

## **An Economic Study of the Cost of Dairy Milk Production In Erbil Governorate**

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### **Abstract**

The aim of this study was to analyse the economic cost of dairy milk production in Erbil district in Kurdistan Region Iraq. The present study was undertaken to find out the cost and returns of milk production. Milk production in Kurdistan is mainly concentrated on small farms in rural areas as a subsidiary occupation to agriculture. In addition to this, there are a number of organized dairy farms. In this region, the low genetic potential of the animals results in the high cost and low milk production. The profit margin can be increased, by decreasing the cost of production. The number of farms in the research area was determined through stratified random sampling method. The data were collected from a total of 20 selected farms by means of survey method. The selected farms were divided into three groups (5 to ≤10 cattle, 11 to ≤25 cattle and equal 26 and >27 cattle). Data was collected on size of farmer land, livestock strength, and status of milk animals, sale and purchase during the year, labor cost, and value of shed, health cover, concentrates cost, veterinary cost and miscellaneous production cost. Multiple regression and Cobb-Douglas production function were estimated by using Ordinary Least Squares (OLS) method. The data were based on the 2021 production period. The study concluded that the average daily milk yield and lactation milk yield per cow of farms were 9.500 kg and 2900 kg/year. The study aimed at finding out the net profit scenarios for livestock and their products. The final product of this research endeavor is to draw policy lessons that can help refining the imbalances and distortions in the milk market. It was concluded that average fixed cost per animal was 49.500, 29.000 and, 7.250 IQD of large, medium and small farmer per month, and variable cost were, 162.500, 93.250 and, 48.250 IQD for large, medium and small farmers per month. The average milk yield per day was 12.250, 9.250 and 6.750 liter. The cost of milk production per liter was, 825, 910 and, 750 IQD for large, medium and small farmers. The econometrics result showed that livestock production is depicting "increasing return to scale" in the study area. An incentive policy focus in the sector would help alleviating poverty at a large scale in rural areas of Kurdistan.

**Keywords:** Milk production, dairy cows, dairy farms, Estimation, production costs.

### **Introduction**

Agriculture plays an important role in the economy of Kurdistan. In the past, livestock sector was ignored both at local and national level. Empirical studies, though in good numbers, conducted in the past did not estimate the cost of milk production and identify major problems faced by livestock rearing farmers. It is further noted that milk production in Erbil is predominantly the realm of small and marginal land holders and landless farmers. Small farmers generally keep 2-3 milk animals as a part of the mixed farming systems. In addition to crop production, these farmers keep few animals for milk production either for home consumption or to sell in order to supplement their income (Ahmed et al., 1996). Noting a very limited existing stuff of research in the estimation of milk production in Kurdistan, this research effort with microeconomic approach was undertaken to such an estimate in addition to identifying problems associated with livestock production systems. The study also aimed at finding out the net profit scenarios for livestock and their products. The final product of this research endeavor is to draw policy lessons that can help refining the imbalances and distortions in the milk market.

### **Materials and Methods**

#### **Sampling Arrangements**

The present study was conducted in Erbil, Kurdistan region. This study was based on primary data and for that purpose a comprehensive questionnaire was designed to collect data. Main source of data was the farmers who were personally interviewed to collect the required information.

For this study a random sampling technique was employed to draw representative sample. Sample size was kept 20 livestock household, Instead of land base classification; farmers were classified on the basis of number of animals keeping in mind the study objectives. Random sampling technique used for selection of farmers in the villages.

### Collection of Data

Interviewing schedule refers to formal questions asked to the respondents by the interviewer. Interviewing schedule was designed to write questions according to the respondents and relevance of research being conducted. The interviewing schedule consisted of structural and non-structural questions. It was prepared in Kurdish because all the respondents were Kurdish speaking. The questionnaire focused on the background information's and information about the livestock production and milk production. The pre-testing was done in order to ensure the validity and accuracy of interviewing schedule.

### Estimation Arrangements

In the rural areas, animals including the dairy cattle were commonly kept under the same shed. For the purpose of cost estimation, depreciation cost was calculated at the rate of 2.5 percent and 5 percent of the current construction cost of the sheds, while the interest rate was charged at the rate of 12 percent (depending upon the opportunity cost of capital). Animal shed costs can be calculated on the basis of adult animal units, using the following formula (Ahmed et al.,1996).

$$MF = SC \times MA/TA \quad (1)$$

MF = the shed cost for dairy cattle

SC = Total shed cost in IQD

MA = the milk animals units

TA = the total animal units

Different types of tools and equipment which were used for feed and fodder utilization for animals. The cost of above equipment's was estimated on the basis of original purchase with respect to the rate of depreciation and interest rate. In the study area fodder is the major input for livestock rearing. The cost of fodder was calculated on the basis of per acre price at prevailing rate in the study area and share of milk animals can be derived from the total cost on green and dry fodder by using the following formula (Ahmed et al., 1996).

$$CMA = TCF \times MA/TA(2)$$

Where

CMA = Cost of green and dry fodder fed to milking animals in IQD,

TCF = Total cost of green and dry fodder fed to livestock,

MA = Milking animals,

TA = Total animals.

