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AN ECONOMIC ANALYSIS OF BUFFALOS MILK PRODUCTION IN GUNTUR DISTRICT OF ANDHRA PRADESH- A REGRESSION ANALYSIS

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ABSTRACT----------
Production of milk is a complicated and multi-factorial process. Production of milk depend on various factors like feeding, breeding and management of animal. In addition, other parameters, including age at first calving, season of calving, stage of lactation, parity, quantity of human labour applied, animal's age, animal value and so on, have an effect on milk yield. Milk production is a function of a number of resource inputs and the understanding of which resource inputs have how much significance in milk production is crucial for a dairy farmer if he is to bring about desired changes in his farming at the micro level.The primary objective of this paper is to examine the economics of buffalo milk production in terms of output, productivity and factors influencing buffalo milk production in guntur district of andhra pradesh. A multi-stage random sampling methodology is adopted for the investigation. 300 respondents samples are drawn by using multi stage random technique. It was the analysis to conclude that the the estimates for both the full sample as well as the subsamples suggest that fodder used per animal per day, green fodder followed by concentrate used per animal per day and the age of the animal could explain 60 to 80 percent of the variations in the value of Milk Yield Per Day Per animal. Among the independent variables, dry fodder used per animal and green fodder used per animal per day are statistically significant with positive impact and in case of magnitude of impact on dependent variable concentrate used per animal per day is highest. But the predictor variable, Number of Labour hours required per day, did not have any significant effect on the dependent variable. The models for all samples are valid as can be seen from their respective p-values of the F statistic. The explanatory power of the model can be enhanced by introducing new explanatory variables but at the risk of introducing multicollinearity.

KEY WORDS*: Milk, Production, Andhra Pradesh, Regression analysis----------*

INTRODUCTION

The livestock sector has a significant contribution in the overall economic growth of the country. It ensures stability of family income in the entire country, especially in arid and semi-arid areas, and acts as a buffer against environmental shocks like drought and famine. More than three fourth humans own the livestock. Tenth Plan growth has been 3.6 per cent.The fruits of growth in this sector should be distributed fairly so as to raise the living standard of small and marginal farmers and the landless labourers and should reach poorly endowed regions like drought- hit, arid, and semi-arid regions of this country. This sector growth should lead to improvement of ambient particularly rural ambient.

The value of output of livestock and its products accounted for 4.11 per cent of total GDP during the year 2020-21 and 31.7 per cent of GDP from agriculture and allied activities. The figures for the year 2020-21 were 4.1 and 26.8 respectively. It houses 5.5 per cent of its workforce. The Eleventh Plan targets a 6-7 per cent annual average growth rate for the sector, with milk attaining a 5 per cent growth. When among Indian agriculture strong trauma was witnessed, ruminant livestock turned out to be the least affected sector (and in 2017-18 there was a record production of 108.5 million tonnes of milk, and 3.8 million tonnes of meat in 2020-21).

Nearly 75 per cent of the milk produced in the country is processed in the un-organised sector and the balance 25 per cent is divided equitably between the co-operative and private-dairy sectors. More than 1.33 lakh village level dairy co-operative societies organized into about 150 district level milk unions in 18 states, collect and process 25.1 million litres of milk a day creating milk products to the tune of 20 million litres a day. The Government's attention in dairy development is focused on promoting dairy activities in the non-Operation Flood areas with the objective of creating co-operative infrastructure, reviving defunct dairy co-operatives and federations, and providing infrastructure at the State level for production of quality milk and milk products.

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Livestock development is a significant source of income and employment in so rural areas. This sector provides employment to 5.5 per cent of the country's labour force comprising of small and marginal farmers, women and landless agricultural workers. It is also a by-product and an ancillary activity. Livestock plays a vital role in agriculture diversification and income generation, and is indispensable for food security.

Hippocrates ' the father of modern medi¬cine' once told in 400 BC "Let our food be our medicine and our medicine be our food ." In essence, nutraceuticals and functional foods are "food components with demonstrated physiological benefits or with an ability to reduce the risk of chronic disease beyond their inherent basic nutrition functions.

Dairy sector plays a pivotal role in income generation and employment for the small and marginal farmers and landless agriculture workers in rural India and it has significance in ensuring food security.

Dairy products and the dairy industry were important in the economy long ago. Dairying is considered as the important suitable means of augmenting the income of rural households particularly for small and marginal farmers, landless agricultural laborers of India. While the relatively low risk and variable price of milk relative to crop production activities means that this enterprise is somewhat risky, the constant income flow during the lactation period, coupled with the availability of family labour and crop residues makes cattle keeping especially appropriate for poor households.

