The Journal of Animal and Plant Sciences, 23(1 Suppl.): 2013, Page: 94-97
ISSN: 1018-7081

PROFITABILITY OF DAIRY FARMING IN PESHAWAR VALLEY

Ahmad, S. [1*], Z. U. Haq[2], M. Shah[3], Y. Muhammad[1] I. Khan[4] and M. Khan[5]

[1] Faculty of Animal Husbandry and Veterinary Sciences; Khyber Pakhtunkhwa Agricultural University Peshawar, Pakistan; [2] Department of Management Sciences, Abdul Wali Khan University Mardan, Pakistan; [3] Department of Rural Sociology, Khyber Pakhtunkhwa Agricultural University Peshawar; [4] Department of Plant Protection, Khyber Pakhtunkhwa Agricultural University Peshawar, Pakistan; [5] Department of Agri Economics , Khyber Pakhtunkhwa Agricultural University Peshawar, Pakistan
Crossholding author: talhasohail71@yahoo.com

ABSTRACT

The study was conducted to determine profitability of livestock enterprise in Peshawar valley. Data on costs and returns was collected from thirty-one dairy farms. Profit function for dairy farms in Peshawar valley is estimated postulating profit as the function of milk price, green fodder price, wage of labor (per month), location of farm (rural vs. urban). The estimated profit function was statistically significant. Price of milk is the most profit elastic variable. Dairy farms located in rural areas are getting statistically significantly low profits than unban dairy producers. It suggests that a dairy farmer located in rural areas is getting significantly less profit as compared to those located in the urban areas. One percent increase in milk price will increase milk profit by 8.278 percents. Labor is an important determinant of profits and increasing one labor decreasing profits by 1.8 percents. However, labor is also a sensitive social variable determining the sustainability or total collapse of the dairy enterprise. Any dairy development policy focusing on the improvement of profits of dairy producers to either price support or inputs subsidies should more focus on dairy producers located in rural areas.

Key words: Profitability; sustainability, social norms, peri-urban dairy farms; rural dairy farms.

INTRODUCTION

Agriculture is the main stay of Pakistan's economy. Agriculture accounts for one-quarter of the country Gross Domestic Product (GDP) and employs 43 percent of the work force. The livestock sector accounts for one-half of the agricultural GDP (Government of Pakistan 2007). The livestock sector grew at 5.8 percent during 1996 to 2006 increasing livestock share in agriculture GDP from 25 percent in 1996 to 50 percent in 2006 (GOP, 2006). During this period, livestock population also increased by one-third, directly contributing to the milk production in the country. Hence, milk alone exceeded the combined value of wheat, rice and sugarcane in the country (GOP, 2008). The peri-urban dairy industry has been associated with huge economic losses associated with the under-developed buffalo farms facing: i) calf losses, irregular breeding, imbalanced feeding; ii) ungainly loans and; iii) a hostile marketing system. The three causes at commercial buffalo herds throughout Pakistan, lead to annual losses to the tune of over US$ 17 billions (Qureshi, 2002). Establishment of the traditional dairy farms is based upon opportunity cost- invested by their ancestors. The investment made by the ancestors and the rising levels of unemployment compel the farming families to stick to the business. The farmers have developed social norms through interaction with the technical, development and marketing agents (Qureshi, 2008).

However the overall health of the livestock sector at the macro-level is determined by the performance of the individual producer at micro (farm) level. Hence understanding the economic performance of the dairy farms helps in understanding the economic performance of the livestock sector. Economic profit measured as the difference between revenue a firm receives and the cost that it incurs on the production is one of the measure of the economic performances. It is relevant to mention that all the cost must be included in the calculation of economic profits (Varian, 1992). This study estimates a profit function of the dairy producers located in Peshawar valley. Economic theory suggests that profit is the function of output and input prices. Economic theory assumes that a competitive firm maximize profit (i.e. the difference between revenue and cost) given the level of output.

