PRODUCTIVITY ANALYSIS OF COW FARMING IN PUTALIBAZAR MUNICIPALITY OF SYANGJA DISTRICT

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RECOMMENDATION LETTER

This thesis entitled **Productivity Analysis of Cow Farming in Putalibazar Municipality of Syangja District** has been completed by Mr. Saphar Shrestha under my guidance and supervision in partial fulfillment of the requirements for the Degree of Master of Arts in Economics.

I recommend it for approval to the evaluation committee

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LETTER OF APPROVAL

This is to certify that the thesis entitled **Productivity Analysis of Cow Farming in Putalibazar Municipality of Syangja District** written and submitted by Mr. Saphar Shrestha has been examined. It has been declared successful for fulfillment of the academic requirements toward the completion of Master of Arts of Economics

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ABBREVIATON AND ACRONYMS

CBS	Central Bureau of Statistics
CD	Cob-Douglas
CEDECON	Central Department of Economics
CES	Constant Elasticity of Substitution
CRS	Constant Returns to Scale
DDC	District Development Committee
DRS	Decreasing Returns to Scale
FAO	Food and Agriculture Organization
FY	Fiscal Year
GDP	Gross Domestic Production
INGO	International Non- Government Organization
IRS	Increasing Returns to Scale
MP	Marginal Propensity
MPP_K	Marginal Physical Productivity of Capital
MPP_L	Marginal Physical Productivity of Labor
MRTS	Marginal Rate of Technical Substitutions
MT	Metric Tons
NDDB	National Dairy Development Board
NPC	Nepal Population Clock
No.	Number
OLS	Ordinary Least Square
Rs	Rupees
TE	Technical Efficiency
US	United State
VDC	Village Development Committee
WB	World Bank

CHAPTER - I

INTRODUCTION

1.1 Background of the Study

Nepal is a small, independent, least developed, agricultural country and landlocked between its two large neighbouring countries namely India and China. It has 1, 47,181 square km area and within this boundary on 1 January 2016, the population of Nepal was estimated to be 28,679,524 people. This is an increase of 1.18 percent (335 312 people) compared to population of 28,344,212 the year before (NPC, 2016). It is a least developed country with per capita income at current price is estimated to be 690 US $. Approximately more than 80 percent of the population lives in rural areas and agriculture is the main occupation of rural areas. According to the WB report 2015, agriculture contributes about 34.35 percent (at constant prices) to GDP.

Agriculture in Nepal has long been based on subsistence farming, particularly in the hilly regions where peasants derive their living from fragmented plots of land cultivated in difficult conditions. Government programs to introduce irrigation facilities and fertilizers have proved inadequate, their delivery hampered by the mountainous terrain. Population increases and environmental degradation have ensured that the minimal gains in agricultural production, owing more to the extension of arable land than to improvements in farming practices, have been cancelled out. Once an exporter of rice, Nepal now has a food deficit. Most of the populations of the Nepal are engaged in agricultural sector. Almost two third of the total population are directly or indirectly involved in agricultural sector. Agriculture sector covers all the activities of production and supply of agro goods or commodity (Shrestha, 2000).

Over 80 percent of the population is involved in agriculture, which constitutes 41 percent of GDP. The seasonal nature of farming leads to widespread underemployment, but programs to grow cash crops and encourage cottage industries have had some success over the years. Two-sevenths of the total land is cultivated, of which 1.5 million hectares produced 3.7

million metric tons of the staple crop of rice in 1999. Wheat and maize together take up a similar portion of the available land, with harvests of 1 million metric tons and 1.5 million metric tons, respectively, in 1999. Production of cash crops increased substantially in the 1970s, and sugarcane, oilseed, tobacco, and potatoes (a staple food in some areas) were the major crops. Agricultural production accounted for about three-fourths of total exports in the late 1980s. As noted earlier, most exports consist of primary agricultural produce which goes to India. In general the majority of Nepalese farmers are subsistence farmers and do not export surplus; this does not prevent a minority in the fertile southern Terai region from being able to do so. Most of the country is mountainous, and there are pockets of food-deficit areas. The difficulties of transportation make it far easier to export across the border to India than to transport surplus to remote mountain regions within Nepal. A considerable livestock population of cattle, goats, and poultry exists, but the quality is poor and produces insufficient food for local needs (CBS, 2012).

Cow farming in Nepal is an ancient farming system still practiced traditionally all over Nepal; commercial cow farming in Nepal is recently introduce and becoming popular between farmers. Commercial cow farming here in Nepal stands for milk production. Cow farming is a source for generating income of Nepali, peoples use to sell the milk on market maximize benefits and survive their lives. Nepal is an agricultural country and there are lots of possibilities in cow or dairy farming. Demands of grass feed dairy products are increasing rapidly in the world, if we export dairy product then earn billions of rupees each year, but there are only few commercials dairy farm started in Nepal. Organic farm Nepal established commercial cow farming in Nepal using the modern technology and produce organic dairy products like milk, cheese and butter. There is Holstein and jersey cows imported from abroad and local cows on farm, main purpose of cow farming is to produce milk. It is strictly prohibited to cut and use the cow or cattle for meat in Nepal. Before starting commercial cow farming in Nepal people used to do cow farming for ritual and cultural purpose (Timsina, 2005).

Cow is a national animal of Nepal. Between Hindu community, cow is a symbol of wealth pray as a Laxmi (goddess of wealth) and every day cow dung used to purify household and

urine to purify from birth, death and other especial occasion, in this way every Nepali family have to have at least a cow farming in traditional way at hut.

An average measure of the efficiency of production is productivity. It can be expressed as the ratio of output to inputs used in the production process, i.e. output per unit of input. When all outputs and inputs are included in the productivity measure it is called total productivity. Outputs and inputs are defined in the total productivity measure as their economic values. The value of outputs minus the value of inputs is a measure of the income generated in a production process. It is a measure of total efficiency of a production process and as such the objective to be maximized in production process. Productivity measures that use one or more inputs or factors, but not all factors, are called partial productivities (Koutosoyiannis, 1997).

According to National Census of Agriculture Nepal 2011/12, 2,280,542 holdings have the 6,430,397 number of cattle's. Out of which 6,214,326 cattle's are local and that of improved are 216,071. In which the number of cattle's below one year are 829,789. 780,486 are local and 49,303 are improved cattle's. 867,394 cattle's are of age between one and three years. And the number local and improved cattle's are 835,369 and 32,024 respectively. Similarly, 4,733,214 numbers of cattle's are of age three and over years where 4,598,470 are local and that of improved are 134,744. In this category, total number of male cattle's are 2,911,194 and the number of female cattle's are 1,822,022. Out of the total number female cattle's of three years and over 1,723,325 are local and that of improved are 98,695. And again 965,125 numbers of cattle's are milking and rest of other i. e. 856,895 cattle's are in dry period on yet not calving.

1.2 Statement of the Problem

Nepal is an agricultural country. Nepali farmer are facing various constraints in the field of agriculture. Traditional and subsistence farming system is still in existence although people are adopting cash farming system. Cow farming is also taken as one of major cash farming, in order of cow milk and the milk product generates the income. And being a profitable occupation than other traditional occupations, cow farming has better prospects for farmer.

Nepal has high demand of milk product than the supply made by the Nepali farmers. So, by increase in the cow farming it may decrease in the import of milk products from abroad and so it result to save the forex stored in the volt of Nepal Rastra Bank.

Putalibazar municipality is one of the municipalities of Syangja district of Gandaki zone. It is the capital of Syangja. According to Nepal census 2011, it had the total population of 30,704 people residing in 8,180 households. The demand of milk product in this area is insufficient with respect to the production of milk. So, insufficient amount of milk are fulfilled by the suppliers of Pokhara, Kaski.

This study may be helpful as it aims to seek the answers of following research questions:

(i) What is the status of cow farming in Putalibazar municipality?
(ii) What is the productivity of cow farming in Putalibazar?
(iii) What are the problems around the measures of commercialized cow farming?

1.3 Objectives of the Study

The general objective of this study is to perform the productivity analysis of cow farming in Putalibazar municipality. And the specific objectives of this study are of:

(i) To analyze the status of cow farming in Putalibazar.

(ii) To estimate the production function of cow farming of Putalibazar municipality.

(iii)To explain the problems and prospects of cow farming in Putalibazar municipality.

1.4 Significance of the Study

Nepal is an agriculture based country. Huge number of populations is involved in agricultural sector, but traditional and subsistence farming system is still in existence. Agriculture sector plays vital and dominant role in economic development. The main significance of this study is to analyze the productivity of cow farming in the study area. And other additional significance of this study, it may helpful to find out and to solve the problems arises in the

commercialized cow farming in Putalibazar municipality of Syangja district. As well as, this study is helpful to point out the prospects of cow farming in Putalibazar municipality. So, this study may help those farmers who are interested to know about the cow farming in the study area of the cow farming.