For milk production total yield per household per lactation of wet animals was computed with respective price received by household and those who did not sell the milk at prevailing price in the villages and used for home consumption was taken into account to arrive at the gross income from milk production. An average animal was supposed to have produced (12.5 kilograms) of fresh dung per day. As in village there was a common practice to make dung cake to be used as fuel, thus the income from farmyard manure was computed in terms of dung cakes. Total number of dung cake produced per day and multiplying it with average village price of dung cake.

### Econometric Model

For simple analysis, statistical package SPSS, mainly cross tabulation and frequency distribution will be executed. F- Statistics used in order to judge whether the difference between the different areas are significant. If the computed value of calculated F-statistics is greater than the tabulated F-statistics, the difference between the areas will be statistically significant. In order to check the difference between the difference areas the multiple comparison "Tuckey Test" will be applied. Following econometrics model was used for income of the farm of livestock production (Pervaz et al., 1985, Sadiq et al., 2003 and Sugiyanto, 1983)

$$Y = \beta_0 + \beta_1 FS + \beta_2 MA + \beta_3 FD + \beta_4 L \quad (3)$$

Where

Y= Income from milk production

FS=Farmsize

MA=Milkinganimal

FD=Feed cost (Green and Dry Fodder) of milkanimal

L=Laborcost

$\beta_0$ =Intercept

$\beta_s$ =Coefficient with respect to FS, MA, FD andL

### Cost of Milk Production

Production Function is technical, mathematical and physical relationship between inputs and outputs. The Cobb-Douglas production function was also is used to trace out the scale of return, as follow (Pervaz et al., 1985, Sadiq et al., 2003 and Sugiyanto, 1983).

$$Y = C (FS)^{\beta_1} (MA)^{\beta_2} (FD)^{\beta_3} (L)^{\beta_4} \quad (4)$$

Where variables Y, FS, MA, FD and L are defined earlier and carry exactly the same meaning while C is the constant and depends on the units of measurement of Y, FS, AU, FD and L. the coefficient,  $\beta_s$  are the elasticity's of output with respect to FS, AU, FD and L inputs respectively. Taking log of equation2

$$\text{LogY} = \text{logC} + \beta_1 \text{log FS} + \beta_2 \text{log MA} + \beta_3 \text{log FD} + \beta_4 \text{log L} \quad (5)$$

This equation was estimated by using OLS method for sample areas and farmers in different size categories. These collectively measure the return to scale. Thus, if  $\beta_1 + \beta_2 + \beta_3 + \beta_4 = 1$ , we have constant return to scale, if  $\beta_1 + \beta_2 + \beta_3 + \beta_4 < 1$ , we have decreasing return to scale and if  $\beta_1 + \beta_2 + \beta_3 + \beta_4 > 1$ , we have increasing return to scale. Following formula was used to determine the production cost of milk.

$$\text{Cost of milk production} = \text{Totalcost} / \Sigma \text{MP} \quad (6)$$

It was used to determine the cost involved in the production of milk (it is on per unit basis) in the sample areas which is function of age, lactation period, feeding practices and calving month etc. due to these variable milk production per day varies over time.  $\Sigma$ MP is the sum of milk production. At the end cost benefit ratio was also calculated in order to determine the profitability of the farm (Hosking and Preez, 2004).

$$\text{Benefit Cost Ratio} = \text{Total Benefit} - \text{Total Cost} \quad (7)$$

## Results and Discussion

### Cost of Livestock Production

It is imperative to carry out cost analysis of livestock enterprise. It can assist to highlight indivisibility of the economies and diseconomies while exploring the avenues of cost the avenues of costreduction.

#### Fixed Cost

The cost items included in the fixed cost category were shed cost, land rent cost, animal cost and equipment cost. In a study .Tambdawi (1979) on the economics of milk production in the Sharkia governorate, In the Arab Republic of Egypt, the most important cost item is the nutritional costs, as it constituted 7.57% of the totalcosts, while labor cost accounted for 3.11%, machinery depreciation 8.7%. Table 1 explained that average fixed cost for the large, medium and small farmers were The fixed cost was, 49.500, 29.000 and, 7.250.IQD per adult milk animal respectively and on overall basis fixed cost of livestock producer was 28500IQD per adultanimal.

