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# Profitability Analysis of Milk Production In District Peshawar

**Abstract**

*The study analyzed the profitability of milk production in district Peshawar. For this purpose 100 dairy farmers are selected from the two purposively selected villages namely* Kalu Khel and Kala *in district Peshawar. The sampled dairy farmers are divided into three categories on the basis of number of milk animals i.e. rural subsistence (1-3 adult milk animals), semi commercial (4-10 adult milk animals) and commercial dairy farmers (10< adult milk animals). The study concluded that average fixed cost per animal per year is Rs.9485.76, Rs.17382.51 and Rs.19070.57 respectively. Whereas, the average variable cost was estimated as Rs.49741.07, Rs.70492.74 and Rs.76559.57 for all the three categories including rural subsistence, semi commercial and commercial dairy farmers respectively. The key finding of the study is that on average, a milk animal produced milk per lactation worth Rs.58220.63, Rs.91823.60 and Rs.107004.01 in the rural subsistence, semi commercial and commercial dairy farms. The results of the benefit-cost ratio for commercial dairy farmer was noted as 1.15 which was higher than those of semi commercial 1.09 and rural subsistence 1.04.The study suggested that provision of the microfinance loans on relax conditions can increase the milk productivity and profitability of the farmers.*

**Key words:** Profitability, benefit-cost ratio, net profit, Peshawar.

## 1.1 Introduction

Pakistan is an agrarian economy and its contribution in the GDP is 22 percent and its share in foreign exchange earning is on the rise and it also contributes in providing raw materials to the manufacturing sector (GOP, 2009). In the past decade, the average growth rate of live stock sector was 5.8% it contributed in the agriculture growth was 49.6% in 2006 (Zia, 2007). Live stock sector has a lot of potential and can be proved as a launching pad for the

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development of farmers livelihood as agricultural resources are enormous including productive land, big irrigation system and infrastructure, weathers and experienced farmers (Mari and Lohano, 2007). Hence this very subsector can be utilized as an opportunity for injecting the rural population in employment generation and alleviating poverty **as** 66% percent of population is living in rural areas. Among rural population farming livestock and agro based industrial workforce is 45% and its contribution to GDP is 11.5 % (GOP, 2011).

Pakistan has the third largest herd size in the world with 63 million animals (GOP, 2009). The census report regarding livestock of 2006 livestock, Pakistan has 29.6 million cows, 27.3 million buffaloes, 26.5 million sheep, 53.8 million goats,0.9 million camels, 0.34 million horses and 0.15 million mules and their number is expected to rise to 35.6 million cattle, 31.7 million buffaloes, 28.1 million sheep, 61.5 million goats and 1.0 million camels,0.4 million horses, 0.2 million mules and 4.7 million asses in 2010-11. The estimated milk production from cattle, buffaloes, sheep and goats is 16133 thousand, 28694 thousand, 759 thousand, 36 thousand and 818 thousand tons respectively in 2010-11 (GOP, 2011). Due to which per capita availability of milk in Pakistan is 85.49 kg per annum which is increasing at the rate of 2.44 % annually (Sajjad.M *et al* 2011).Resultantly the increasing trend was observed in the milk production in the last decade (Zia, 2007).

Milk is the largest and the most important product in the live stock sector and its nutritional value cannot be denied and its production is increasing due to increase in the number of animals as depicted in the 2006 livestock census report, milk production has increased by 36 % since 1996 (Zia, 2007).

There are four main production systems of cows and buffaloes in Pakistan. These include rural subsistence small-holder production system, rural market oriented smallholder production system, rural commercial dairy farming system and peri-urban commercial dairy farming system (FAO, 1987). Majority of national livestock population is distributed in small units throughout Pakistan. Small-holders have major share of the population of large ruminants keeping 60% buffaloes and 55.5% cows, with less than 6 animals per household. Under the rural subsistence smallholder production system which is most common in Pakistan, milk is produced for the family at minimal cost. Grazing provides most of the feed requirements of animals. Some roughages and a small quantity of concentrate are given only to milking animals. More than 90% of the milk produced under this production system is used for family consumption. This traditional system is highly dependent on family labor (Afzal and Naqvi, 2003).

Milk production business provides employment especially to the landless and small holder dairy farmers in rural and peri-urban areas of Pakistan. Studies show that about five million farm families are involved in production, collection and distribution of milk and its products. The activities of this sub-sector account for 10 to 25% of the incomes of landless and small holder dairy farmers depending on the accessibility of the market. Estimated value of milk and its products in Pakistan is about Rs.50.86 billion per annum (Anwar and Younas, 2000). In

Pakistan, round about 80% of milk is produced in rural areas, 15% in peri-urban and 5% in urban areas. Only 3-5 % of total production is marketed through formal channels. The remaining 97% is produced and marketed in raw form by informal agents ( Zia, 2007).

One of the studies conducted by Farooq (2005) analyzed demand and supply of milk in Pakistan. He identified a gap of 3.52 million tones between demand and supply of milk in the year 2003.He further added that this gap is expected to rise to 55.48 million tones in the year 2020. In Pakistan, yield per animal is low as compared to other milk producing countries of the world. For example, One New Zealand dairy animal produces as much as three dairy animals in Pakistan and one American cow produces as much as seven Pakistani cows (Garcia et al., 2003). It depicts and highlights some technical, management and institutional factors which are causing this very gap of milk production in Pakistan with respect to other countries of the world.

In Khyberpakhtunkhwa the livestock sector is playing a crucial and significant role in the overall economy of the province through a major contribution of 57.5 % in the provincial GNP (Sajjad,M. 2011) and generating ample opportunity for employing nearly one million workforce of the province (District Census Report, 1998).Livestock census report of the year 2006 reflects that the share of provincial livestock in the livestock-population of Pakistan is 20.20% in cow, 7.06% in buffaloes, 12.68% in sheep and 17.85% in goats.