1.5 Limitations of the Study

Every study has some limitations according to the geographical structure, environment, social status, thinking of local public etc of the study area. Such as, the study held on Putalibazar municipality of Syangja district. So, it may be or may not be represent the extent of the problems for the country as a whole. The study is related only with productivity analysis of cow farming of the study area. The main constraints of the study are time period as well as finance, due to which large sample may not be included in study.

1.6 Organization of the Study

This study has been divided into five chapters. The first chapter is introduction of the study dealing with the background of the study, statement of the study, objectives, significance and limitations of the study. Likewise the second chapter is review of the literature in which theoretical concept of production models, international and national context have been reviewed. The third chapter of this study includes research methodology in which research design, nature and source of data, method of data collection, model specifications, their features and properties have been elaborated. And mainly the methods and tools of data analysis have been described. In the chapter four, the collected data from the study area and secondary data from different sites, journals, books, reports etc have been presented and analyzed. The chapter five which is the last chapter of this study; have been presented summary of the findings, conclusions on the basis of findings of the study and recommendations.

CHAPTER - II

REVIEW OF LITERATURE

Livestock farming is an important component of Nepalese economy and cow farming is one of the major components of livestock farming for milk production. Commercial milk production is directly related to the dairy farming. Many researches have been done in the field of cow farming as well as buffalo farming and milk production or dairy sectors. Among them, some literatures are reviewed here.

2.1 Theoretical Concept

Arrow, Chenery, Minhas and Solow in their new famous paper of 1961 developed the Constant Elasticity of Substitution (CES) function. This function consists of three variables Q, K and L, and three parameters A, and it may be expressed in the form;

$Q = A [\alpha K^{-\theta} + (1-\alpha) L^{-\theta}]^{-1/\theta}$; where Q is the total output, K is capital, and L is labor. A is the efficiency parameter indicating the state of technology and organizational aspects of production. It shows that with technological and/or organizational changes, the efficiency parameter leads to a shift in the production function, α is the distribution parameter or capital intensity factor coefficient concerned with the relative factor shares in the total output, and θ is the substitution parameter which determines the elasticity of substitution.

And $A > 0$; $0 < \alpha < 1$; $\theta > -1$

The CES production function possesses the following properties

(i) The CES function is homogenous of degree one. If we increase the inputs C and L in the CES function by n-fold, output Q will also increase by n-fold.

Thus like the Cobb-Douglas production function, the CES function displays constant returns to scale.

(ii) In the CES production function, the average and marginal products in the variables C and L are homogeneous of degree zero like all linearly homogeneous production functions.

(iii) From the above property, the slope of an isoquant, i.e., the MRTS of capital for labor can be shown to be convex to the origin.

(iv) The parameter (theta) in the CES production function determines the elasticity of substitution. In this function, the elasticity of substitution,

$\sigma = 1/ 1 + \theta$

This shows that the elasticity of substitution is a constant whose magnitude depends on the value of the parameter θ. If $\alpha = 0$, then a = 1. If $\theta = \infty$, then a =0. If $\theta = -0$, then a $=\infty$. This reveals that when a = 1, the CES production function becomes the Cobb-Douglas production function.

If $Q < 0$, then a = – 0; and if в $< \infty$, then $a < 1$. Thus the isoquants for the CES production function range from right angles to straight lines as the elasticity substitution ranges from 0 to.

(v) As a corollary of the above, if L and C inputs are substitutable ∞ for each other an increase in C will require less of L for a given output. As a result, the MP of L will increase. Thus, the MP of an input will increase when the other input is increased (Kwatiah, 2016).

Cobb-Douglas production function is one of the widely used production function used in the economics. C.W Cobb and H. Douglas formulated this function in 1928. They formulated this production function with the ideal assumption that the sum of the elasticities should be equal to one. The strong view that the sum of the elasticities should be one has been dropped out with the criticism of Durand and a new function known as “Power function” came into existence, which is linear in logarithmic form.

The simplest Cobb-Douglas production function model has the following form:

$Q = A L^{\alpha} K^{\beta}$, Where, Q stands for output, L for labor, and K for capital. The parameters A, α, and β are estimated from empirical data. Also $0 < \alpha < 1$, $0 < \beta < 1$. Equivalent is a linear function of the logarithms of the three variables:

Log (Q) = log (A) + α log (L) + β log (K) + u; where residual u is added in the multiplicative form e^u.

In the case where constant returns to scale is present, then $\alpha + \beta = 1$. Alternatively, constant returns to scale may be imposed by putting $\alpha = 1 - \beta$ so that $Q = A L^{\alpha} K^{\beta}$ can be rewritten as:

$Q = A L^{1-\beta} K^{\beta}$, So, $Q/L = A (K/L)^{\beta} e^u$; and taking logarithms of both sides gives

Log (Q/L) = log A + β log (K/L) + U

This second form avoids multicollinearity between log K and log L and also reduces heteroscedasticity if the variance of K is correlated with L (Wynn and Holden, 1974). Features of Cobb-Douglas Production function are;

a) It is homogeneous of degree $\alpha + \beta$. and consists of following conditions;

If $\alpha + \beta > 1$, then depicts increasing returns to scale (IRS)

If $\alpha + \beta = 1$, then depicts constant returns to scale (CRS)

If $\alpha + \beta < 1$, then depicts decreasing returns to scale (DRS)

b) In special case that is $\alpha + \beta = 1$, it is linearly homogeneous.

c) Its isoquants are negatively slopped throughout and strictly convex for positive value of K and L.

d) When it is linearly homogeneous, it is characterized by diminishing returns to each input for all positive levels of K and L.

Cobb-Douglas production function is also a special case of CES Production function. (Economic point, 2013)

Hossain et. al., (2012), argued that the Cobb-Douglas production function is one of the widely used functions in Econometrics. A famous case is the well- known Cobb-Douglas production function introduced by Charles W. Cobb and Paul H. Douglas, although anticipated by Knut Wicksell and, some have argued, J. H. Von Thunen. They have estimated it after studying different industries in the world, for this it is used as a fairly universal law of production. In 1928, Cobb & Douglas published an exploratory and pioneering paper concerning with aggregate time series for manufacturing and mining industries in USA. During their studies, they assumed constant returns to scale and fitted the time series index, number of labor and capital and output in the production function of American industries over a period of 1899 to 1922 A.D. They finally estimated the function as $Y=1.01L^{0.75} K^{0.25}$ and concluded that the contribution share of L was ¾ of total output in American Industries.

2.2 International Context

ANZDEC (2002) has stated the seasonality of milk production is related with 1) Onset of parturition 2) Onset of monsoon and 3) Availability of green grasses. Milk production in Nepal has two seasons; Flush and Lean season. First half of the location period is a flush season i.e. high milk production in which milk is produced for 5-6 months while the second half of 5-6 months is a lean season (lower milk production), Flush season usually starts from august/September and last until January/February that is milk production is increased from the month August/September and contiguous its peak production up to December/January and starts decreasing in January/February. The lean season or the low production period starts from February/March / April and lasts until August / September where milk yield continuous decreasing and reaches lowest in August/ September./ During the flush season, the Lactating cows / Buffaloes after parturition obtain sufficient green grasses to eat during monsoon and early winter months resulting into more milk production. While in the lean season, the availability of green forage reduced to almost zero during spring and summer dry months causing lowest milk production.

FAO (1972) has mentioned milk as the only farm product which can provide a day to day income, but it must be collected every day, except perhaps during the dry season. The farmer should be encouraged to produce milk and to become milk minded by providing a market for his production. A farmer will become accustomed to receiving a certain amount of cash everyday once he possesses money, the milk producer will certainly look for means spending it to improve his standard of living. Thus, encouraging a local trade for various commodities for his family or foods and daily equipment. When a number of farmers in the same village are doing the same thing, this will have considerable impact on the social and economic development of the community as a whole. This has been shown on many occasions where the opening of a milk plant with regular daily collection and payment has improved the standard of living not only of the farmers but also of other people living in the area.

Felipe (2005) performed a compressive study on Cobb-Douglas production model and concluded that the model has very serious implications for today's work in macroeconomics. An algebraic transformation of the identity, under the appropriate assumptions about the data, yields a form that resembles a production function. This implies that if the correct form of the identity, written as a production function, were fitted, one should always conclude that the aggregate production function exhibits constant returns to scale, and that factor markets are competitive. Every firm is a profit maximizer and is very much concerned about the theory of firm in order to make correct decisions regarding what items, how much and how to produce them. All these decisions are directly related with the cost considerations and market situations where the firm is to be operated.

Kon (1972) has mentioned milk is a complex mixture consisting of an emulsion of fat and colloidal dispersion of proteins, together with the milk sugar (lactose) in true solution. These major constituents are accompanied by various minerals, vitamins, enzymes and various minor organic compounds such as citric acid, some of them nitrogenous in nature. The characteristic opaque color of milk is due mainly to the dispersion of the milk proteins and the calcium salts. The composition of milk not only differs from species but varies widely within any one species and even within breeds' races of one species.

