND DISCUSSION

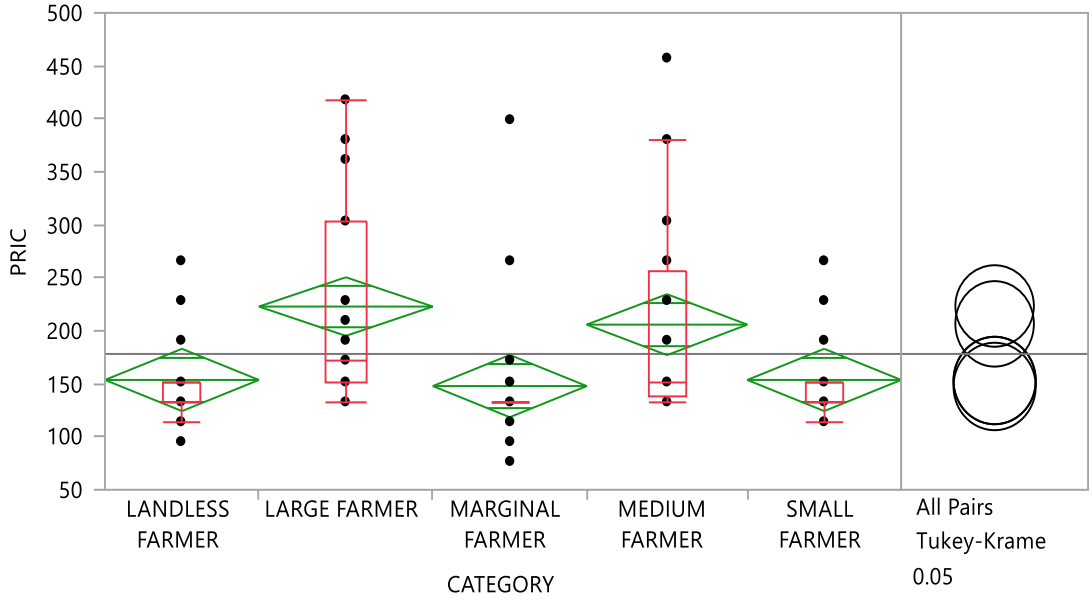
Summary of all categories of Non Member Dairy Cooperative Society for Milch Buffalo:

The analysis are revealed that mean of large farmers was observed Rs. 222.88 they were the most benefited in nonmember buffalo category followed by Medium farmers Rs. 205.88, Landless and Small farmers Rs.163.65 each and the least for Marginal farmer Rs.147.87.

Tukey test was applied to see to get in to the depth of the problem under investigation. This indicated that there is non-significance difference between Medium, Landless and Small farmers. At the last there is non-significance difference among Landless, Marginal and Small farmers for milch Buffalo. The other report indicated the fact that fact P value for Large farmer-Marginal farmer, Large farmer-Landless farmer, Large farmer-Small farmer and Medium farmer-Large farmer were observed significant at 5 % level of Probability (0.0032, 0.0081, 0.0081 and 0.0074) respectively

Summary of all categories of Non Members Dairy Cooperative Society for Milch Buffalo:

Oneway Analysis of PRICE by CATEGORY



Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
LANDLESS FARMER	95	114	133	133	152	228	266
LARGE FARMER	133	152	152	171	304	391.4	418
MARGINAL FARMER	76	102.6	133	133	133	228	399

Level	Minimum	10%	25%	Median	75%	90%	Maximum
MEDIUM FARMER	133	133	137.75	152	256.5	380	456
SMALL FARMER	114	133	133	133	152	250.8	266

OnewayAnova

Summary of Fit

Rsquare	0.171147
AdjRsquare	0.142065
Root Mean Square Error	71.13633
Mean of Response	178.1849
Observations (or Sum Wgts)	119

Means for OnewayAnova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
LANDLESS FARMER	23	153.652	14.833	124.27	183.04
LARGE FARMER	26	222.885	13.951	195.25	250.52
MARGINAL FARMER	23	147.870	14.833	118.49	177.25
MEDIUM FARMER	24	205.833	14.521	177.07	234.60
SMALL FARMER	23	153.652	14.833	124.27	183.04

Std Error uses a pooled estimate of error variance

Means Comparisons

Comparisons for all pairs using Tukey-Kramer HSD

Confidence Quantile

q*	Alpha
2.77192	0.05

LSD Threshold Matrix

Abs(Dif)-HSD	LARGE FARMER	MEDIUM FARMER	LANDLESS FARMER	SMALL FARMER	MARGINAL FARMER
LARGE FARMER	-54.689	-38.766	12.788	12.788	18.571
MEDIUM FARMER	-38.766	-56.922	-5.356	-5.356	0.426
LANDLESS FARMER	12.788	-5.356	-58.147	-58.147	-52.364
SMALL FARMER	12.788	-5.356	-58.147	-58.147	-52.364
MARGINAL FARMER	18.571	0.426	-52.364	-52.364	-58.147

Connecting Letters Report

Level				Mean
LARGE FARMER	A			222.88462
MEDIUM FARMER	A	B		205.83333
LANDLESS FARMER		B	C	153.65217
SMALL FARMER		B	C	153.65217
MARGINAL FARMER			C	147.86957

Levels not connected by same letter are significantly different.

Return to Scale for the Dairy Cooperative Society Non-Members (Buffalo):

Table

S.N.	Category	β_1	β_2	β_3	Total $\beta_1 + \beta_2 + \beta_3$	Return to Scale ≥1
1	Landless	1.13099	7.24889	1.737800	10.117	**≥1**
2	Marginal	101.2977	680.9261	-5394.2367	-4612.0129	≤1

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3	Small	-1.04399	28.6483	-1.42134	28.270	**≥1**
4	Medium	1.33266	502.157	-24.7964	478.693	**≥1**
5	Large	1.9923	19.000	-3.82199	17.17031	**≥1**

β_1= Elasticity of Fodder

β_2= Elasticity of Concentrate

β_3= Elasticity of Miscellaneous expanses

The above table no.31 reveal that Elasticity of milk production for all the five categories of non member farmers of dairy cooperative society in buffalo namely Landless, marginal, small, medium and large farmers. The last column indicates their economies of scale. Their respective value were observed 10.117, -4612.0129, 28.270,478.693 and 17.17031 respectively, out of these five categories namely marginal farmers were observed have decreasing return to scale with value -4612.0129.

The remaining four categories i.e., landless, small, medium and large exhibited increasing return to scale with the value of 10.117, 28.270, 478.693 and 17.17031 respectively. Analysis further reveals that return to scale was the highest for medium farmers followed by small, large and landless non member farmers of dairy cooperative society in case of buffalo.

V. CONCLUSION

Study reveal that Elasticity of milk production for all the five categories of non member farmers of dairy cooperative society in buffalo namely Landless, marginal, small, medium and large farmers. Out of these five categories namely marginal farmers only were observed have decreasing return to scale.

The remaining four categories i.e., landless, small, medium and large exhibited increasing return to scale and analysis further reveals that return to scale was the highest for medium farmers followed by small, large and landless nonmember farmers of dairy cooperative society in case of buffalo.

The analysis are revealed that mean of large farmers was observed highest they were the most benefited followed by Medium farmers, Landless and Small farmers and the least for Marginal farmer in nonmember of Buffalo category.

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