**Table 1: Share of Khyberpakhtunkhwa in Livestock Population of Pakistan**

| Livestock(millions) | Pakistan | Khyberpakhtunkhwa | %Share of Khyberpakhtunkhwa |
|---|---|---|---|
| Cows | 29.56 | 5.97 | 20.20 |
| Buffaloes | 27.33 | 1.93 | 7.06 |
| Sheep | 26.49 | 3.36 | 12.68 |
| Goats | 53.79 | 9.60 | 17.85 |

Source: Agriculture census report, 2006

In Pakistan, buffalo is the main milk producing animal by contributing 66.1% followed by Cow which contributes 31.4% of total milk production in Pakistan. Khyberpakhtunkhwa has the potential to host nearly all milk producing animals specially cow and buffalo and it is currently hosting 6.3% buffalo and 21.5% cow population of Pakistan (GOP, 2008).This number can be increased manifold if the available resources are tapped efficiently and managed accordingly for the further development of milk production generally in the province and particularly in the study area.

## 1.2 Objectives of the Study

Major objectives of the study are:

1. To analyze the profitability of dairy farmer milk production in the study area.

2. To suggest policy recommendations on the basis of the findings of the study.

## 2. Review of Literature

A brief review of existing literature is considered as an integral part of any research study. It provides a strong theoretical background to the problem under study, detailed information about the nature and type of research and analytical techniques used in studies relevant to the topic concerned. A brief review of theoretical and empirical literature relevant to milk production is given below.

Sajjad and Munir (2011) carried out their research study on economies of scale in buffalo milk production in district DI Khan of Khyberpakhtunkhwa Pakistan, during Feb, 2009. The objectives of the study were to estimate cost, net revenue and return to scale from buffalo milk production. A multistage stratified random sampling technique was used in data collection. In first stage, two villages were randomly selected from the district and in second stage; fifty respondents from each village were included in the sample. Cobb-Douglas production function was used for data analysis. Results indicated that total cost per buffalo remained Rs.14015.20. The major cost items identified were dry fodder (Rs.5809.4), green fodder (Rs.2897.2), hired labor (Rs.308.9), permanent labor (Rs.222.5), concentrate (Rs.5809.4), medicine and vaccination (Rs.637.7) and other costs (Rs.259). Whereas the average net revenue remained Rs.9089.70 from milk production per buffalo per year. It was revealed that labor and concentrate contribute significantly while green and dry fodder, health, building and utensil contribute but insignificantly. The farmers are operating in the increasing return to scale in the region and buffalo farming is a profitable enterprise in the area.

Uddin *et al*., (2010) studied dairy farming in Bangladesh and analyzed farm economic system of extensive, intensive and traditional dairy production. One average-sized and one large-sized from each production systems were selected in three regions. The results showed that the large-scale intensive production system had the lowest milk production costs as compared to the small-scale traditional system. The highest milk yield was observed in the large-scale intensive dairy farming system (1600 kg/year). Milk yield increased and the cost of milk production decreased with increasing farm size. Small-scale farmers of extensive and traditional farming system were not able to cover their full economic costs. They suggested that, farmers need to adopt new cost reducing management strategies and the government should take initiatives by liberalizing input markets, developing basic infrastructure and facilitating access to yield increasing technology.

Maqsood et al., (2010) studied the factors affecting milk production in buffaloes in district Jhang during 2008-09. The major aim of the study was to quantify the factors affecting milk production. The value of dry fodder, green fodder, concentrate, labor hours and number of lactations were considered important factors for the estimation of milk production. Out of 25, five dairy farms were selected by simple random sampling technique. Sixty buffaloes were selected

from these farms and data on out put and inputs were collected on daily basis for seven days monthly from each farm for a year. A log-log regression model was used for the estimation of milk production. Results showed that a 1% increase in the value of green fodder will increase milk production by 2.64% and a 1% increase in the value of labor hours will increase milk production by 2.15%. The number of lactations variable showed a negative relationship with milk production. A 1% increase in lactation number will decrease milk production by 0.76%.However, the effect of dry fodder and concentrates was negligible in the current study.

Sajjad and Munir (2010) examined economic efficiency of milk production in district Peshawar. They examined the productive efficiency of milk production during 2009.Data were collected from 100 dairy farmers which were selected by multistage sampling technique. Descriptive statistics, stochastic frontier production and cost function models were used for the analyses of the data. The results showed that about 85% variation in the output of milk among the farmers was due to differences in their technical efficiencies. Similarly 78% of the variation in total cost of production among the farmers was due to the presence of allocative inefficiency. They suggested that government should make such policies which could bring young people in the dairy farming as rising age leads to decline in the efficiency of the dairy farmers.

Shah *et al*., (2009) estimated cost of milk production at micro level in Jhang district in Pakistan. The study aimed at finding out the net profit for livestock and their products. By using random sampling techniques 100 respondents were selected. 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, concentrate cost, veterinary cost and miscellaneous production cost. Multiple regression and Cobb-Douglas production function were estimated. The econometric results showed that livestock production is depicting "increasing return to scale" in the study area.

Jalil, H. (2009) investigated the market structure, sources of milk production and average unit of productivity in peri-urban areas of Lahore. Using primary data of year 2007 from some selected peri-urban areas of Lahore, the results of this study revealed that the lack of training and dairy related education hinders opportunity of value addition with undue cost of poor transportation, low quality and mismanaged distribution. Lack of marketing and supply chain in dairy industry is another bottleneck of development. The results of this study call for the role of government in the development of dairy sector. The government needs to provide critical support for the promotion of smallholder producers in peri urban areas.