The fat of milk is a mixture of the chemical combination of many different fatty acids with glycerol milk proteins consists of casein, a phosphor protein founds only in milk and farming the cured when milk is acidified or re-enacted, together with soluble proteins, mainly L-Lactobunins and B-lacto globulins. Lactose or milk sugar is disaccharide; that is, it consists of two simple sugars in combination, in this instance glucose and gelatos. The milk of the buffalo contains much more fat than cow's milk, rather more non fatty solids and probably rather less riboflavin. The buffalo converts carotene into vitamin a more efficiently than cow and its milk contain only traces of carotene otherwise most of what has been said about cow's milk applies equally to buffalo's milk.

Korir et. al., (2010) have conducted a study on Dairy cattle productivity after the post election crisis in Uasin Gishu District of Kenya. To determine the dairy productivity after the post election crisis was the main objective of this study. The survey has been done in four designated project areas namely, Turbo, Kapseret, Kessess and Ainabkoi. In this study primary data has been collected by use of structured questionnaires from 194 systematically selected farmers. The data has been then analyzed by use of the SPSS. The results of this study showed that 67.53 of the farmers had lactating cows; the average number being 1.2 cows. The numbers of all the livestock categories (lactating, dry, bulls and steers, and calves) reduced after the post election crisis. Despite a higher mean production of 10.67 liters/day for pure breeds than the average production of 7.38 liters/day among the crosses they concluded that this was not significant different and they implied that the milk production of pure bred dairy cattle was yet to be exploited. On this study Korir and his team recommended that the development agencies should focus on all production and management initiatives to enable farmers exploit existing potential.

Rob, Topader and Islam (2010) have conducted a study on Comparative study on the cost benefit between indigenous and cross bred cows reared in rural area of Dinajpur district in Bangladesh. In their study a total of 70 dairy cows (20 crossbred and 50 indigenous) from rural level small and marginal dairy farmers (1-3 cows) have been selected. Relevant information from the individual milk producers have been collected through personal interrogation method with the help of a structured data collection questionnaire prepared for the study. According to this study the cost involvement for feed, treatment and medication of

crossbred cows were significantly higher (P<0.01) than the indigenous dairy cows. They found that the per day milk production was 1.86 ± 0.57 liter in indigenous cow whereas 5.94 ± 3.49 liter was in crossbred cows and income level from milk yields of crossbred cows were 3.19 times higher than the indigenous cows. The cost benefit ratio of rising crossbred and indigenous dairy cows were 1.19 and 1.26, respectively. According to their study the current rearing cost of crossbred cows was 2.71 times higher than indigenous cows. By considering the other traits they concluded that the raising of crossbred cows was more economic than the raising of indigenous cows. Consequently they conclude that the inclusion of a few crossbred cows can increase the income of a dairy entrepreneur which improve the livelihood and provide round the year employment of its family labor.

Sollod (1996) has highlighted the major marketing constraints on dairy products. The main constraints are; delivering milk from farm to plant and plant to market (transport and chilling), lack of strategic marketing plan (future directions and approach, supply demand relation etc.), lack of well defined and optimized marketing channels, lack of public awareness of nutritional benefits and consumer confidence, inability to differentiate between public and private markets, farm inputs not synchronized with farm outputs, etc. He also presents the results the poor marketing. According to him, fewer people, especially children enjoy the nutritional and aesthetic benefits of dairy products, farmers earn less cash income and dairies don't realize their profit potential, dairy animals suffer from malnutrition.

If milking cows and buffaloes are inadequately fed and malnourished, there exist some effects such as ; they produce less milk and proportionately more feed is used to keep them alive (maintenance requirement), they produce more harmful methane gas that is released into air by eructating (belching). The methane gas accumulates in the atmosphere and causes global warming, which will cause suffering for our children. Human treatment should prevent animals from suffering from malnutrition.

Swanepoel, (2014) stated that the objective of the research was to quantify the economic contribution of the Colorado dairy industry. Using an I- O model the industry was analyzed, for each of the four separate sectors within the Colorado dairy industry, dairy producers, fluid milk and butter manufactures, cheese manufactures, ice cream and frozen dessert

manufactures. After estimating the economic contribution of each sector alone, the four individual components were aggregated into one industry. The quantification of the industry allows for future policy decisions to be made with the necessary knowledge, it provides an understanding of the social impact of the dairy industry, details the impacts on related industry, and allows for the long term benefits of the industry to be effectively analyzed.

Primary results generated from the IMPLAN estimation were the total output from each of the four industries; $ 593,525,940, $ 1,601,698,242, $ 766,750,610, $ 61,544,628 respectively. This results in a combined economic contribution of over $ 3 billion to the Colorado regional economy. Dairy producer industry created a total of 2,270 jobs in the economy, fluid milk and butter manufacturing, 1,140 cheese manufacturing 773, and ice cream and frozen dessert manufacturing created a total of 150 jobs in the regional economy. The total dairy industry combined to produce 4,333 jobs in the Colorado economy.

Uotila and Dhanapala (2013) stated that the common need of milk producer is to obtain a fair price for their milk and this is fulfilled through collective marketing. Milk is considered to be one of the most sensitive agricultural commodities, requiring special and timely care, and this can be provided conveniently as well through the collective operation of cooperative dairy societies. Apart from the collection and marketing of milk, other services such as dairy inputs, extension services, veterinary health care, artificial- insemination services, provision of animal feed, fodder seed, planting material, fertilizers and credit, and training and education, can also be provided through cooperatives. These would act as business associations owned and operated by members for their entire benefit.

Many countries are attempting to increase livestock and especially milk production by assisting small- scale farmers, since they are the most numerous and poorest of the population, and very often also landless. Such a policy has a social as well as a commercial purpose since while it provides rural employment, more cash income and diversification away from traditional crop production (by- products), it also enhances the utilization of potential family labour. The farmer cooperative system has proved to be an effective vehicle for livestock development in general and for dairy development in particular in rural areas.

Wanbugu, Opiyo and Lilian (2011) have conducted a study on productivity trend and performance of dairy farming in Kenyan. They had examined the trends in milk productivity and performance of the Kenyan smallholder dairy sector using a nationwide representative panel household data (2000-2010) and cross-sectional data collected in 2010 in the major milk producing areas in their study. Descriptive statistics and gross margin analysis of the dairy enterprise has been used to examine the performance of the dairy sector between zero and non-zero grazing systems, and across different milk sheds. The findings of the study showed a positive trend in milk productivity between 2000 and 2010. However, productivity was higher in higher potential areas and increased up the income quintiles, suggesting that dairy farming could be a preserve of the relatively better off households. Gross margin analysis showed that dairying is an economically viable enterprise in the short-run, with the non-zero grazing system having higher gross margins and therefore, a financial advantage. However, an example of zero grazing for farmers selling milk through the Githunguri farmers' cooperative society indicated that zero grazing dairying can perform well under conditions of collective marketing, good linkage to markets in terms of processing, access to production information, credit as well as other benefits. The major findings of this study is that the greater commercialization of the dairy sub-sector and an increase in smallholder income comes from improved technologies by making the existing resources more productive, as well as policies and actions that deals with the seasonal intra-year variations in production which include creation of a strategic milk reserve, investment in processing of long life dairy products and investment in infrastructure such as roads and electricity.

Zhu and Lansink (2010) have conducted a study on Technical efficiency and productivity differentials of dairy farms in three European countries (Germany, Netherlands and Sweden): the role of Common Agricultural Policy subsidies between 1995- 2004. They had the objectives of their study to investigate technical efficiency and technical efficiency change of specialized German, Dutch and Swedish dairy farms and to compare their relative productivity. Among other objective of their study was to determine the wealth, insurance and coupling effects of subsidies on technical efficiency. However, truly decoupled subsidies (i.e. single farm payments) reflecting the wealth and insurance effect have not been granted in the studied period. For this they analyses ten years data and introduced three variables to

reflect the coupling, and the wealth and insurance effect of subsidies. Furthermore, they compared the performance of the dairy farms in the sample across countries by analyzing their relative productivity.

Researchers analyses ten years data to conduct this study and found the result which showed the greatest average TE for Swedish farms, followed by German and Dutch farms. Average TEC results indicate an increasing trend in the Netherlands and Germany and decreasing trend in Sweden. In German and Swedish dairy farms, larger size, higher degree of specialization, lower share of family labor, more rented land, and lower degree of indebtedness increase TE. However, three exogenous factors including the share of family labor in total labor, the share of rented land in total land and the share of long-term debts in total assets have an opposite effect in the Netherlands compared to that in Germany and Sweden. In contrast to the technical efficiency results, the three countries rank oppositely in terms of relative productivity. On their result, on average for a given set of total inputs the Dutch production technology results in the highest output, followed by the German and Swedish technologies. Relative productivity scores show that German and Swedish dairy farms have potential for improvement in productivity, compared to the production technology in the Netherlands.

