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Factors Affecting Milk Production in Buffaloes: A Case Study

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ABSTRACT

This study quantified the effect of major factors affecting the milk production in buffaloes. The important factors considered for the estimation of milk production included the value of dry fodder, the value of green fodder, the value of concentrate, number of lactations and the value of labour hours. A production function for milk was estimated by employing Ordinary Least Square (OLS) regression. In the estimated model among all the relevant variables, green fodder, lactation number and labour hours were found to be the influential factors affecting milk production in this species.

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INTRODUCTION

Agriculture sector plays crucial role in the economy of Pakistan, and the livestock sector contributes almost 52% to the value addition in the agriculture sector and almost 11% to Gross Domestic Products (GDP). The utility of livestock sector is very important in the rural economy of Pakistan, as it also provides employment to 30-35 million rural populations (Government of Pakistan, 2007-08).

In the livestock sector, milk is the most important produce and essential item of our daily food requirements. It is consumed as fresh and also in the form of various by-products such as yogurt, butter, cheese etc. As the population of Pakistan is continuously increasing, the demand for milk is also expanding. Buffalo is the major dairy animal in Pakistan and the estimated buffalo population in the country is 29 million heads (Govt. Pakistan, 2008-2009). Pakistan stands second among buffalo-milk producing countries in the world (Bilal *et al*., 2008).

One of the major reasons of low milk production in Pakistan is absence of optimal level of feed and fodders (Chaudhary and Ahmad, 1987). Available literature on milk production suggests that milk production depends on the breed of the animal, feeding optimal level of feed and fodder, management and the climate of the dairy farm location/region. Similarly, other factors include age of the animal at the time of first calving, number of lactations and health status of the animal (Rao, 1985). Among all these factors, some factors have immediate effects on the yield/production of milk. For example, by increasing the quantity and quality of feeds and fodders, milk production can be increased. Similarly, protection of milking animals from extreme climate temperatures of summer and winter seasons increase milk production or at least maintains the current level of regular milk production.

So, keeping in view absolute importance of milk sector in national economy, it seems imperative to conduct research on identification and quantification of major variables affecting milk production. The specific objectives of this study were: (i) to identify the most relevant factors which affect the milk production (ii) to quantify the elasticity of milk production with reference to each of the independent variable.

MATERIALS AND METHODS

Simple random sampling technique was used for the selection of samples. In District Jhang, five dairy farms were selected randomly from a list of 25 farms. Then from these five farms, 60 buffaloes were selected to collect information on daily milk production, daily consumption of feeds and fodder of each selected milking animal during 2008-09. This record of output (milk production) and inputs (feeds and fodders) was maintained for seven days in each month and the average values were calculated, which generated one observation for each month and hence a total of 60 observations from all the farms. Two observations were not complete in the records which were dropped. Finally, 58 observations were available on all the variables for the selected model. The data on both the dependent and independent variables was transformed to natural log form. To estimate the milk

production function, a log-log model was employed (Gujrati, 1995). The ordinary least square regression method was used for data analysis. Detailed information of all the variables used in the model is given in Table 1. The estimated elasticity coefficients of regression model are presented in Table 2.

Table 1: Description of the variables used in the milk production model

Variables	Description
Dependent variable	
Y = Milk production	Value of average milk yield per animal per day (Rupees)
Independent variables	
X_1 = Dry fodder	Value of dry fodder used per animal per day (Rupees)
X_2 = Green fodder	Value of green fodder used per animal per day (Rupees)
X_3 = Concentrate	Value of concentrate used per animal per day (Rupees)
X_4 = Lactation number	Number of lactation(s) completed (including current lactation)
X_5 = Labour hours	Value of labour hours used per animal per day (Rupees)

Table 2: The coefficients of the estimated milk production regression model

Variables	Estimated elasticity coefficients	Standard error	Probability level
Constant	19.21		
LnX_1	0.42	0.63	0.506^{NS}
LnX_2	2.64	1.27	0.042^{*}
LnX_3	2.04	1.46	0.169^{NS}
LnX_4	-0.76	0.16	0.000^{**}
LnX_5	2.15	0.58	0.001^{**}

NS = Non-significant, * = Significant (P< 0.05),
** = Significant (P<0.01).