Khan *et al*., (2008) performed a research study to know the productive performance of buffaloes kept at Livestock Farm of KPK Agricultural University, Peshawar, Pakistan. The data of buffalo herd was analyzed on the basis of daily, morning, evening and monthly milk yield as well as in different seasons of the year. The average highest and lowest milk production was found from 6-9 liters and 4-5 liters daily per buffalo. The season on individual yearly basis did not

show uniform pattern of highest yield trend but the comparative analysis on cumulative basis showed highest trend in summer, followed by autumn, spring and winter. They concluded from the study that milk production of buffaloes can be maintained at their maximum potential provided some good management practices are established at the farm e.g. de worming in regular intervals, feeding balanced ration and concentrates, ample quantity of drinking water and special care for seasonal requirement of the species both in terms of feeding and management.

Sarker and Ghosh(2008) conducted a research study for the analysis of milk production in West Bengal India estimating the cost, net return and relative profitability of cooperative and non-cooperative farms. Primary data was collected from 320 milk producers for both cooperative and non-cooperative dairy farming households using stratified random sampling technique. The farms were further categorized as good-cooperative, bad cooperative, good non-cooperative and bad non-cooperative farms. Profitability was analyzed by using Net Present Value (NPV), Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR) for ten years period, the average life span of milk cattle. Factors influencing the production of milk per unit and for explanation of the variation in output caused by inputs, cobb-Douglas production function was used. Results showed that major cost item was variable cost (85%) and the contribution of fixed cost remained 14 % for all categories of farms. The average net benefit and benefit-cost ratio for all good cooperative farms were considerably higher and significant than the non-cooperative farms. Results of NPV, AAM, BCR, and IRR are considerably higher for all good cooperative farms as compare with other farms. Results from regression analysis also confirm the same results for all types of farms. Good cooperative farms have higher profitability of Rs.29.12/day/animal than other farms of Rs.17.24/day/animal whereas there was no significant difference among the average cost of the various farms. They suggested that govt; and other institutions should provide immediate special packages to non-cooperative farms to make dairy farms profitable, employment generative and higher value addition in agricultural sector.

Khan and Usmani (2005) performed a research study in the rural mountainous areas of North West Frontier Province of Pakistan to characterize small holder's subsistence livestock production system. Eighty two livestock farmers were interviewed in 16 villages of Batagram and Mansehra districts. It was estimated that gross profit averaged Rs.32475 per buffalo, Rs.3320 per sheep and Rs.5314 per goat per year. Gross margin for cattle was negative and the farmers were sustaining a loss of Rs.1960 per cow per year. Keeping in view the poor production environments, the overall performance of animals was encouraging and offered considerable scope for improvement.

Kopeck (2002) analyzed the relations between the level of milk yield and the economic results of dairy cows breeding on the base of operational and economic data received from 135 agricultural enterprises. The analysis was aiming at the optimization of milk production expressed by means of the cost function. By evaluating the above-mentioned relations, there was recorded a tendency of the faster growth of milk yield compared to the costs for market milk for one feeding

day of a dairy cow. On the base of the expense function, there was expressed the maximum profit for a liter of market milk, the maximum profit for a dairy cow per year and the interval of profitability of milk production in 2000.

Franks (2001) studied economics of milk production between 1987-88 and 1996-97 in England and Wales, JK. The results of the study show how smaller herds, came under increased financial pressure. In part this was because the milk price premium ceased to be captured by smaller dairy enterprises after 1994-95. Predictions of the future structure of dairy production to 2006 are also presented. Two methodologies suggest between 9000 and 11000 dairy farms will cease milk production by 2006. These estimates are based on 1996-97 dairy enterprise data, and June census data. But the lower milk prices and poor profitability since 1996-97, together with technological developments such as sexed semen; suggest these predictions may underestimate the number of dairy farms ceasing milk production.

Anwar and Younas (2000) analyzed cost of milk production in district Toba Tek Singh, Punjab, Pakistan at farm level during the months of January and February. Farms were categorized on the basis of milk animals as Rural subsistence (1-3 milk animals), Semi commercial herd (4-10 milk animals) and Commercial herd (>10 milk animals). Cost was estimated for labor input, Capital input and feeding expenditures (fodder and concentrates) on animals. The cost per liter of milk for rural subsistence, semi commercial, commercial herds and overall was Rs.5.09, 5.06, 4.70 and 5.04 respectively. On average, rural subsistence per lactation milk production remained worth Rs.17200.40, semi commercial Rs.16843.19, and commercial herds worth Rs.18681.19. Total cost for rural subsistence, semi commercial and commercial herd was Rs.17020, 15941.04 and 15607.96 respectively. The cost-benefit ratio determined as 1:1, 1:1.06 and 1:1.19 for the three categories and 1: 1.08 for overall respectively showing that milk production is profitable in the area and commercial herds are the major beneficiaries of milk production.

Kerr *et al*., (2000) conducted a study on the dairy milk production in Queensland. The data for survey were obtained through personal interviews, involving 37-86% of farmers in 4 dairying districts in Queensland. The results of the study showed that the farms that adopted proven management aids and having advance technology have higher levels of milk production that is closer to achievable milk production. Measured milk yield relative to achievable milk production for 2 regions was significantly different from the other 2, while the age of the main decision maker was also a significant factor.

Jaouen and Jaouen (2000) investigated different aspects of milk production and processing on cattle, sheep and goat farms in France. A survey was carried out among 280 farms with more than 10 goats, 5 cows or 30 ewes and processing (part of) its milk production. Results were presented in a survey carried out among an unknown number of goat farms with milk productions between less than 10000 and more than 70000 1iters/year. Labor requirements on family farms were also described, as well as marketing of milk products (mainly cheeses). Returns from milk and cheese production on farms of different sizes are compared, and future prospects for on-farm processing are discussed.

Rajendran and Prabaharan (2000) studied economics of milk production in India, a sample of 360 farmers were taken and categorized them as landless laborers, marginal farmers, small farmers or large farmers. Data were collected by personal interview on areas such as feed used (green fodder, dry fodder or concentrates), types of labor used (child, adult, male, female), number of hours employed, and wages for different categories of labor. Results are discussed with reference to feed consumption, labor input for cow vs. buffalo production, and use of hired vs. family labor.