Regarding the effects of Common Agricultural Policy subsidies, they found various observations. First, both output-related and input-related subsidies have negative impacts on Technical Efficiency in Germany and the Netherlands, but no significant impacts in Sweden. Second, a higher share of total subsides in total farm income has a negative effect on Technical Efficiency in each country. Third, in each country the farmers' total income become more dependent on subsidies; these changes in farm support have significantly worsened the farmers' performance. Their results imply that a higher degree of coupling in farm support negatively affects farm efficiency. The motivation of farmers to work efficiently is lower when they depend to a higher degree on subsidies as a source of income. Moreover, their results indicate that the composition of subsidies has a much smaller effect on efficiency than does the composition of total farm income. This latter finding is especially of importance in the light of the 2003 Common Agricultural Policy reform, which has decreased the share of coupled subsidies but left the share of subsidies in total income

unaffected. In summary, farm income support of Common Agricultural Policy since the 1992 Common Agricultural Policy reform may have decreased farmers' overall competitiveness by decreasing their technical efficiency.

2.3 National Context

Acharya (2012) has analyzed the livestock farming and cost of buffalo milk production in Ugratara VDC of Kavrepalanchowk district. The general objectives of this research were to study the livestock farming trends in Nepal, to identify per unit (Per liter) cost of milk production of buffaloes according to size of stall, to compare the cost of milk production and price of milk paid by DDC.

From this study, researcher found that per day per milking buffalo average total cost were Rs. 32.80 , Rs. 31.20 and Rs. 29.40 for one, two and three buffalo stalls respectively. And so the single buffalo stall has higher total cost than other big stalls. Therefore, farmers should keep more than one buffalo for milk production to get more profit. Among the cost component feed cost constituted to be the most significant component cost. It varied from Rs. 120.33 for one buffalo stall, 103.18 for two buffalo stall and 92.65 for three buffalo stall respectively. Labor cost varied from Rs 60.50, Rs. 44.25 and Rs. 46.83 for one buffalo stall, two buffalo stall and three buffalo stalls respectively. The labor cost also decreasing when the number of buffalos in stalls was increased.

Aryal (2012) has analyzed a study on the cost aspect of milk production in Tasarpu VDC of Dhading district. Researcher selected 30 farmers as sample to achieve the objectives. In his study, researcher found that per day per milking buffalo average total cost was Rs. 171.54. Out of total cost, feeding cost constituted to be the most significant component. It is found that average feeding cost per day per buffalo was Rs. 91.52. Similarly, labor cost, interest cost, cost of utensils, maintenance cost and medicine cost per day per buffalo were Rs. 60.50., Rs. 12.28, Rs. 3.26, Rs. 2.06, and Rs. 1.92 respectively.

Similarly, it was found that the total income per day per buffalo was Rs. 192.85, profit was Rs. 21.32, total milk production was 6.73 liters and per liter cost of milk production was Rs. 25.77.

Dhakal (1997) has conducted a study on the quality of raw and pasteurized milk in Biratnagar city. Researcher has found the quality of raw milk collected from farmers is very poor in terms of bacterial quality, which has to be improved in s greater way. The direct field visit showed that the livestock keeping system was very poor. The survey shows that farmers did not wash the under properly and again the milking pail was not sanitized properly. Another factor might be that the farmer would bring the milk of previous evening. The chilling centre did not always test acidity. Hence there is always the possibility to come the poor quality milk to the processing plant.

Dhakal (1999) conducted a study on Development of dairy farming, a case study of Gitanagar VDC and conducted that general economic contribution of the people can be raised by making them engaged in dairy farming in modern line. Farmers give equal importance to crops production and dairy farming but the study shows that dairy farming is more attractive to bring positive change in their general economy. Although commercialization of dairy farming does not go back more than two decades, but the study shows that dairy farming is more profitable than the other agricultural activities.

But the low price of the milk in the market is a disincentive for farmers to pursue to dairy farming. While this issue needs to be looked into there is a lot of scope for farmers to diversify into milk product like cheese, flavored milk, flavored yoghurt, and condensed milk, in order to get better value, for the milk they produce.

Ghimre (2015) conducted a study on Productivity Analysis of Bottlers Nepal Limited (Kathmandu Plant) with the major objective of studying the trends of Inputs and output, their degree of association and establishing the relation between the variables using suitable models. He used descriptive, analytical as well as quantitative approach to examine the data and the study is based on secondary data of 11 fiscal years from 2003/04 to 2013/14 to fulfill the objectives. Different statistical tools and model has been used for analysis and interpretation to draw conclusion. Eviews-7 and Microsoft excel 2010 has been used for analysis and calculation purpose. With the use of time series data from Bottlers Nepal Limited (Coca-Cola operations in Nepal) spanning eleven years, from FY 2003/4 to FY 2013/14, trends in output and the input factors (labor and capital) employed has been studied.

Degree of association between the variables has been checked and relation between the output and the factor inputs has been established in the form of simple linear, Cobb-Douglas and Translog production function. From the estimated production function, marginal productivity and elasticity of labor and capital has been observed for determining status of labor and capital utilization.

According to Ghimire, the trend study shows that each variable has an increasing trend in general though each of them consists of unit root, meaning non-stationary. Yearly average percentage raise in capital input has been found higher than the labor input signifying that the efficiency of labor is higher than the efficiency of capital. From the study of correlation between the variables, he found that there exists strong degree of association between the dependent variable (output) with both the explanatory variables (labor and capital). In his study, the value of R^2 has been found significant enough (around 70%) in all three estimated models which shows that all these models are able to establish the relation between inputs and the output. From the simple linear model, the marginal physical productivity of labor and capital found to be 83.66 and 0.01633 respectively. With the Cobb-Douglas model, output elasticity of labor and capital (α and β) were found as 0.83 and 0.55 respectively. According to researcher, summation of two output elasticities gave the value as 1.38 signifying that the production of Bottlers Nepal Limited has been characterized by increasing returns to scale. Followed Augmented Engle-Granger tests for model estimation, suggested that the co-integration evidence is somewhat fragile though the variables are co-integrated, as only simple linear model passed the test. For Error correction model, simple linear model has been taken which passed both the Lagrange Multiplier test and the Histogram test, reveals that the speed of adjustment of the disequilibrium in model is 30.88 % annually.

Jha (1982) conducted a study on cost aspect of milk production at Jhaukhel village, Bhaktapur district. He had selected 40 producers with different sized buffalo stall as his investigation target. According to his major findings, average net maintenance cost per milk buffalo varied from Rs.8.03 to Rs. 10.12 on different stalls and seasons. The feeding cost had been calculated to be 74% of total cost. The average cost per liter milk product on with different sized stalls and seasons ranged from Rs. 2.16 to Rs. 2.69. The per liter cost of milk production was highly correlated with totally yield in different seasons. Higher net

maintenance cost per day per milk buffalo on 4 and above sized stall in all the seasons had observed to be Rs. 9 to Rs. 10.12 followed by 2-3 sized stall with Rs. 8.55 to 9.27 in this study. In single buffalo stall, per day net maintenance cost had observed to least of Rs. 8.03 to Rs. 8.38. In the entire sized group, the net maintenance cost to be higher in the winter season (Rs. 8.58 to Rs. 10.12) and lower in summer season (Rs. 8.03 to Rs. 9.04). Feeding cost constituted the most important items of cost accounting. Average share of feeding cost to total cost in all the three seasons had observed to be higher in 4 and above buffalo stall (70.89% to 73.39%) and the least in one buffalo stall (53.41% to 57.19%). Labor cost counted to be 10% to 25% of the total cost in different sized stalls and seasons. The labor cost was found to be decreasing with the increasing in sized of herd in his study.

Average per day yield of milk in all three seasons was observed to be the highest both on 4 and above followed by 2-3 buffalo sized group stall (3.77 liters to 3.87 liters) and the least being on one buffalo group stall (2.98 liters to 2.87 liters).

Joshi and KC (2001) conducted the research on dairy product and its marketing system and they also discuss about the quality of milk. They states that the problem of milk quality worsens. The quality of milk is sometimes worsening by various factors. Some of them might be done deliberately by farmers for monetary gains but sometimes it happens due to technical mistakes or carelessness in chilling centers. At different unites the raw milk is exposed to adulterations of various kinds added to change the chemical composition of the milk for getting higher payments. At each point in the chain quality control and monitoring activities are not performed effectively. The problem of quality in milk collection will be solved to a greater extant if chilling of milk can be performed as closed to the milk production point as possible. They further states that cost of producing per liter of milk in Nepal is Rs 13.5 to Rs 15.5 depending on type of farm and location. In an international prospect, the cost of milk production in Nepal is considerably higher (50% or more) compared to countries like New Zealand and Australia. The relatively high cost of producing milk of a general low quality is a major constrain in achieving the goals of the Nepalese dairy industry.