Studies on Determination of milk production

The investigation of Sambasiva Rao (1985) revealed that dry fodder, green fodder and concentrates, numbers of lactations, labor hours and the age of the animals collectively accounted for more than 75 percent of the variation in milk yield among the marginal, small, medium, large and very large farming systems. It was further found that the marginal value product of labour was below its factor cost in all size classes excepting the marginal farms. The marginal value product of dry fodder was above unity for the marginal and large farmers and less than, one for the big farmers. For green fodder and concentrates the marginal rates are more than unity for all size classes. So it means that by using more green fodder and concentrates too there was a chance of raising the milk production.

Virender Singh and K.N. Rai(1998) have studied the production and marketing cost of Buffalo Milk in Haryana. The study revealed that feed and fodder cost constituted the largest share of the total cost of maintenance in Zone - II. The net profit per day of milch buffalo was very low due to high maintenance cost and low milk yield of milch buffalo on each herd-size group in each zone of the state. Net profit from milk production per buffalo per day was increasing in small size-group in both the zones most probably due to higher milk yield of milch buffaloes in the small size group as compared to medium and large herd size-group in both the zones. However, all the herd size groups in each zone were above breakeven. But most of farms were little over the break - even point, hence they were at the risk of going down with slightest variation in milk yield or prices/price of feed and fodder. The price of milk was the major variable impactingSEVERALmilk commerce volume considerably, in addition to the production scale. The formation of milk co-operatives in rural areas led to higher output of milk and higher marketed surplus.

Shantanu Kumar and Uma Sah (2000) discussed different parameters of dairy development. Parameters such as infantile density, cattle-buffaloes ratio, crossbreed population, number of cooperative societies and producer members per society and milk collection per society per day, A.I. routes per 1000 producible infantile population, cattle feed production and milch animal productivity were also identified as an aggravating variable which led to dissimilarity in dairy development across the regions. Surya Murthi (2001) has stated milk production can be enhanced considerably at a low cost through crossbreeding in cows and selective (upgrading) breeding in buffaloes, scientific and cost-effective feeding, controlling and preventing diseases, rational management, and assured market for milk. The measures of dairy farming to be improved will not only provide steady and regular employment but also guarantee income to the farmers and the landless labourers in the villages and this, in turn, raises the living standard of the rural people.

Vijay GorakhPatil (2010) analysed the cost of milk production at the dairy farm in case of Shirpur Tehsil in Dhule district of Maharashtra state. The investigator had purposively selected fifty dairy farmers from eight villages from Shirpur Tehsil, District Dhule. The questions on fixed and variable cost were posed. The purpose of the study is to find out the cost of milk production. The cost of milk production per farm was Rs 113.87, in which the variable cost 83.76 per cent (Rs 95.38) and the rest 16.24 per cent (Rs 18.49) was fixed cost. The cost of variable was the leading cost element in production. The feed (stuff) cost and the labor cost are two main elements out of the variable cost.

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OBJECTIVE OF THE PAPER

The objective of this paper is to study the economics of buffalo milk production and productivity and factors influencing milk production in the Guntur district of Andhra Pradesh.

METHODOLOGY

Data employed in this work are collected by sample sources which are carried out in the study area for the year 2024. The study adopts a multi-stage random sampling procedure. A multistage random technique is used in the selection of the 300 respondents. Stage one Guntur is split into four regions viz., Tenali Narasaraopeta and Gurazala, Guntur revenue division. One or two mandals will be chosen from each block E.g. Tadikonda and Ponnuru from Gunturrevenue division, Narasaraopeta and Satt bname=block_splitting aste 2napalli from Narasaraopetarevenue division, Gurazala and Macherla from Gurazalarevenue division and Repalle and Bhattiprolu from Tenalirevenue division. The criterion of the region is based on the maximum number of milch buffaloes of various types in the three years & above age group in a district, as per the Statistical Abstract Andhra Pradesh.

At the second stage two villageswere chosen from each mandal, namely in the Ravela and Pamulapadu from Tadikondamandal, Namburu and Doppalapudi from Ponnurumandal. Jonnalagadda and Ravipadu from Narasarapetamandal and Kantepudi and Dhullipalla from Sattenapallimandal, Modugula and Pulipadu from Gurazalamandal, Rayavaram and Thallapalli from Macherlamandal, Karumur and Peteru from Repallemandal and Addepali and Vellaturu from Bhattiprolumandal. A total of 16 villages are chosen and in each village, 20 sample homes are chosen. A total of 320 sample respondents are selected for the study. But 20 respondents not cooperate in the field work." So then sample responses of 300 are determined as size of sample.