A brief review of literature shows different costs of milk production and the contribution of different inputs to it. It also highlights some of the factors which affect milk production. To the best of my knowledge, so far no study has undertaken the task of profitability analysis of milk production in District Peshawar. This has created a gap in literature. The present is an effort to fill this gap.

## 3. Data and Methodology

This section provides information about the data sources, variables definition, sampling procedure and the theoretical models that were used for empirical analysis. The details are as follows:

### 3.1 Sample Size

District Peshawar being the representative area of milk production in khyberpakhtunkhwa forms the universe of the study. However, this study was conducted in two purposively selected villages namely Kalu Khel and Kala situated in the surroundings of the well known animal market Kala Mandi of district Peshawar. These villages have been purposively selected because the main occupation of most of the households in these villages is dairy farming and milk production is comparatively higher, used both for the domestic and commercial purposes.

Both primary and secondary data were used to meet the objectives of the study. For the collection of primary data, a comprehensive questionnaire was designed in the light of the objectives of the study. For examine the validity and accuracy of the interview schedule, it was pre tested in the field. After pretesting, changes and modifications were incorporated and interview schedule was finalized for data collection. Face to face interviews were conducted for the profitability analysis of milk production in district Peshawar as well as for studying the general characteristics such as respondent's age, education and experience in keeping livestock.

An informal survey of the area showed that the number of households in Kalu khel and Kala villages is 350 and 154 respectively making a total of 504 households. Whereas, the number of dairy farmers in both the villages is 333, out of which 252 farmers belong to Kalu khel and 81 farmers belong to Kala village. However, the dairy farmers in both the villages are further categorized into rural subsistence (1 up to 3 adult milk animals), semi commercial (4 upto10 adult milk animals) and commercial Dairy farmers (above 10 adult milk animals). The

sample size and variation in data usually affect the quantity and quality of information obtaining from the survey given the limitations in terms of respondents availability, cost efforts, data management, travelling and time. It was decided to interview 100 respondents. Hence, a sample size of 30% (i.e. 100) dairy farmers was chosen proportionally representing all types of farmers involved in the dairy farming activities. The details are given in table 2 which is given as below:

**Table 2: Categorization of the dairy farmers on the basis of farm Size**

| Village Name | Farm Type | No of Dairy Farmers | Sample Size |
|---|---|---|---|
| Kalu Khel | Rural subsistence Dairy farmers (1 upto 3 adult milk animals) | 145 | 44 |
| | Semi commercial Dairy farmers (4 upto 10 adult milk animals) | 84 | 25 |
| | Commercial dairy farmers (above 10 adult milk animals) | 23 | 07 |
| Kala | Rural subsistence Dairy farmers (1 upto 3 adult milk animals) | 30 | 09 |
| | Semi commercial Dairy farmers (4 upto 10 adult milk animals) | 37 | 11 |
| | Commercial Dairy farmers (above 10 adult milk animals) | 14 | 04 |
| Total | | 333 | 100 |

Source: Field Survey, 2015.

### 3.2 Analytical Framework

The methodology that was used to achieve the stated objectives of this study was divided into two main parts given below:

#### 3.2.1 COST ANALYSIS

The estimation of cost of production is an important item of information necessary for developing rational price policy and development strategies of milk production. The costs of milk production cover both the variable costs and the fixed costs.

**(a)Variable costs include:**

**(i) Feed costs:** - Feed costs are the main important constituents of direct costs of milk production. Feed costs include mainly the cost for green fodder, dry fodder and concentrate fodder (CF). Prevalent market prices were used to work out the feed cost per year (in Rs.) to each milk animal.

**(ii) Labor costs:** Hired labor and family labor are the important constituents of milk production. In study area, permanent and family labor was observed during the survey. There was no temporary labor in the farms. Value of hired labor was evaluated from the money wage (in Rs.) paid by the milk producer farmer. The valuation of family Labor was imputed at the prevailing market wage rate for family labor hours.

**(b)Fixed costs include:**

**(i) Interest on capital**: Interest on capital (including milk animal) was evaluated at the rate of 6% per annum i.e. half of the normal interest rate ( Anwar and Younas, 2000) on the present value of fixed assets. The interest on working capital was not computed as there was regular flow of income from milk, which was utilized for the working expanses (V.P. Sharma & R. V. Singh, 1994).

**(ii) Depreciation**: In case of milk animal, 10% deprecation cost was charged on the average value of the animal (Sharma & Singh, 1994). Also depreciation cost was calculated at the rate of 10% for shed, equipments and utensils utilized during the year.

**(iii) Miscellaneous expenses**: These include the expenditures on health care, veterinary and AI expenses, bull service, electricity and water charges etc.

### 3.2.2 PROFITABILITY ANALYSIS

The analysis of profitability was carried out by the use of financial evaluation measures like benefit-cost ratio, net profit and return to scale. The following procedure was used (Garcia et al., 2003) to find out the net profit of the dairy farmer after the deduction of all costs of production:

**Total receipts** = Milk production+ Farm yard manure+ Calves + Government Payments (if any)

**- Total Expenses** = Variable costs+ Fixed costs + Paid interest on liabilities

= **Net cash farm** - Depreciation cost

= **Farm income** - Opportunity costs (Calculated interest on own capital + Calculated cost on family labor)

= **Dairy Farmer Net Profit** ----------

### 3.3.3 BENEFIT - COST RATIO

To examine the profitability of the dairy farmers, the following formula of benefit cost ratio was used following Shah et al., 2009, Anwar and Younus, 2000).

BCR = TFB/TFC

Where,

BCR = is the benefit cost ratio of the farmers milk production per year.

TFB = is the total farmers benefit/profit from milk production per animal per year.

TFC = is the total farmer cost on milk production per animal per year.

Moreover, the TFB was computed by adding income from milk production, farmyard manure and income from the sale of calves per animal per year. Similarly, TFC was computed by adding the initial fixed cost and total variable

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animal per year.