Kandel (1997) studied on the cost aspect of milk production in Shivnagar VDC of Chitawan district. The study revealed that on a average per day per milk buffalo net maintenance cost

varied from Rs. 80.65, Rs. 77.9 and Rs. 77.9 for one, two and three buffaloes stall, respectively. Higher net maintenance cost per day was observed on single buffalo stall as compare with that of more than one buffalo stall. The feed cost constitute most important item for the total cost according for about 76.25%, 73% and 73.14% of total cost for one, two and three buffaloes stall respectively, and labor cost according to be 12% to 13% of the total cost for all groups.

The study shows that the average per day yields of milk buffalo for more than one buffalo stall (57 liters to 5.4 liters). The different was because of the fact, large farmers' comparatively maintained superior breed of buffaloes, which are better converter of feeds and consequently gave of as compared to smaller farmers.

Average per liter cost of production of milk higher on single buffalo stall (Rs 14.9) as compared with that of more than one buffalo stalls (Rs 13.19)

DDC is offering Rs. 16 per liter to produce milk from the farmer in this area. There, the preceding explanation clearly reflects that for the uplifting of farmers especially poor one with one buffalo, there is dire need for revamping the existing policy of government of DDC.

Karki (2010) studied the cost of milk production for dairy farmers: A case study of Tansen municipality of Palpa district. A descriptive as well as analytical research design has been used for this study. Primary data has been used as vital role to fulfill the objective of this study and secondary data were also used to make comparisons.

Researcher found that the average cost of milk production in bigger stall is lower due to the decrease in feed cost as the average per liter cost of milk production has ranged from Rs. 20.13, Rs. 18.79 and Rs. 18.19 for one, 2-3 and 4-5 buffalo stall respectively. And the average income per day per milking buffalo according to size of stall has ranges from Rs. 154.96, Rs.161.2 and Rs. 161.2 for 1, 2-3 and 4-5 buffaloes stall respectively. His study showed that per day milk average total cost varied from Rs. 119.78, Rs. 116.53 and Rs. 112.77 for one, 2-3 and 4-5 buffalo stall respectively. He also conclude that the farmers are so much interested in farming cow than buffaloes because in between the fiscal year 1997-98 to 1996-97 the number of milking buffaloes have been increased by 16.6 percent and that of

cow has been increased by 19.5 percent. Beside this the study showed that the feeding cost is decreasing with the increasing size of stalls.

Kharel (2005) conducted a study on the cost aspect of milk production. He described about the dairy farming of Sikkim, India. The main objectives of his study were; to find socio economic condition of farmers, trend of milk collection and marketing and to find the problems and suggest necessary measures for overcoming them in Sikkim. Researcher uses primary as well as secondary source of data. In primary sources, he uses field survey questionnaire and secondary data are gathered through the government, NGO/INGO, National Dairy Development Board, Sikkim milk union journals and so on.

Researcher found that after establishment of milk collection centre, farmers were increased cross breed cows instead of local cows. Total milk collection among samples households was estimated 390 liter per day. After establishment of milk collection centre, the amount of milk sales was increased day by day. Income from selling milk and milk product was Rs. 8340 per year. The dairy income is spent in various items. 25 percent households spend the dairy income in overall domestic expenses. The price of standard milk is Rs 10 to Rs12 per liter which has 4 percent fat and 7.5 percent SNF per liter in milk. The researcher finds several problems in the study area on dairy farming such as problem in credit facilities, veterinary, insurance, fodder, price of milk, improved breed, quality diet etc.

Lindegaard (1993) conducted a research on fodder resource amongst the milk producers in Illam, distribution of buffalo, milk production and productivity in different district of eastern development region of Nepal and this research shows that when a household has a lactating cow, they meet their own demand of milk products and afterward they sell milk if they have any surplus. Thus even though milk sells provide a reasonable possibility for cash income, the household requirement for milk products is given higher priority. He states that most of the weeds feed during the raining season have a positive impact on milk quantity but a negative impact on milk quality i.e. fat percentage. Livestock throughout the year are fed in such a way that they are just kept on maintenance level.

Niroula (2006) conducted a study on an economic analysis of dairy product and its marketing system: A case study of eastern development region. For this study, he had used primary as well as secondary data where the primary data has the main role in his study. 118 household has been taken from 224,572 household of three districts.

In this study researcher draws the conclusion that , 94 percentage of people are engaged in dairy farming and milk production is as important source of cash income for the farmers as they depends on the agricultural production in Eastern Development Region. In his study, he mentioned that both the number of milk selling farmers and milk production has been increasing every year. And the duration of milk selling is depends on the breed and number of milking cow/buffaloes and also geographical region. His study shows that women play an important role in dairy farming. Overall contribution of women labor in livestock farming is above 70 percentages.

Pradhan (1994) conducted a study focused on the total aspect of milk production in Panauti area of Kavre. In his conclusion, it was found that an average per day milk buffalo net maintenance cost per day was observed on single buffalo stall compared with that of more than one buffalo stall.

In the total cost, feed cost constituted the most important item of total according for about 64.1% to 72.2% for one buffalo stall and more than one buffalo stall respectively and labor cost accounted to be nearly 16% of the total cost for all groups.

2.4 Research Gap

Different studies have been done in the national and international level regarding to cow farming. Especially, the productivity analysis of cow farming in Putalibazar municipality is the first research based on current data. It is found that, there are a lot of researches have been done on dairy farming in the context of Nepal as well as in Syangja but no one yet studied on the productivity analysis of cow farming. So, this research may help to reduce the gap between national and international context about the productivity analysis of cow farming.

CHAPTER - III

RESEARCH METHODOLOGY

Research methodology is an essential part of the thesis paper which forms the framework for obtaining all necessary inputs of the study. It refers to the various steps to be adopted by researchers in studying the problem with certain objectives in view. In this study the methodology includes research design, nature and sources of data, sampling procedure, data collection techniques and tools, data processing, analyzing methods and presentation.

3.1 Research Design

This research has been attempted to study the productivity analysis of cow farming in Putalibazar on the basis of the specific objectives of the research. This study analyzed all the information collected by field survey.

This study is based on the exploratory and descriptive research design since the study is focused on the productivity analysis of cow farming on the Putalibazar municipality, Syangja district and also used both qualitative and quantitative techniques.

3.2 Nature and Sources of Data

This study is mainly based on primary data and depends on secondary data whenever required. Primary data has been collected from study area by using structured and unstructured questionnaires, Field survey; the researcher has been visited the field and observe the research area. Here interview schedules i.e. structured questionnaires has been used to collect primary data and relevant information. A set of structured questionnaire has been developed for the interview and these questions have been asked to the head of household or a responsible member of the cow farm

All the secondary data have been collected from different published and unpublished records, text books and previous research studies, reports of government and non-government organizations.

3.3 Data Collection Procedures

For the collection of primary data the field survey has been conducted in Putalibazar municipality of Syangja district. There are 30,704 people are resided in 8,180 households in 13 wards of Putalibazar municipality (CBS, 2011). And there are only few numbers of commercial and registered cow farms. So to make the study reliable and to extract the more reliable result, those farmers have also been included in the study that had lesser number of cattle in their farm. For this study, 27 households i.e. cow farming households have been visited. Those farmers were found by using snow ball sampling method which is the non-probability sampling method.

To understand the basic concept about the productivity, productivity related models different kinds of Journals, Books, Articles, Documents and many more websites have been visited and studied. The researcher has been visited to the site of study area for the collection of the data with the help of structured and unstructured questionnaires. Secondary data has been collected from different websites and published government and non-government reports.

3.4 Model Specifications, their Features and Properties

This part deals with the major estimation models that are for the study purpose and how the collected data are processed and analyzed.

3.4.1 Model Specification

There are various different forms of production function that can represent the input output relations in econometric models. This study uses only two models of production function namely Simple Linear and Cobb-Douglas production function. The general relation is Q= f (K, L) where, Q is the output produced, K is the capital employed, and L is the labor cost. The two production function model that has been used for this study has been discussed shortly below.

3.4.2 Simple Linear Production Function

The simple linear production function model can be in the form of simple linear equation $Q = A + \alpha L + \beta k$, Where, Q stands for output, L for labor, and K for capital and A (Constant), α

(share of labor contribution), and β (share of capital contribution) are the parameters which are estimated from empirical data. Features of simple linear production function are;

(a) All inputs are perfect substitutes.

(b) The returns to scale are constant because the output changes proportionally with the change in all input factors. This can be checked as below;

$Q = \alpha L + \beta K$ (Initial output level)

Multiplying all inputs by a constant factor c. Q' represents the new output level.

$Q' = \alpha (cL) + \beta (cK)$ (New output level)

$Q' = c (\alpha L + \beta K)$

$Q' = c Q$

So, if all inputs change by a factor of c, output changes by c. Therefore, linear production function has constant returns to scale.

(c) The elasticity of substitution, for a linear production function, is ∞ (Economic point, 2014).

3.4.3 The Cobb-Douglas Production Function

Cobb-Douglas production function is one of the widely used production function used in the economics. C.W Cobb and H. Douglas formulated this function in 1928. They formulated this production function with the ideal assumption that the sum of the elasticities should be equal to one. The strong view that the sum of the elasticities should be one has been dropped out with the criticism of Durand and a new function known as "Power function" came into existence, which is linear in logarithmic form.