RESULTS AND DISCUSSIONS

Milk synthesis is a multifactorial process and can be viewed as a composite function of many variables. Milk production is influenced by different elements such as animal feeding, breeding and management. Besides these, other elements such as age at first calving, season of calving, stage of lactation, number of lactations, human labor, age of animal, value of animal, etc. also have an effect on milk yield. The dairy farmer needs to know what inputs to resources have the greatest impact on milk production if he is to make beneficial alterations in his operation at the micro-level.

Towards this end there is an effort in this section to analyze the average milk yields of buffaloes and the inputs by different class of cultivators in the region, the determinants i.e. the extent of co-relation between milk production and the relative significance of factors, and the inputs in the production of milk. The average milk yield was 4.50 litro of milk per day per animal on an average. The research also investigates the relative contribution of various inputs to milk production. The data show that green fodder and concentrates are vital inputs in case of all type of farms, and these are the most capital intensive inputs. For this Milk Production function technique is adopted as analytical tool to evaluate the input contributions in milk production. In the analysis of production functions, selection and definition of the variables are very important. The fitted model will be biased if a relevant variable is left out or if an irrelevant variable is included. As Far as management is concerned, human labour hours (family and hired both) devoted to the animal for its upkeep is used as proxy. As far as feeds are concerned, green fodder, dry fodder and concentrates are taken up to the analysis. The number of lactations, age of the animal and value of the animal are taken as the determinants of milk yield among the other variables while all other variables are excluded from the analysis for want of data and measurement problems.

Specification of the Variables

Milk Yield

Proper care has been taken in the collection of data on milk yield. The milk yield data are collected at four 15-day quarters per year. So all in all we have 460 observations. The milk yield is multiplied with the corresponding market prices (The price is not constant) and the weighted mean of these 460 observations is taken.

Green Fodder

The ordinary green fodder were local grass, Lucerance, Jowar, guinea grass, bajra, Rhodes grass, sugarcane tops etc. but in nearly all the cases the animals were fed with local grass, pillipesara, jute. As a result, in the absence of a conversion factor (TDN Equivalent) the amount of green fodder fed to the animal (own or purchase) in value terms is considered as the variable, whereas in case of home grown grass, the value of the grass is imputed.

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Dry Fodder

The Dry Fodder is bad in quality but it is a good item of feed. It consists of paddy straw, wheat straw, jowar straw, bajra, ragi straw, kadbi, lucerne hay, local grass hay, pulses plant residues, groundnut plant residues. But it has also been witnessed that in the study area paddy straw; bajra straw, jowar straw, horse gram straw and jute straw can be fed to animals. Since they are all of similar metabolic make-up, they are not converted to TDN equivalent. The quantity of fodder (in value terms) fed to an individual animal per day is also used as a regressor on milk production. For home grown fodder, the value of the fodder is imputed.

Concentrates

Concentrate feeds are very important for increasing milk yield, as animals cannot obtain adequate nutrients for growth and production from fodder alone. Among the common concentrate feeds are ricebran, wheat bran, rice husk, pulses husk, groundnut cake, gingelly cake, cotton seed, mustard seed, broken rice,bajra grain, maize grain, jowar grain, gold mohur and vijaya feed etc.

Labour Hours

Observing cattle also has a significant influence on milk output. It is well known that feeding and management are the basic inputs to enhance the production potential of animals. As management matters animal maintenance require higher number of labor whether family or hired. This variable captures the time taken to bring fodder from field, chaffing, feeding the animals, milking the animals, cleaning the cattleshed etc. When labour is employed at an aggregate level, it is allocated to the animals in the herd on the basis of the quality of feed given to them.

Age of Animal

Age of animal affects the yield of milk greatly. It is a common knowledge that with increasing age of an animal, the milk production increases in each succeeding lactation upto certain age and after that it declines. The age of animal is given in this function in which it is in lactation.

Determinants of Milk Yield

The following is the model used for determination of the factors influencing milk yield:

$Y = f(Xi, X2, X3 , X4 , Xs)$

where

Y = Milk Yield per Day per Animal(Rs.)
Xi = Fodder used per animal per day (in Rs)
X2 = Green fodder used per animal per day (in Rs)
X3 = Concentrate used per animal per day (in Rs)
X4 = No of Labour hours required per day
X5 = Age of animal (in Years)

The corresponding MLR Model to be estimated is given by:

$Y = \ln + \beta 1 \ln X1 + \beta 2 \text{In} X2 + \beta 3 \ln X3 + \beta 4 \ln X4 + \beta 5 \ln X5 \ldots\ldots\ldots + \beta n \ln Xn + \mu - U$