## 4. Results and Discussion

The present section shows the results of the study. The first part deals with the general characteristics of the sampled respondents such as household size, age, education level and experience in dairy farming etc. The second part presents the profile of live stock kept by the sample respondents of the study area. The last part presents results of the analysis pertaining to milk production in the study area.

### 4.1 GENERAL CHARACTERISTICS OF THE RESPONDENTS

This section shows the general characteristics of the sampled respondents.

#### 4.1.1 Education Level

Different studies have been carried out (Srivasrava R.K. et al., 2003, Farooq.A. et al., 2007) which reveals that literacy status of farmers is an important variable, which influence the grower's receptiveness and responsiveness to innovation and resource allocation efficiency. Hence the literacy rate plays a significant role in human resources development. But it does not truly reflect the development stage of society; hence the level of human capital formation is generally measured through the mean number of schooling years (Sharif, 1983).

**Table 3: Educational Status of Sampled Respondents by Dairy farm category**

| Variables | Category wise dairy farms | | | Total |
|---|---|---|---|---|
| | Rural subsistence | Semi commercial | Commercial | |
| | Percent of Respondents | | | |
| Illiterate | 35 | 9 | 8 | 52 |
| Education level | | | | |
| Primary | 12 | 19 | 0 | 31 |
| Middle | 3 | 6 | 0 | 9 |
| Metric and above | 3 | 2 | 3 | 8 |
| Total | 53 | 36 | 11 | 100 |

Source: Field Survey, 2015

Data with respect to literacy status of the sampled respondents were collected on the basis of their schooling years, which were categorized in primary, middle, metric and above metric. In order to know the composition of the literate population of the respondents, it was found that about 52% respondents were illiterate and the remaining 48% respondents were literate having different level of education, which is below national level of 60% and provincial level of 65% for

rural male population (Govt; of KPK, 2011). The main reason of low literacy rate of dairy farmers may be their tendency towards live stock keeping. Out of literate thirty one percent of the respondents were educated at Primary level education and the rest 17% of the respondents had middle to metric and above metric level education as shown in table 3.

### 4.1.2 Age of the Respondents

The age of the respondents is considered as significant factor to accept or reject the new idea or information. The respondents were categorized into three age groups viz; young (31-40 years), middle (41-50 years) and old age (51 and above). It is remarkable that majority of the respondents (67%) belonged to the age group of (41 to 50 years), followed by 23 and 10 percent respondents were belonging to the age group of (31-40 years) and (51 and above) respectively. It is obvious that most of the mature age group people are involved in dairy farming in the study area. Which is a positive sign for the improvement of the dairy farming industry as dairy farming is a laborious work and farmers need to be energetic enough to do the hard labor of dairy farming.

**Table 4: Age of the Respondents by Dairy farm category**

| Age | Dairy farm category | | | Total |
|---|---|---|---|---|
| | Rural subsistence | Semi commercial | Commercial | |
| | Percent of respondents | | | |
| 31-40 | 8 | 0 | 2 | 10 |
| 41-50 | 34 | 29 | 4 | 67 |
| 51 and above | 11 | 7 | 5 | 23 |
| Total | 53 | 36 | 11 | 100 |

Source: Field Survey. 2015

### 4.1.3 Professional experience

In study area, dairy farming was the main source of income generation for the respondents. Experience also plays an important role in dairy farming. An experienced dairy farmer uses his resources efficiently to produce milk. He wisely manages his dairy farm and takes care of his milking animals seriously. Twelve percent of the dairy farmers were having experience of 11 to 15 years; sixty one percent were having 16 to 20 years experience while the remaining twenty one percent were having 21 and above year's experience as depicted in Table 5.

**Table 5: Experience of dairy farmers (years) by dairy farm categories (in% age)**

| Experience (years) | Dairy farm category | | | Total |
|---|---|---|---|---|
| | Rural | Semi | commercial | |

| | subsistence | commercial | | |
|---|---|---|---|---|
| 11-15 | 5 | 7 | 0 | 12 |
| 16-20 | 35 | 21 | 05 | 61 |
| 21and above | 13 | 08 | 06 | 27 |
| Total | 53 | 36 | 11 | 100 |

- Source: Field Survey, 2015

### 4.1.4 Family Size of the sample house holds

Size of the household may have an important influence on the labor supply behavior of household members and the choice of occupation to be adopted by them (Elahi et al., 1983). As a result the information on the size of household was collected during the survey. The mean family size (Mean ± SE) in the studied households was 8.6± 0.268. However, the average family size for commercial dairy farmer (13.5 ± 1.193) was greater than the rural subsistence (7.48 ± 0.221) and semi commercial (8.9 ± 0.235). There was a significant difference in family size observed among all the three categories of dairy farms. Also the results agree with the reports of ILCA (1990).

**Table 6: Family Size of the Sample households by farm categories**

| Dairy Farms | Number | Mean ± SE | Sig. P(≤ 0.05) |
|---|---|---|---|
| Rural Subsistence | 53 | 7.4 ± 0.221 | .000 |
| Semi Commercial | 36 | 8.9 ± 0.235 | |
| Commercial | 11 | 13.5 ± 1.193 | |
| Total | 100 | 8.6 ± 0.268 | |

Source: Field Survey. 2015.

Sig. = Significant value, SE = Standard Error of mean

### 4.1.5 Dairy farm size

The role of farm size remained quite controversial e.g. chaudhry et al, 1985 and Helbag, 1996 reported that small farm size are more productive as compared to large farms in Pakistan and conversely; Griffin, 1970 found a positive relationship between farm size and productivity.