MATERIAL AND METHODS

Conceptual model: It is assumed that a livestock producer choose actions, $a_1, \cdots, a_n$, to maximize the difference between total revenue (associated with each action), r ($a_1, \cdots, a_n$) and total cost c ($a_1, \cdots, a_n$) at a given level of output y ($a_1, \cdots, a_n$). This is the basic behavioural assumption used in the analysis (Higgins, 1986; Varian, 1992). The profit maximization problem

yields the optimal set of action a*($a_1^*, \cdots, a_m^*$), derived by taking the derivate of r($a_1, \cdots, a_m$) – c($a_1, \cdots, a_m$) with respect to the $a_1, \cdots, a_m$. The resulting relationship implies that marginal revenue from an additional unit of milk is equal to the marginal cost of producing the additional unit of milk. Varian (1992) terms this relationship as the "fundamental condition" for profit maximization. This condition also suggests that the firm should hire an amount of additional input such as labour so that the marginal cost of the additional unit of labour equals the marginal revenue of the additional labour.

Mathematically the firm's maximization problem that can be laid as

$$\pi(p, w) = \max pf(x) - wx \quad (1)$$

Where π is the profits, p is the scale price of output (milk), w is the vector of input prices, x is the set of inputs and $f(x)$ is the technological relationship in the form of production function between milk yield and inputs. Taking the derivative of equation (1) with respect to any input x_i yields

$$p\frac{\delta f(x^*)}{\delta x_i} = w_i \quad (2)$$

Where $\frac{\delta f(x^*)}{\delta x_i}$ is the marginal product of x_i and x^* is the optimal level of x. Substituting backing the optimal level of inputs (equation (2)) in to equation (1) yields the profit function, $\pi(p, w)$. Hence, profit is the function of output price and input prices. Varian (1992) reports that a profit function is non-decreasing in output price, non-increasing in input price, homogeneous of degree one in output price and convex in output price.

Given the above discussion of the economic theory, the empirical profit function for the dairy producers in Peshawar is specified as under:

$$\pi(p, w) = \alpha_0 + \alpha_1 ln(P_i) + \alpha_2 ln(G_i) + \alpha_3 ln(G_i) + \alpha_4 ln(L_i) + \varepsilon_i \quad (3)$$

Where p_i represents milk price per litre of the *i*th dairy farm, G_i is the per kilogram price of green fodder, L_i is per month wage of labour, ε_i represents the random errors, *ln* the logarithm and α_i are the estimated parameters. Random errors are assumed to be normally distributed with mean zero and variance σ^2. The model is estimated using ordinary least squares technique.

Data: Information voluntarily provided by large scale commercial dairy farms situated at urban and per-urban areas of Peshawar, (Khyber Pakhtunkhwa) was utilized in this study. The data were collected through a series of visits, paid to farms within a span of one month. Daily operations were monitored and farmer/operation manager was interviewed using structured and pre-tested questionnaire. All inputs under use and output marketed or used as opportunity, and the quoted cots were used to workout profitability of the dairy farms.

RESULTS AND DISCUSSION

Descriptive statistics of the variables used in the regression analysis is given in table 1. The standard errors of all the variables are very low showing small variations in the selected variables. Table 2 presents partial correlation between the selection variables. Partial correlation shows the relationship between two variables without controlling for the effects of other variables. The correlation between milk price and profits of the dairy farm from milk production is statistically significant. The other statistically significant associations are due to dummy variable representing rural dairy farms — its association with milk price and green fodder price are statistically significant.

The associations between the dependent variables, profit and per liter price of milk, per kilogram price of green fodder, labour wages (Rupees per month) and dummy variable representing rural dairy farms was computed. With the exception of dummy variable, the association between profit and the other three variables is positive. However, the association between price of milk and profit is positive and significant while a dairy farmer located in rural areas is getting less profit as compared to those located in the urban areas.

Regression analysis: The F-Statistics given in table 3 shows that the combined effect of the set of independent variables used in the analysis is statistically significant. Hence, on over all the regression results are statistically significant. Table 4 shows that about 30 percent of the variation in the profits of the dairy farms are explained by the variation in the independent variables. Studies based on cross-section data usually produce lower explanatory power. The estimated results are according to the prior expectation. As already mentioned, profit is non-decreasing in output price, implying that price is expected to be positive. The estimated effect of price on milk price is not only positive but also statistically significant and very elastic. The coefficient of 8.278 suggests that a 1 percent increase in milk price will increase milk profit by 8.278 percents.