Where a is the intercept, β1, β2, β3, β4, β5 are regression coefficients to be estimated, and e is an error term.
The above mentioned multiple linear regression model is estimated by OLS for the individual villages in addition to the full sample. Since potential multicollinearity problem may exist, the correlation matrix of independent variables is presented in (Table - 7.13), it shows that there is no significant correlation between independent variables, so it is feasible to use OLS to estimate the effect of each independent variable on dependent variable. However, graphical inspection of OLS residuals and White's test suggests that the presence of heteroscedasticity in the OLS regression. Hence, it is appropriate to use the OLS method with the heteroscedasticity-consistent covariance matrix estimator to estimate the model. The results of the regression are reported below and the drawn inference is discussed thereafter.

Heteroscedasticity -corrected OLS-All farmers

Regression results of the full sample are reported in table 1 and 2. It is evident from the results that the fit was able to capture about 66 percent of the total variation in the dependent variable. For milk yield (Y) all independent variables also had statistically significant positive effect except number of labour hours needed per day (X4). The significance of the model is confirmed by the value of F statistic. Of the independent variables, concentrates consumed per animal per day (X3) was the strongest significant positive influence on milk yield. In terms of magnitude, age of animal has largest effect on milk yield. Also the green fodder used per animal per day (X2) and the two fodders used per animal per day (Xi) exert strong positive influence on milk yield as established by positive sign of the coefficient. But number of labor hours spent per day (X4) has no significant influence on the dependent variable.These findings are consistent with the findings of previous studies.

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Table-1 Correlation Coefficients

	X1	X2	X3	X4	X1
X1	1.000	0.06660	0.1719	-0.0401	0.1153
X2		1.0000	0.1975	0.1165	0.0708
X3			1.0000	-0.820	0.0749
X4				1.0000	0.0048
X5					1.0000

Source: primary data
Using the observations 1 - 300
Under the null hypothesis that the variables are correlated
5% critical value (two-tailed) = 0.0914 for n = 300

Table -2
Regression Coefficients—all farms

Independent Variables	coefficient error	Standard	t-ratio	p-value
Constant	144.601	16.21	8.917	0.000***
X1	0.592	0.17	3.383	0.000***
X2	0.191	0.08	2.313	0.021***
X3	0.963	0.22	4.325	0.000***
X4	2.400	1.64	1.458	0.145
X5	5.09	2.06	2.462	0.0142***

Source: Primary data
No of observations (n = 300)
Dependent variable: Y
** Indicates significant at 5% level,
*** Indicates significance at 1% level.
Statistics based on the weighted data:

R-squared	0.67522	Adjusted R-squared	0.665041
F(5, 454)	7.38	P-value(F)	0.000

Excluding the constant, p-value is highest for (X4)

Heteroscedasticity - corrected OLS:

The above specified model results applies well for data on Small farmers containing 140 observations. The value of adjusted R-squared shows that about 79 percent of the variation in dependent variable is explained by the independent variables of the model. The value of F statistic confirms the overall significance of the model. All the explanatory variables except animal's age (X5) have positive and significant effect on milk yield. Of the input variables, Concentrate used per day {X3) was the most significant statistically, and in terms of the size of its effect, number of labour hours required per day (X4) is the most important factor. Green fodder and other fodders used are also have positive effect on milk in animals.

Table- 3
Regression Coefficient of Small farmers

Independent Variables	coefficient error	Standard	t-ratio	p-value
Constant	81.13	4.14	19.59	0.000***
X1	0.14	0.062	2.38	0.028***
X2	0.25	0.044	5.72	0.000***
X3	0.51	0.042	16.20	0.000***
X4	1.34	0.45	3.54	0.002***
X5	0.54	0.64	0.98	0.323

Source: primary data
Using Sampling observations for small farmers (n = 140)
Dependent variable: Y
*** Indicates significance at 1% level
Excluding the constant, p-value is highest for variable (X5)

Statistics based on the weighted data:

R-squared	0.902	Adjusted R-squared	0.894
F(5,145)	105.11	P-value(F)	0.000

Excluding the constant, p-value is highest for (X5)

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Heteroscedasticity -corrected OLS

The stated model has a fair fit for the medium farmers data with the size of sample being 125. The model's explanatory variables accounted for approximately 62 percent of the variation in animal's milk yield. Fodder (Xi), green fodder (X2), concentrate (X3) and milk yield are also significantly and positively related. I earlier results, the number of labour hours required per day (X4) is not significant in relation to dairy production As milk yield. According to the regression result, Age of animal (X5) appears to have a significant positive effect on milk yield.Even though the model did moderately explain the variation in dependent variable the overall model fit is high with p-value from F Statistics.