Data regarding dairy farm size showed that almost all the respondents (100%) belonging to rural subsistence and semi commercial categories in the study area had their farm size less than one kanal of area. It is remarkable to note that more than a half (54%) o f the respondents belonging to commercial dairy farmers had farm size 01 up to 02 kanal area while the remaining 46% had an area of 2.1 up to 04 kanal for their dairy farm as depicted in table-07:

**Table 7: Dairy farm size by dairy farm category**

| | Dairy farm category | |
|---|---|---|

| Farm size (Kanal) | Rural Subsistence | Semi Commercial | Commercial | Total |
|---|---|---|---|---|
| < 01 | 100 | 100 | 0 | 89 |
| 01-02 | 0 | 0 | 46 | 5 |
| 02-04 | 0 | 0 | 54 | 6 |

Source: Field Survey. 2015

### 4.1.6 Farm structure

During survey in the study area, structure of dairy farms was also taken into consideration. It was observed that majority of the respondents (85%) had kacha cum pakka farms made from mud and bricks, 11% respondents had kacha farms made only from mud and only 4% had pakka farms made from bricks as given in table 8.

**Table 8: Farm Structure**

| Variable | Dairy farm category | | | Total |
|---|---|---|---|---|
| | Rural Subsistence | Semi Commercial | Commercial | |
| Kacha | 21 | 00 | 00 | 11 |
| Kacha-Pakka | 79 | 100 | 64 | 85 |
| Pakka | 00 | 00 | 36 | 04 |

Source: Field Survey. 2015

### 4.1.7: Average number of animals per dairy farm category:

It was interesting to note that all the three categories had an excess capacity for keeping animals. For example, on average rural subsistence dairy farmer had a capacity of keeping twelve animals while it was keeping only four animals. Similarly, semi commercial dairy farmer had a capacity of sixteen animals but there were only eight animals kept. In the same manner, commercial dairy farmers had a capacity of 75 animals and they were keeping 59 animals on average as depicted in table 9.

**Table 9: Average Farm capacity and number of animals per dairy farm**

| Farm category | Farm capacity(no of animals) | Total live stock(no) |
|---|---|---|
| Rural subsistence | 12 | 04 |
| Semi commercial | 16 | 08 |
| Commercial | 75 | 59 |

Source: Field Survey, 2015

### 4.1.8 Herd composition and milking animals:

Due to limited agricultural land holdings, existing cropping pattern and non availability of pasture land; people usually were keeping buffaloes, cows, bull and donkeys. Mixed herding system was prevailing in the study area. But goats and sheep were not present in the dairy farms. They were kept in separate herds for the purpose of milk production for home consumption, meat and wool production and for earning cash income. Dairy farmers were keeping a variety of livestock species depending upon their needs, availability of fodder and adoptability of animals to local environment etc. Results in the study area show that among other milk animals, on average buffaloes were kept at higher proportion (55) in commercial dairy farm category while in semi commercial category, each farmer kept 7 buffaloes as shown in table 10.

**Table10: Herd composition and milking animals**

| Dairy farm category | Herd composition | | | Milking Animals | |
|---|---|---|---|---|---|
| | Buffalo | cow | Other Animals (Bull, Ox, Donkey) | Buffalo | Cow |
| Rural subsistence | 1.38 | 0.40 | 0.24 | 1.15 | 0.40 |
| Semi commercial | 7.22 | 0.55 | 1.0 | 5.86 | 0.55 |
| Commercial | 54.10 | 3.10 | 1.0 | 52.10 | 3.10 |
| All | 9.10 | 1.29 | 0.60 | 8.45 | 1.29 |

Source: Field Survey. 2015

Different types of animals kept by the dairy farmers in the study area are shown in the table 10. Results indicated that there is no such big difference between the total herd composition and the milking animals because no one is ready in dairy farming to keep dry animals in the farm. The reason may be the higher feeding cost of animals, higher cost involved in their management and small cultivable land to meet the fodder needs of the animals.

## 4.2 MILK PRODUCTION

Milk is the major live stock product and the key income generating item. The daily milk production varies from rural subsistence to the semi commercial and to the commercial dairy farmers as depicted in table 11. The table reveals that 92.28 % of the milk produced comes from buffaloes followed by cows which contribute 7.71 % towards the total milk production in the study area.

**Table11. Average milk production (liters) per day per animal and total production**

| Type of animal | Dairy farm Category | | | All | No of animals | Total production | % age |
|---|---|---|---|---|---|---|---|
| | Rural Subsistence | Semi Commercial | Commercial | | | | |
| Buffalo | 3.64 | 5.75 | 6.45 | 4.71 | 928 | 4370.88 | 92.28 |
| Cow | 5.65 | Nil | 8.20 | 6.64 | 55 | 365.2 | 7.71 |

Source: Field Survey. 2015

On overall basis, cow produced on average 6.64 liters of milk per day followed by buffalo 4.71 liters per day per animal. The reason for more milk production of cow is the improved breed of cow (Sahiwali). Within categories, on average commercial dairy farmers produced 6.45 liters, semi commercial produced 5.75 liters and rural subsistence produced 3.64 liters per buffalo per day. The large production of milk by commercial dairy farmer was due to the fact that they feed good and balanced amount of concentrates and other fodders to the milking animals along with good management practices. Similarly, commercial dairy farmers are leading in milk production from cow. On average, they produce 8.20 liters of milk from cow per day, which is greater than 5.65 liters of milk per cow per day of rural subsistence dairy farmer as shown in table 11. Whereas no dairy farm was found having cows in semi commercial dairy farmers. Although cow produces more milk than buffalo, the reason for keeping buffalo in the farms is that buffalo milk is rich in fat contents and is much liked by the consumer as compare to cow milk in the market.

### 4.2.1 Lactation period of different milk animals

The average lactation period of milk animals in the study area is given in table 12. Buffalo has the lactation period of 11.04 months while the cow has 10.98 months lactation period. Duration of lactation period in rural subsistence, semi commercial and commercial dairy farms for buffalo was 11.26, 11.15 and 10.62 respectively and for cow was 10.93, 11.00 and 11.00 in respective categories as shown in table 12.