In case of the input prices, profits are expected to be non-increasing in input prices and hence their expected sign should be negative. Hence, the estimated coefficient of green fodder is negative but statistically equal to zero. In the context of production economics, such unexpected signs are also reported in the previous studies including Hussain and Young (1987), Lau and Yotopolus (1971) and Chaudhry, *et al.* (1987). In order to

further investigate that whether normalization of profits and prices as suggested by Färe and Primont (1995) would eliminate the negative sign of green fodder price. Normalization is carried to remove money illusion and firm responds to relative prices. Normalization also increases the degrees of freedom by one as the price of output drops out of the equation. Results suggest that normalization did not change the negative sign.

Interestingly the location of a dairy producer statistically significantly determines the profit of the farm. A dairy farmer located in rural areas is getting significantly less profit than a dairy producer in urban areas. Therefore, any dairy policy focusing on the improvement of profits of dairy producers to either price support or inputs subsidies should more focus on dairy producers located in rural areas. Results also suggest that labor is an important determinant of profits and increasing one labor decreasing profits by 1.8 percents. The labor constitutes an important determinant of sustainability or total collapse of the farming enterprise. Timing of various events like milking, feeding, watering, are very sensitive to changes and any irrational behavior on part of the labor have resulted in termination of such enterprises (Personal observation and communication with M S Qureshi).

Table 1: Summary statistics of the variables

Variable	Mean	Standard Error	95% confidence Intervals	
Log of profit	13.662	0.102	13.454	13.871
Log of milk price	3.832	0.008	3.815	3.848
log of green fodder price	0.710	0.024	0.661	0.758
log of labour wage	8.655	0.020	8.613	8.696
Dummy (Rural vs Urban)	0.214	0.079	0.052	0.376

Table 2: Partial correlation between the selected variables (Pearson correlation given in parenthesis)

	Log of profit	Log of milk price	log of green fodder price	log of labour wage	Dummy (Rural vs Urban)
Log of profit	1.000				
Log of milk price	0.308	1.000			
	(0.086)				
log of green fodder price	0.073	-0.054	1.000		
	(0.697)	(0.774)			
log of labour wage	0.100	-0.203	-0.040	1.000	
	(0.612)	(0.299)	(0.839)		
Dummy (Rural vs Urban)	0.018	0.401	0.448	0.216	1.000
	(0.924)	(0.023)	(0.011)	(0.269)	

Table 3: Analysis of variance of the estimated model

Source of Variation	Sum of Square	DF	Mean sum of square	F-statistics*
Model	2.339	4	0.585	
Residual	5.476	23	0.238	2.46 (0.074)
Total	7.815	27	0.289	

Source: Survey data, *df for F-Statistics 4, 23

Table 4: Estimates of the profit function estimated using ordinary least squares

Logarithm of the variable	Coefficient	Standard Error	P-Value
Log of milk price	8.278	2.725	0.006
log of green fodder price	1.309	0.899	0.159
log of labour wage	-1.810	0.986	0.079
Dummy (Rural vs Urban)	-0.679	0.318	0.044
Summary Statistics			
R-Squared	0.299		
R-Squared Adjusted	0.177		
Number of Observations	28		