Table 3: Descriptive statistics of the variables used in the milk production model

Variable	Minimum	Maximum	Mean	Standard deviation
Y = Milk production	60.00	440.00	221.07	96.97
X_1 = Dry fodder	3.00	4.00	3.30	0.36
X_2 = Green fodder	24.00	28.00	26.66	1.07
X_3 = Concentrate	29.00	35.00	31.55	1.89
X_4 = Lactation number	2.00	7.00	4.05	1.38
X_5 = Labour hours	2.50	3.50	2.94	0.33

The characteristics and related variable assumed to be affecting the milk production included dry fodder, green fodder, concentrate and labour hours, as all these independent variables were expected to be positively related with the milk production. In the model building process, various forms of ordinary least squares regression models were estimated, among all estimated models log-log form of the regression model was found to be the best for the current data analysis. The functional form of the estimated model is given as under:

$$\text{Log } Y = a + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \varepsilon$$

Where: a = constant term and β's = unknown regression coefficients to be estimated of the independent variables and ε is random error term.

RESULTS AND DISCUSSION

The descriptive statistics for the variables which were used in the estimated log-log regression model are presented in Table 3. This table provides the basic information on all the variables viz. minimum value, maximum value, mean value and their standard deviations. The factors selected for the milk production were the value of dry fodder, the value of green fodder, the value of concentrate, number of lactations and the value of labour hours.

Out of five estimated elasticity coefficients (Table 2), three elasticity coefficients were significant (P<0.05). The estimated elasticity coefficient for green fodder shows that increasing green fodder value by 1 percent the value of milk production increases by 2.64 percent (P<0.05). In Pakistan, generally fodders like rice straw, wheat straw, maize, sorghum and millet are provided to the buffaloes. As the population in the country is increasing fast, it is very difficult to allocate additional land for fodder production (Ahmad *et al*., 1990) but at the same time investment in producing balanced and adequate feed is essential for improving milk yield in the country (Afzal, 2010).

The variable of lactation number showed negative sign with milk production and was found highly significant. The coefficient of this variable shows that for every one percent increase in lactation number, there will be 0.76 percent decrease in milk production, keeping other factors constant. The behavior of this variable may be due to decreasing potential of milk production attributed to increasing age of buffaloes. Similarly, the estimated elasticity coefficient for labour hours used reveals that by increasing labour hours value by 1 percent, the value of milk production increases by 2.15 percent (P<0.01).

The computed F-value of the model was 14.16 (P<0.01), indicating that a definite statistical relationship exists between the dependent variable and the independent variables. Above findings conclude feed and labor as important determinants of milk production in the study area. Similar findings were found by Razzaque *et al.* (2009), who concluded that feed and labour costs affected significantly net income of dairy farms in Kuwait. The Durbin-Watson test value was 1.79, suggesting that there is no problem of autocorrelation in the data set. The coefficient of determination (R^2) was 0.58 which indicates that all the explanatory variables explained 58 percent of the variation in milk production.

Conclusions

Results of the present study revealed that green fodder, lactation number and labour hours were relatively more influential in the milk production. However, dry fodder and concentrate had no effect on this trait.

REFERENCES

Afzal M, 2010. Re-designing Smallholder Dairy Production in Pakistan. Pak Vet J, 30(3): In press.

Ahmad B, KA Qureshi and MA Bajwa, 1990. Economic relationship of cottonseed cake and wheat bran with milk production. Pak J Agri Sci 27(3): 203-206.

Bilal MQ, BB Khan and G Muhammad, 2008. Dairy Industry in Pakistan. In: "Health and Husbandry of Dairy Animals." Edited by BB Khan, Department of Livestock Management, University of Agriculture, Faisalabad, Pakistan.

Chaudhary AM and B Ahmad 1987. Cost of Production of Milk and Beef in Faisalabad District 1981-82. Research Report jointly published by Punjab Agriculture Research Coordination Board and University of Agriculture, Faisalabad, Pakistan.

Government of Pakistan, 2007-08. Pakistan Economic Survey, Economic Advisor's Wing, Ministry of Finance, Islamabad, Pakistan.

Government of Pakistan, 2008-09. Pakistan Economic Survey, Economic Advisor's Wing, Ministry of Finance, Islamabad, Pakistan.

Gujrati DN, 1995. Basic Econometrics. 3rd Ed, McGraw-Hill, Inc, New York, USA.

Rao BS, 1985. Factors affecting the milk production: A case study. Indian J Agri Econ, 40(2):169-174.

Razzaque MA, M Bedair, S Abbas and T Al-Mutawa, 2009. Economic impact of calf mortality on dairy farms in Kuwait. Pak Vet J, 29(3): 97-101.