**Table 12. Average Lactation period of Milk Animals (Months)**

| Type of Animal | Dairy Farm Category | | | All |
|---|---|---|---|---|
| | Rural subsistence | Semi Commercial | Commercial | |
| Lactation Months buffalo | 11.26 | 11.16 | 10.62 | 11.04 |
| Lactation Months cow | 10.93 | 11.00 | 11.00 | 10.98 |

Source: Field Survey. 2015

### 4.2.2 Average milk production per animal per day by lactation sub-periods:

In order to examine the reduction of production of milk during different stages of lactation period, the total lactation period was distributed among four quarters. Whereas each quarter contained three months duration. On overall basis, results indicate that buffalo produced 8.26 liters in first quarter, 6.27 liters in second, 4.11 in third and 3.79 liters in fourth quarter. Similarly cow produced 10.15 liters in first quarter, 8.15 in second, 6.65 in third and 4.65 liters in fourth quarter showing a decreasing trend of round about two liters in milk production as shown in table 13.

**Table13. Average Milk Production per day per animal by lactation Sub-periods:**

| Lactation sub- periods | Production by Dairy farm category | | | | | | All | |
|---|---|---|---|---|---|---|---|---|
| | Rural subsistence | | Semi commercial | | Commercial | | | |
| | Buffalo | Cow | Buffalo | Cow | Buffalo | Cow | Buffalo | Cow |
| 1st Quarter (liters) | 7.43 | 8.00 | 8.75 | nil | 9.45 | 13.60 | 8.26 | 10.15 |
| 2nd Quarter (liters) | 5.46 | 6.00 | 6.75 | nil | 7.45 | 11.60 | 6.27 | 8.15 |
| 3rd Quarter (liters) | 4.22 | 5.31 | 3.75 | nil | 4.91 | 8.80 | 4.11 | 6.65 |
| 4th Quarter (liters) | 3.76 | 3.31 | 3.75 | nil | 4.00 | 6.80 | 3.79 | 4.65 |
| All | 3.64 | 5.66 | 5.75 | nil | 6.45 | 8.20 | 4.71 | 6.64 |

Source: Field Survey, 2015

## 4.3 COST OF MILK PRODUCTION

### 4.3.1 Variable Cost Results

Variable costs include green fodder, dry fodder, concentrate , baghass (wastes of sugar beet) costs and labor costs as shown in table 14. Green fodder was almost used for three to four months when the bulk of dry fodder declines at the end of the winter season. However, farmers try at their best to store more feed as a dry fodder for winter season. Barseem, barley, sugar cane stalk and tops as well as maize were used as green fodder for live stock those were kept for the purpose of milk production.

Feeding cost was the most important constituent of the variable cost. On overall basis, average variable cost was recorded as Rs.60160 per lactating animal per year. Average variable cost per animal per year was estimated as Rs.76559.56 in commercial dairy farm followed by Rs.70492.73 in semi commercial and Rs. 49741.07 in rural subsistence dairy farm category. Which is two third of the cost of commercial dairy farm category as shown in table 14. The difference in the average variable costs among the three categories was due to the difference in costs on concentrates and dry fodder.

The labor cost of the total variable cost per animal per year was Rs. 23450.96, Rs.17516.11 and Rs.14286.60 for rural subsistence, semi commercial and commercial dairy farmers respectively.

The higher cost of labor per animal of rural subsistence dairy farmer was due to the fact that ratio of labor employed per animal was high as compare to other two categories as shown in table 14.

**Table 14: Variable cost incurred per animal per year by dairy farm category in district Peshawar**

- Source: Field survey.2015

| Category wise dairy farms | Green fodder cost/ milking animal (Rs.) | Dry fodder cost / milking animal (Rs.) | Conce; cost/ milking animal (Rs.) | Baghass cost/ milking animal(Rs.) | Total feeds cost / milking animal(Rs.) | Labor cost/ milking animal (Rs.) | Average Variable cost per milking animal |
|---|---|---|---|---|---|---|---|
| Rural Subsistence | 12025.47 | 4390.16 | 9719.27 | 914.28 | 26290.11 | 23450.96 | 49741.07 |
| Semi Commercial | 14873.62 | 9111.58 | 27184.68 | 1806.73 | 52976.62 | 17516.11 | 70492.73 |
| Commercial | 14220.06 | 8115.12 | 36674.03 | 3263.76 | 62272.96 | 14286.60 | 76559.56 |
| Total | 13292.21 (32.30) | 6499.62 (16.31) | 18971.82 (46.50) | 1949.51 (4.89) | 39855.37 (100) (66.25) | 20306.33 (33.75) | 60161.70 (100) |

- Note: Figures in parentheses indicate percentage.

### 4.3.2 Fixed Cost Results

The total fixed cost on over all bases was Rs.13382.92 including interest on capital per animal Rs.5098.97, depreciation cost Rs.6591.10 and Miscellaneous cost per animal Rs.1692.85 as shown in table 15. Fixed cost for commercial dairy farmer is Rs.19070.58. This is high as compare to the cost of semi commercial Rs.17382.51 and rural subsistence Rs.9685.76 because commercial dairy farmer purchased costly milking animals and mainly improved breed which raised interest on capital to Rs.6985.90 and depreciation cost to Rs.10062.87 for commercial dairy farmer. There was no remarkable difference in the miscellaneous cost for commercial and semi commercial dairy farmer, may be due to the similar housing patterns adopted by these dairy farmers while in rural subsistence category, miscellaneous cost was Rs.1413.30, which was less as compare to the other two categories. This indicate that the share of depreciation cost was 49.25 percent almost half of the total fixed cost as compare to 38.10 percent share of interest on capital and 12.65 percent share of miscellaneous costs as shown in table 15.