Table –4 Regression Coefficient of Medium farmers

Independent Variables	coefficient error	Standard	t-ratio	p-value
Constant	91.72	4.96	21.63	0.008***
X1	0.340	0.10	2.65	0.009***
X2	0.24	0.05	2.6	0.000***
X3	0.387	0.05	5.27	0.000***
X4	0.730	0.49	2.23	0.214***
X5	0.906	0.43	3.32	0.033**

Source: primary data

Using Sampling observations for medium farmers (n = 125)
Dependent variable: Y
** Indicates significance at 5% level
*** Indicates significance at 1% level
Excluding the constant, p-value is highest for variable (X5)
Statistics based on the original data:

R-squared	0.536624	Adjusted R-squared	0.620
F(5,100)	7.23	P-value(F)	0.000

Excluding the constant, p-value is highest for (X1)

Heteroscedasticity - corrected OLS: Large farmers

The adjusted R squared value being around 68 percent and the F statistic being highly significant indicate that the model the large farmer resulting in 35 observations is not a bad fit, though. For this sample, too, there are fodder (Xi), green fodder (X2) and concentrate used (X3) as the major explanatory variables for milk yield and concentrate used per animal (X3) is the single most dominating factor, as is apparent from the size of the coefficient. Milk yield is not affected significantly by both the number of hours needed per day (X4) and the age of animal (X5).

Table - 5
Regression Coefficients of Large farmers

Independent Variables	coefficient error	Standard	t-ratio	p-value
Constant	105.93	3.35	24.45	0.000***
X1	0.19	0.06	1.48	0.022**
X2	0.08	0.06	1.72	0.07
X3	0.57	0.16	3.78	0.000***
X4	0.99	0.75	1.33	0.189
X5	1.85	0.70	2.67	0.009***

Source: Primary data

using sampling observations for large farmers (n = 35)
Dependent variable: Y
** Indicates significant at 5% level,
*** Indicates significance at 1% level

Statistics based on the weighted data:

R-squared	0.69845	Adjusted R-squared	0.67870
F(5,109)	9.312705	P-value(F)	0.000

Excluding the constant, p-value is highest for (X5)

SUMMARY

The process of milking is intricately and numerously associated with many variables. The production of milk is subject to several factors such as feeding, breeding, and husbandry of the animal. In addition to these, factors

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such as, age at first calving, season of calving, stage of lactation, lactation number, human labour, animal age, animal worth, etc. There are some factors associated with production of milk which is relatively important for dairyman as well as consumer for rural development. An attempt has been made to reiterate the importance of resource inputs on milk productionThe knowledge of resource implies for the dairy farmer to bring about desired adjustments in his operations at his level. In this context, the aim of this paper is to study the economics of milk production, its productivity and associated factors affecting milk production in Guntur dist of A. A multi-stage random sampling method is employed for the study. Samples of 300 respondents are chosen through the multi-stage random sampling method. Abstract The results of the regression analysis for the total as well as subsamples indicate that, on an average, 60 to 80 percent of the variation in Milk Yield Per Day Per animal was accounted for by fodder consumed by an animal per day, green fodder consumed by an animal per day, Concentrate consumed by an animal p....day, and animal age. Out of these independent variables, fodder used per animal and green fodder used per animal per day have a positive impact on with high significance, and in terms of the magnitude size of the impact on the dependent variable the concentrate used per animal per day is the largest. The number of Labour hours needed per day as explanatory variable did not exert any significant effect on the dependent variable. The models for the various sample sections are good as shown by the p-values of the F statistics for each. The predictive power of the model can also be increased by including more explanatory variables but then there may be a multicollinearity problem.

REFERENCES

1. *Gurumurthi, S. (1999). Miracle in milk procurement. Economic and Political Weekly, 34(18), 1016Singh, V.P., Singh, H., & Kaur, H. (2021). Economic analysis of green fodder crops for enhancing the dairy profitability in Punjab. Environment Conservation Journal, 22 (SE), 1-8.*
2. *Satashia, M., & Pundir, R.S. (2021). An economic analysis of milk production across different sizes of buffaloes and crossbred cows in Middle Gujarat. Asian Journal of Dairy and Food Research, 1-7.*
3. *Singh, P., & Alli, M.M. (2017). Cost benefits analysis of milk production in Ballia district of Uttar Pradesh. Indian Journal of Economics and Development, 13(4), 779-783.*
4. *Singh, P., & Alli, M.M. (2017). Cost benefits analysis of milk production in Ballia district of Uttar Pradesh. Indian Journal of Economics and Development, 13(4), 779*