The simplest Cobb-Douglas production function model has the following form:

$Q = AL^{\alpha}K^{\beta}$, Where, Q stands for output, L for labor, and K for capital. The parameters A, α, and β are estimated from empirical data. Also $0 < \alpha < 1$, $0 < \beta < 1$. Equivalent is a linear function of the logarithms of the three variables:

Log (Q) = log (A) + α log (L) + β log (K) + u; where residual u is added in the multiplicative form e^{u}.

In the case where constant returns to scale is present, then $\alpha + \beta = 1$. Alternatively, constant returns to scale may be imposed by putting $\alpha = 1 - \beta$ so that $Q = A L^{\alpha} K^{\beta}$ can be rewritten as:

$Q = A L^{1-\beta} K^{\beta}$

So, $Q/L = A (K/L)^{\beta} e^{u}$; and taking logarithms of both sides gives

Log (Q/L) = log A + β log (K/L) + U

This second form avoids multicollinearity between log K and log L and also reduces heteroscedasticity if the variance of K is correlated with L (Holden, 1974).

Features of Cobb-Douglas Production function are;

a) It is homogeneous of degree $\alpha + \beta$. and consists of following conditions;

If $\alpha + \beta > 1$, then depicts increasing returns to scale (IRS)

If $\alpha + \beta = 1$, then depicts constant returns to scale (CRS)

If $\alpha + \beta < 1$, then depicts decreasing returns to scale (DRS)

b) In special case that is $\alpha + \beta = 1$, it is linearly homogeneous.

c) Its isoquants are negatively slopped throughout and strictly convex for positive value of K and L.

d) When it is linearly homogeneous, it is characterized by diminishing returns to each input for all positive levels of K and L.

Cobb-Douglas production function is also a special case of CES Production function (Economic point, 2013).

3.5 Methods and Tools of Data Analysis

Data has been collected from the study area through questionnaire method, interview method and field survey for primary data. Journals, published and unpublished research and reports have been used for the secondary data. Collected data has been grouped, sub-grouped and classified as necessary so as to meet the objectives of the study.

Regression, t-test, simple linear production function and Cob-Douglas production function has been used to analyze the productivity of the cow farming. The systematic analysis has been made by using qualitative techniques. The quantitative data fundamental operations along with simple statistical tools have been used. Besides these, table and chart have also been used for the presentation of the findings.

This study used the ordinary linear square (OLS) in log linear regression analysis. So, simple linear and C-D production models have been used. Following are the major factors, which the analysis will be looking at, despite the properties of production functions already discussed above.

3.5.1 Coefficient of Determination (R-square)

The coefficient of determination (R^2) is defined as the square of the coefficient of multiple correlations. When it is multiplied by 100, it gives the percentage of variance in dependent variable which is associated with the variance in independent variables. The range of it is in between -1 to 1. If the value of is close to 1 it shows positive relationship and imply that more of the variability in dependent variable is explained by the regression model. So this gives the measurement of goodness of fit of a model. Therefore, it is a very necessary statistic to compute for determination of validity of regression model. The sample coefficient

of determination is given by**:** $R^2 = \frac{ESS}{TSS} = 1 - \frac{RSS}{TSS}$; Where, ESS = Estimated sum of square, RSS = Residual sum of square, TSS = Total sum of square. (Gujarati & Sangeetha, 2007)

3.5.2 Standard Error of Estimates

Standard Error of Estimates, also called as the Standard Error of Regression (SE) is simply the standard deviation of Q values about the estimated regression line and is often used as a summary measure of the "goodness of fit" of the estimated regression line. The Standard error of estimate is given by:

$S_{reg} = \sqrt{\frac{ut\,\hat{}\,2}{n-3}}$, Where, $ut^2 = \Sigma (Qt - \widehat{Q}t)^2$

(Gujarati & Sangeetha, 2007)

3.5.3 Microsoft Office Excel

The econometric tool used for the data analysis in this study is Microsoft Office Excel. Microsoft Office Excel 2007 has been used for this study. Microsoft Office Excel is ideal package for quickly and effectively managing data, performing econometric and statistical analysis, generating forecast or model simulation and producing high quality graphs and tables for publication or inclusion in other applications and simply, it is very fast and easy to use than any other econometric software. Here in this study it is used mainly for econometric analysis.

CHAPTER – IV

PRESENTATION AND ANALYSIS OF DATA

This chapter four consists of presentation and analysis of data relating to the output (Q) and two inputs as the explanatory variables, Labor (L) and Capital (K). This is the main text of the study to find out the answer of research question and satisfies the objectives of the study. For the purpose of presentation and analysis, 27 different farm's data has been analyzed. The collected and tabulated data have been analyzed by using Microsoft Office Excel 2007. This chapter includes presentation, analysis and integration of collected data with organizing sequentially as per the objectives of the study.

4.1 Introduction of Study Area

Syangja is a district lying in Gandaki Zone of Western Development Region. Syangja is its district headquarters. It lies in the hilly region at an altitude ranging from 366m to 2592m. It lies at about latitude 28º 4' 60" North and longitude 83º 52' east. Siddhartha Highway links Bhairahawa and Pokhara through Syangja. Syangja is also notable foe being the first district of Nepal to implement the Home stay for promoting the village tourism. It is extended in area of 1164 km^2 where total 289,148 people dwells in 68,881 household with 163,395 female and 125,833 male. And the population density of Syangja is of 248 persons per sq km. there are two popular saying associated with the naming of Syangja district. And the first one is derived from the word "sinja". Sinja is a word found in Magar dialect and is actually the Surname Ethnic Tribes called Magars. Thus since the place was habitat of sinja people the whole place became popular as sinja and in course of time the word Sinja got distorted into Syangja. And the second one is; a great flood from Aandhikhola River once engulfed the place. Seeing the people in trauma, one old man prayed to the god chanting "Sainyaa Jaa" to commemorate the contribution of that old man which later changed to the term Syangja. And from the tourism point of view, Syangja is a famous destination as it has the many attractions like; Darhau Sirubari village, Rakta lake, Chhangchhangdi, Aandhikhola, Panchamul, Panchase, Rajasthal, Andhanadhi Daha, Chandikalika, Nuwakot danda, Alamdevi temple, Kailash Cave, Budhakot etc. In Syangja, 86.07 percent Hindu, 12.47 percent Buddhist, 0.58

percent Islam, 0.07 percent Christian, 0.01 percent Jain and 0.08 percent other are resided (CBS, 2012).

4.2 Status of Cow Farming

Cow farming in Nepal is an ancient farming system. And it is still practiced traditionally all over the Nepal. Commercial cow farming in Nepal is recently introduce and becoming popular between farmers but still it is in infant stage. Cow farming is mainly based for milk production although still the buffalos are preferred for milk production in Nepal.

4.2.1 Milk Production in Nepal

Table 4.1 shows the status of milking cows and buffalos are given where the number and the quantity of produced milk of cow and buffalo are shown.

Table 4.1: Number of Milking Cows, Buffalos and the Production of Milk in Nepal

Years	Cow		Buffalo		Total Milk Production (MT)
	Numbers of Milking Cows	Milk Production (MT)	Number of Milking Buffaloes	Milk Production (MT)	
2011/12	998,962 (2.55)	468,913 (4.85)	1,331,039 (3.05)	1,153,838 (4.0)	1,622,751 (4.2)
2012/13	1,025,591 (2.67)	492,379 (5.00)	1,369,796 (2.94)	1,188,433 (3.02)	1,680,812 (3.60)
2013/14	1,020,175 (-0.53)	562,684 (14.28)	1,304,686 (-4.75)	1,135,076 (-4.49)	1,697,760 (1.01)

Source: National Dairy Development Board, 2014

(Note: Numbers in brackets denotes growth in percent as compared to that of previous fiscal year.)

It is found that the cows and buffaloes are the main source of milk production in our national context. In 2013/14, out of the total population of buffaloes and cows, only 130,486 buffaloes

and 1,020,175 cows are said to be milking and a total of 1,697,760 MT milk was produced in the country. Of which, the share of buffalo milk was 1,135,076 MT that is 66.86 percent and that of the share of the cow milk was 562,684 MT which is 33.14 percent. Total milk output has been increased by 1.01 percent as compared to the 2012/13.

As compared to 2012/13 the numbers of milking cows have been decreased by 0.53 percentage and that of the number of milking buffaloes have been decreased by 4.75 percent in 2013/14. On the other hand, as compared to 2012/13 cow milk production has been increased by 14.28 percent and that of buffalo milk production has been decreased by 4.49 percent in 2013/14.

And so from the above table it is seen that the share of buffalo's milk is higher than that of cattle's milk. That means buffalos are playing dominant role in milk production in Nepal.