**Table 1. Average fixed cost for the large, medium and small farmers**

A. Fixed Cost	Large	Medium	Small	All
<b>Shed cost</b>	8.250	5.750	3.500	5.750
<b>Land rent</b>	6.750	5.250	1.750	4.500
<b>Animal cost (IQD)</b>	33.000	17.000	1.000	17.000
<b>Equipment cost</b>	1500	1000	1000	1250
<b>A. Total</b>	49.500	29.000	7.250	28.500

#### Variable Cost

The various components of variable cost were labor cost, green fodder cost, concentrate cost and cost of medicine and vaccination. These costs were taken on average monthly basis. Hussein (1981) in a master's thesis at the Faculty of

Agriculture at Ain Shams University indicated a study Economic for some dairy farms in the Republic of Iraq that the cost of feed accounts for 80% of Average variable costs, with workers' wages accounting for 92% of average fixed costs that on private farm (breeders). On the other hand Al-Askar Fahd (1999) shows in a study on the economics of dairy production and marketing in Saudi Arabia that the feed costs accounted for 1.50% of the total production costs. While the costs of breeding and veterinary treatments accounted for 0.10% and labor costs 1.11%.

The table 2 explained the variable cost of various components. On average variable cost for large, medium and small farmers were 162500, 93250 and, 48.250 IQD and on overall bases variable cost of livestock producers was 101.750 IQD.

**Table 2. Cost and revenue of livestock by farm categories**

Particulars	Large	Medium	Small	All
<b>Costs</b>				
<b>B. Variable Cost</b>				
Fodder (Green +Dry)	67.500	38.500	20.750	42.250
Concentrate	50.750	26.500	10.250	29.500
Labor	22.000	15.750	5.750	14.500
Vet. & Medicine	22.250	12.500	11.500	15.500
<b>B. Total</b>	<b>162.500</b>	<b>93.250</b>	<b>48.250</b>	<b>101.750</b>
<b>1. Total Cost (A+B)</b>	<b>212.000</b>	<b>122.250</b>	<b>55.500</b>	<b>130.250</b>

### Milk Yield

Milk production is a function of milk yield per day, lactation period and its characteristics, breed and age of animal reared Ali shah et al,(2009). The kind and quantity of concentrate fed to animals also influence milk yield. The data indicated that average yield of milk per day per milk animal was 12.250, 9.250 and 6.750 liters for the large, medium and small livestock producing communities respectively, and on overall basis average milk yield per day adult milk animals was estimated to be 9.350 liters. Average prices of milk were 1000 IQD per liter.

Overall basis income generated from milk was 222.500IQD. For large, medium and small farmers was 375.000, 195.000 and 97.500 IQD, respectively. The difference was due to different number of animals per farmer in the study area. On the other hand, milk output is a function of age, lactation period, calving month, feeding practice etc. Due to these variables milk production per day varies over time. From the table 3, it was clear that the cost of milk per day liter varied from 825 for the large farmer, 910 for the medium farmer and 750 IQD for the small farmer respectively.

**Table 3. Average yield of milk per day per month and income generated from milk.**

Particulars	Large	Medium	Small	All
Milk Yield/ day	12.250	9.250	6.750	9.350
Milk (Liter) /month	367.5	277.5	202.5	282.5
a) Milk (IQD)	367.500	277.500	202.500	282.500
b) Farmyard Manure	150.000	75.000	50.000	91.500
<b>2. Gross Income (a +b)</b>	<b>517.500</b>	<b>352.500</b>	<b>252.500</b>	<b>374.000</b>
Net Income ( <b>2 -1</b> )	305.500	230.250	197.000	244.250
Cost per Liter	825	910	750	830

Net salary comprises all the receipts from the major and minor items of animals, which are created by animal's proprietors. The sources of salary considered in this ponder were deal of drain and barnyard excrement per draining creature per month. These components were assessed at the current cost rates per units win within the test region.

Table (3) showed that the gross income of large, medium and small farmers was 525000, 270000 and 147500, IQD respectively and overall bases gross income was 314250 IQD. The difference was due to efficient management practices by the farmers. On overall basis, net incomes from livestock production were 193750 IQD, The difference was due to different number of animals per farmer in the study area. On the other hand, milk output is a function of age, lactation period, calving month, feeding practice etc. Due to these variables milk production per day varies over time. From the table, it was clear that the cost of milk per day liter varied from 825, for the large farmer, 950 for the medium farmer and 850 IQD, for the small farmer respectively..

### **Conclusion:**

The results of the study clearly indicated that feed was the major cost component in total variable cost followed by labor cost. Dry fodder was the major feed item for all types of milking animals followed by concentrates. The profit margin can be increased, by decreasing the cost of production.

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