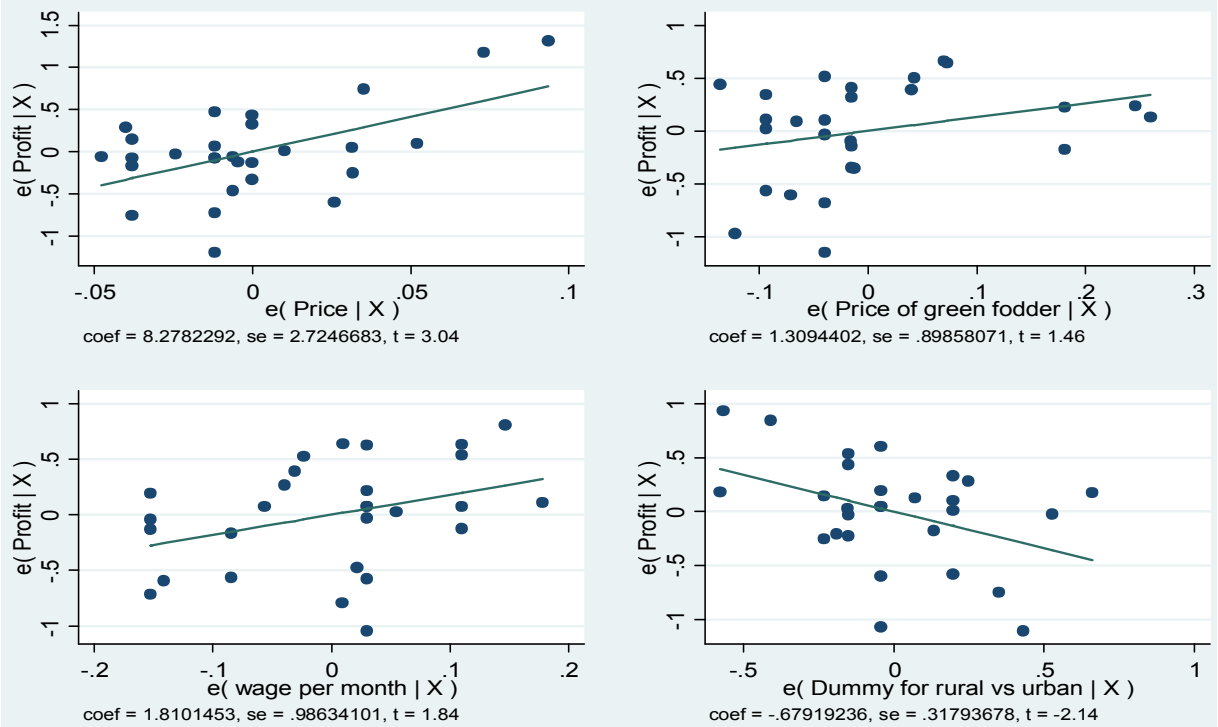

Figure 3: Estimated relationship between profits and exogenous variables

Conclusion: The study suggests that a dairy farmer located in rural areas is getting significantly less profit as compared to those located in the urban areas. One percent increase in milk price will increase milk profit by 8.278 percents. Labor is an important determinant of profits and increasing one labor decreasing profits by 1.8 percents. However, labor is also a sensitive social variable determining the sustainability or total collapse of the dairy enterprise. Any dairy development policy focusing on the improvement of profits of dairy producers to either price support or inputs subsidies should more focus on dairy producers located in rural areas.

REFERENCES

Chaudhry, M. A., L. S. Fan and Z. Hussain (1987). Efficiency of wheat production on upstream and downstream farms in the Indus Basin. Pakistan J. Agric. Social Sci. 1:2, 1-9. Pakistan Agric. Res. Council, Islamabad.

Färe, R. and D. Primont (1995). Multi-output production and duality: Theory and Applications. Massachusetts: Kluwer Academic Publishers

Government of Pakistan (GOP). (2007). Economic survey of Pakistan. Ministry of Finance, Government of Pakistan, Islamabad

Government of Pakistan (GOP). (2008). Economic survey of Pakistan. Ministry of Finance, Government of Pakistan, Islamabad

Government of Pakistan (GOP). (2006). Livestock census. Population and Livestock Census Organization, Islamabad

Higgins, J. (1986). Input demand and output supply on Irish farms – A microeconomic approach. *European Review of Agricultural Economics*, 13: 477–93

Hussain, Z. and R. A. Young (1987). Salinity damage to irrigated crops : Economic measure from a farm survey in Pakistan. In Agricultural and Economic Stability. M. Bellamy and B. Greenshield, Eds. International Assoc. of Agric. Economists. Paper No. 4: 129-132

Lau L. J. and P. A. Yotopolus (1971). A test for relative efficiency and an application to Indian agriculture. American Economics Review 61(1):94-109.

Qureshi, M. S., G. Habib, H. A. Samad, M. M. Siddiqui, N. Ahmad and M. Syed (2002). Reproduction-nutrition relationship in dairy buffaloes. I. Effect of intake of protein, energy and blood metabolites levels. Asian-Aust. J Anim Sci, 15(3): 330-339.

Qureshi, M. S. (2008). Dairy Farms and farmers. Social norms and training needs. Pak J Agric Sci,45 (2):215-217.

Varian, H. R. (1992). Microeconomic Analysis. Norton, New York, USA.