4.2.2 Numbers of Cattle in Nepal

According to the age of cattle, their numbers in Nepal are shown in the table 4.2;

Table 4.2: Number of Cattle in Nepal

Cattle	Below 1 year	1 to 3 years	3 and over years	Total
Local	780,486 (94.06%)	835,369 (96.31%)	4,598,470 (97.15%)	6,214,325 (96.64%)
Improved	49,303 (5.94%)	32,024 (3.69%)	134,744 (2.84%)	216,071 (3.36%)
Total	829,789 (100%)	867,393 (100%)	4,733,214 (100%)	6,430,396 (100%)

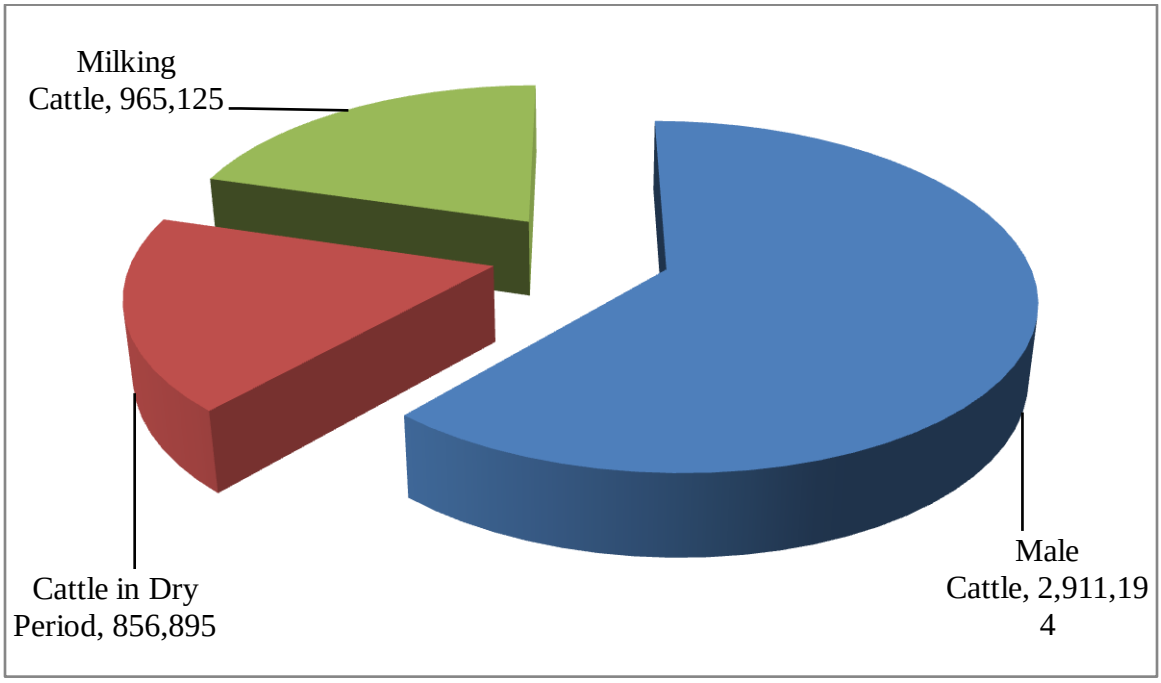
Source: Central Bureau of Statistics, 2012

According to this table, it shows the number of cattle of fiscal year 2011/12 in which huge number of cattle are of local i.e. 96.64 percentage and that of improved are negligible i.e. 3.36 percentage.

4.2.3 Number of Cattle in Dry and Milking Period in Nepal

In the table 4.3, three and over years of cattle's number are shown. And they are divided in male and female cattle. Again female cattle are divided into two groups; dry period and the milking cattle.

Figure 4.1: Number of Cattle in Dry and Milking Period in Nepal



Source: Central Bureau of Statistics, 2011/12

Figure 4.1 shows three and over years cattle's number which is divided into male cattle, cattle in dry period and milking cattle, where 2,911,194 are male cattle out of 4,733,214. Cattle in dry period are 856,895 in number and the milking cattle are 965,125 in number.

4.2.4 Numbers of Cattle in Syangja District

According to the age of cattle, their numbers in Syangja district are shown in the table 4.3;

Table 4.3: Number of Cattle by their Age in Syangja District

Cattle	Below 1 year	1 to 3 years	3 and over years	Total
Local	2,635 (98.80%)	5,882 (98.39%)	39,436 (99.52%)	47,953 (99.33%)
Improved	32 (1.20%)	96 (1.61%)	192 (0.48%)	320 (0.67%)
Total	2,667 (100%)	5,978 (100%)	39,628 (100%)	48,275 (100%)

Source: Central Bureau of Statistics, 2012

From table 4.3, we can say that the numbers of improved cattle are in negligible. Huge numbers of cattle are of local type. Here in the table above 4.4, below one year cattle are 2,667 and out of them only 1.2 percent of cattle are improved types i.e. 32 that of local cattle are 98.8 percent. Likewise, in the age group of one to three years cattle, there are again only 1.61 percent of cattle are improved and that of local cattle are 98.439 percent. And this is worsen for improved cattle in age group of three and over; only 0.48 percent of total cattle of improved and rest of all are local breed that is 99.52 percentages.

4.2.5 Production of Milk in Syangja District

Table 4.4 shows the production of milk in Syangja of cow and buffalo from fiscal year 2010/11 to the fiscal year 2011/12 with their respected share on total milk production in Syangja district.

Table 4.4: Total Milk Production in Syangja District

Fiscal Year	Cow Milk Production (Mt)	Buffalo Milk Production (Mt)	Total Milk Production (Mt)
2010/11	5,640 (10.19%)	49,717 (89.81%)	55,357 (100%)
2011/12	6,693 (12.15%)	48,412 (87.85%)	55,105 (100%)
2012/13	7,169 (12.78%)	48,917 (87.22%)	56,086 (100%)
2013/14	7,596 (13.31%)	49,471 (86.69%)	57,067 (100%)
2014/15	8,384 (14.59%)	49,089 (85.41%)	57,473 (100%)

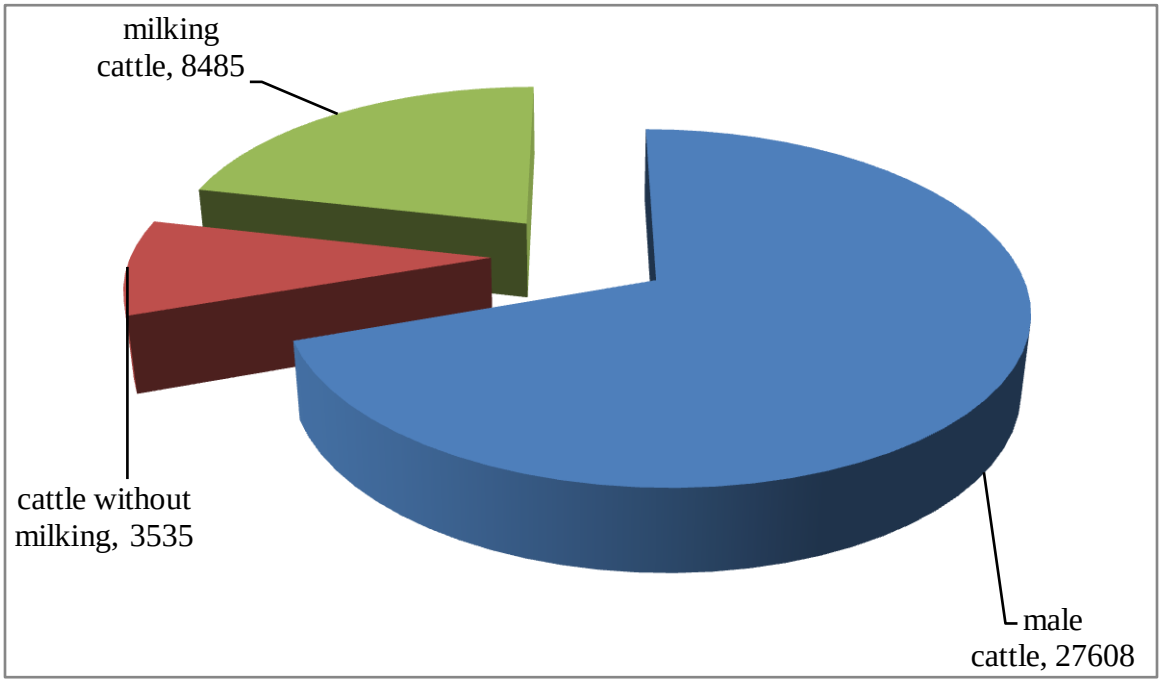
Source: ICIMOD, 2016

According to this table 4.4, in fiscal year 2010/11, out of total milk production, share of cow and buffalo are 10.19 percentages and 89.81 percentages respectively. In fiscal year 2011/12, the share of cow milk in total milk production was 12.15 percent and that of buffalo was 87.85 percentages. The share of cow milk was increasing trend and in fiscal year 2012/13 it became 12.78 percentages from 12.15 percent. Similarly in fiscal year 2013/14, it became 13.31 percent and in fiscal year 2014/15 the share of cow milk reached to 14.59 percent.