**Table15. Fixed cost per milking animal (Rs.) by dairy farm category.**

| Dairy farm Category | Interest on capital/ milking animal (Rs.) | Depreciation/ milking animal (Rs.) | Misc; cost/ milking animal (Rs.) | Fixed cost/ milking animal (Rs.) |
|---|---|---|---|---|
| Rural subsistence | 3753.93 | 4318.53 | 1413.30 | 9485.76 |
| Semi commercial | 6502.61 | 8876.01 | 2003.89 | 17382.51 |
| Commercial | 6985.90 | 10062.87 | 2021.80 | 19070.58 |

| | | | | |
|---|---|---|---|---|
| Total | 5098.97<br>(38.10) | 6591.10<br>(49.25) | 1692.85<br>(12.65) | 13382.92<br>(100) |

- Source: Field Survey, 2015.
- Note: Figures in parenthesis indicate percentage.

### 4.3.3 Average total cost incurred per milking animal per year

Average total cost per milking animal was estimated by adding fixed and variable cost per animal per year. On overall basis, the value of average fixed cost and average variable cost was estimated as Rs.13382.92 and Rs.60161.71 giving a total average cost of Rs.73544.63 per milk animal per year. This shows that the contribution of fixed cost was 18.20 percent while that of variable cost was 81.80 percent in the total cost per milk animal per year.

**Table 16: Average total cost incurred per animal per year by dairy farm category**

| Dairy Farm Category | Fixed cost/ milking animal | Variable cost/ milking animal | Total cost per milking animal |
|---|---|---|---|
| Rural Subsistence | 9485.76 | 49741.07 | 59226.83 |
| Semi Commercial | 17382.51 | 70492.74 | 87875.25 |
| Commercial | 19070.57 | 76559.57 | 95630.14 |
| Total | 13382.92<br>(18.20) | 60161.71<br>(81.80) | 73544.63<br>(100) |

- Source: Field Survey, 2015.
- Note: Figures in parenthesis indicate percentage.

### 4.3.4 Economics of milk production by farm category

Table 17 presents the economics of milk production by dairy farm category in district Peshawar. Prevalent market price of milk at farm gate was taken for the calculation of gross returns from milk. On average, the value of milk produced per animal per year was estimated as Rs.75874.62, Rs.91512.85 and Rs.107065.97 for rural subsistence, semi commercial and commercial dairy farmers respectively.

The data obtained from 100 respondents in the study area indicated that the average total income from milk per animal per year was Rs.61758.37, Rs.96261.03 and Rs.110396.96 for rural subsistence, semi commercial and commercial dairy farmer per animal per year respectively. Similarly, the average total cost per milk animal per year was Rs.59226.83, Rs.87875.25, and Rs.95630.14 and cost per liter of milk produced was computed Rs.57.66, Rs.52.65 and Rs.46.71 for rural subsistence, semi commercial and commercial dairy farmers. The benefit cost ratio was recorded as 1.04, 1.09, and 1.15 for rural subsistence, semi commercial and commercial dairy farmer respectively. Net profit obtained was higher for commercial dairy farmers (Rs.14828.78) per animal

per year as compare to semi commercial (Rs.8075.03) and rural subsistence (Rs.2343.78). On over all bases, total income per animal was estimated as Rs.79325.01 and total cost per animal was recorded as Rs.73544.63 and the benefit cost ratio was obtained as 1.07 depicted in table 17.

**Table 17. Economics of Milk Production per Animal per Year by Dairy Farm Category.**

| | **Categories of dairy farmers** | | | **All (100)** |
|---|---|---|---|---|
| | **Rural Subsistence (53)** | **Semi Commercial (36)** | **Commercial (11)** | |
| Milk Production(liters) | 1027.00 | 1669.52 | 2047.14 | 1370.52 |
| Price per Liter(Rs.) | 56.69 | 55.00 | 52.27 | 55.60 |
| Income from Milk production (Rs.) | 58220.63 | 91823.60 | 107004.01 | 75395.43 |
| FYM Income (Rs.) | 3537.74 | 2104.10 | 1324.81 | 2778.20 |
| Calves Income (Rs.) | Nil | 2333.33 | 2068.14 | 2271.26 |
| Total Income (Rs.) | 61758.37 | 96261.03 | 110396.96 | 79325.01 |
| Total Cost per Animal (Rs.) | 59226.83 | 87875.25 | 95630.14 | 73544.63 |
| Cost per Liter (Rs.) | 57.66 | 52.64 | 46.71 | 53.66 |
| Net Profit (Rs.) | 2343.78 | 8075.03 | 14828.78 | 5780.38 |
| Benefit-Cost Ratio | 1.04 | 1.09 | 1.15 | 1.07 |

- Source: Field Survey, 2015

The commercial dairy farmers were earning greater profit because of large herd size, high yielding animals, low labor cost, fodder resources and their awareness about modern production practices. The findings of this study are in line with the findings of Anwar and Younas, (2000) and Goswami and Rao, (1992) who reported that benefit-cost ratio was the highest for large farms followed by medium farms.

**Conclusion**

This study was conducted during July 2015 in district Peshawar with the objectives to analyze the profitability of dairy farming enterprise. One hundred dairy farmers were selected from the two purposively selected villages in district Peshawar. The sampled dairy farmers were categorized into three categorieson the basis of number of milk animals i.e. rural subsistence (1-3 adult milk animals), semi commercial (4-10 adult milk animals) and commercial dairy farmers (10< adult milk animals).The results showed that average fixed cost per animal per year was Rs.9485.76, Rs.17382.51 and Rs.19070.57 and average variable cost was estimated as Rs.49741.07, Rs.70492.74 and Rs.76559.57 for rural subsistence, semi commercial and commercial dairy farmers respectively. On an average, a milk animal produced milk per lactation worth Rs.58220.63, Rs.91823.60 and Rs.107004.01 in the rural subsistence, semi commercial and commercial dairy farms. The benefit-cost ratio for commercial dairy farmer was noted as 1.15 which was higher than those of semi commercial 1.09 and rural subsistence 1.04.

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