4.2.6 Number of Cattle in Dry and Milking Period in Syangja District

Figure 4.2 shows three and over years of cattle's number. And they are divided in male, female cattle of dry period and the milking cattle.

Figure 4.2: Number of Cattle in Dry and Milking Period of Syangja District



Source: Central Bureau of Statistics, 2012

Figure 4.2 shows the numbers of cattle of three and over years. According to this table, there are huge numbers of male cattle i.e. 27,608. Out of 39,628 cattle of three and over years, only 8,484 cattle are milking and 3,535 cattle are cattle without milking i.e. are in dry period.

4.2.7 Production of Milk in Putalibazar

According to Nepal census 2011, Putalibazar municipality has 30,704 populations in 8,180 households. Out of 8,180 households, farmers of 27 household have been involved in this study. On the basis of this study, following is the information of milk production in Putalibazar.

Table 4.5: Milk Production in Putalibazar

Local Cow		Improved Cow		Total milk production in liters
Out of total milking Cows	Production of milk in liters	Out of total milking Cows	Production of milk in liters	
67	196 (39.84%)	43	296 (60.16%)	492 (100%)

Source: Field Survey, 2016

Out of 92 cattle, 67 local cattle are milking and out of 48 improved cattle, 43 are milking. From these 67 local and 43 improved cattle, 492 liters of milk are producing per day in Putalibazar. Where the share of local cattle's in total milk production is of 39.84 percent i.e. 196 liters per day. And that of improved cattle are of 60.16 percent i.e. 296 liters per day.

4.2.8 Number of Cattle in Putalibazar

Table 4.6 shows the number of cattle in Putalibazar in which total number of cattle, the number of local cattle and the number of improved cattle are shown.

Table 4.6: Number of Cattle in Putalibazar

Cattle	Local	Improved	Total
Male	25	5	30
Female	67	43	110
Total	92	48	140

Source: Field Survey, 2016

Table 4.6 shows the number of cattle in Putalibazar. Which is the total number of cattle's of 27 cow farm of Putalibazar. Here out of 140 cattle, 92 are local cattle and rest of other i.e. 48 cattle are of improved. Here the numbers of male cattle in local cattle are 25 while it is just 5 in improved cattle.

4.3 Production Function Model Estimation and Productivity Analysis

The OLS regression has been done for Simple Linear production function and Cob-Douglass production function model. And parameters obtained from these models are used to estimate and compare the capital and labor productivity. For this observed quantities of different variables are tabulated below;

Table 4.7: Observed Data with respect to Q, L and K of Different Farms

S.N.	Output produced (Q) in Rs.	Labor employed (L)	Capital (K) in Rs.('000)
1	154,841.00	1.57	422
2	247,189.50	3	531.86
3	423,224.80	4	670.75
4	565,670.00	6	865.35
5	707,735.00	6.5	1138.92
6	842,420.00	7.8	1012.54
7	978,930.00	9	1184.12
8	1,118,725.00	12	1543
9	1,259,250.00	14	1315.18
10	1,665,130.00	17	1824.43
11	1,434,450.00	18	2078
12	3,265,261.00	20	4275
Average	1,055,235.52	9.905	1,405.15

Source: Field Survey, 2016

Table 4.7 is obtained from the data of 27 different cow farms. In which, two or more numbers of farm with the same number of cattle has been merged by taking average of

collected data. In above table first five data are the averages data of more than one cow farm and rest of other are single farm's data.

4.3.1 Simple Linear Production Function

This is just a simple linear regression without log in the form of $Q = C + \alpha L + \beta K$. This function assumes that the capital and labor are perfect substitutes. The table below shows the output result of OLS regression as Simple Linear Production function.

Table 4.8: Result of OLS Regression as Simple Linear Production Function

Dependent Variable: Q (Objervation-12)				
Variables	Coefficient	Std. Error	t-statistic	P-values
C	-142795.3437	75343.00222	-1.895270158	0.090570321
L	28203.33703	12410.78978	2.272485275	0.0491629
K	653.8011791	74.54682645	8.770342216	1.05433E-05
R-Squared			0.970010859	
S.E of regression			134181.4067	

Source: Computation with Microsoft Office Excel 2007from table 4.7

This above values can be converted in functional form of simple linear model as;

$Q = -142795.344 + 28203.34 L + 653.801 K$……. (1)

From this equation (1), we see that the production of cow farm of Putalibazar, for the 12 different observation. And the output can be given by subtracting the constant value of 142795.344 from the additional resultant of 28203.34 times the number of labor and 653.801 times the capital employed in ('000) rupees.

From a purely statistical viewpoint, the estimated regression line fits the data very well. The R^2 value is 0.97 means that near about 97 percent of variation in output is explained by the labor and capital.

4.3.2 Marginal Physical Productivity for Linear Production Function

It is seen that, marginal physical productivity of labor is

$$MPP_L = \frac{\delta Q}{\delta L}$$

= 28203.34; meaning that the increase in one unit of labor can increase the output product by 28203.34 rupees in a farm.

And for the Marginal Physical Productivity of Capital;

Since, Marginal physical productivity of capital is

$$MPP_K = \frac{\delta Q}{\delta K}$$

= 653.801; which means that the increase in one unit of capital (Rs 1,000) can increase the output by 653.801 rupees in the farm.

For the simple linear production function, marginal productivity of labor and capital is in the constant form. Therefore it is not changing. But in reality, it may be changing. So, the above calculation can only be used to judge whether the production system of cow farm of study area is still a labor or the capital intensive. And here, it is found that the production system of cow farm is still a labor intensive as increase in one unit of labor can return a larger increase in output than that of capital.

4.3.3 Cob - Douglass Production Function

When CD production function is converted to log linear form, and OLS regression is carried out following result has been obtained;

Table 4.9: Result of OLS Regression as Log Linear CD Production Function

Dependent Variable: Q (Objervation-12)				
Variables	Coefficient	Std. Error	t-statistic	P-values
C	8.051137002	0.92632238	8.691506513	1.13469E-05
Ln (L)	0.592756058	0.134275598	4.414473414	0.001684627
Ln (K)	0.61068733	0.166975346	3.657350293	0.005257119
R-Squared			0.981793319	
S.E of regression			0.125879653	

Source: Computation with Microsoft Office Excel 2007from table 4.7

So, here we have the log linear equation of Cobb-Douglas production function as;

$$\text{Ln } Q = 8.051 + 0.593 \text{ Ln } L + 0.611 \text{ Ln } K \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Expression in its original form yields the following equation: $Q = 3137.36\, L^{0.593}\, K^{0.611}$

From the equation (2), we see that the production of cow farm, for all the twelve different observations. The output elasticities of labor and capital (α and β respectively) are 0.593 and 0.611 respectively. In other words, at the time of study, holding the capital input constant, a one percent increase in labor input would led on an average of 0.593 percent increase in the output. Similarly holding the labor input constant, a one percent increase in the capital input led on the average of 0.611 percent increase in the output. Adding the two output elasticities, we obtain 1.204 (which is greater than one) which gives the value of the returns to scale parameter. As is evident, over the period of the study, productions of cow farm are characterized by increasing returns to scale.

And from a purely statistical viewpoint, the estimated regression line fits the data very well. The R^2 value is 0.98 means that near about 98 percent of variation in (log of) output is explained by the (log of) labor and capital.

4.3.4 Marginal Physical Productivity for C-D Production Function

Again, marginal physical productivity of labor and capital has been obtained from the partial derivative of the above obtained equation with respect to labor and capital respectively. Unlike the constant value in simple linear production function, MPP_L and MPP_K in CD production function depend on K and L employed.

Now here the Marginal Physical Productivity of Labor is;

$MPP_L = \frac{\delta Q}{\delta L} = \frac{\delta}{\delta L}(3137.36\ L^{0.593}\ K^{0.611}) = 1{,}860.45\ K^{0.611}\ L^{-0.407}$

$= 1{,}860.45*(1405.096)^{0.611} *(9.905)^{-0.407}$ (putting the average value of K and L)

= 61,311.04126; meaning that increase in one unit of labor can increase the output product by 61,311.04 rupees.

And again the Marginal Physical Productivity of Capital is

$MPP_K = \frac{\delta Q}{\delta K} = \frac{\delta}{\delta K}(3137.36\ L^{0.593}\ K^{0.611}) = 1{,}916.93\ L^{0.593}\ K^{-0.389}$

$= 1{,}916.93*(0.905)^{0.593} *(1{,}405.15)^{-0.389}$ (putting the average value of K and L)

= 445.3608263; meaning that increase in one thousand rupees in Capital can increase the output product by 445.36 rupees.

4.4 Problem and Prospects of Cow Farming

Every sector has their own bad aspects like different problems, limitation, criteria as well as prospects of the related field. Here cow farming in Syangja bazaar, Putalibazar municipality also has the different kind of problems and the prospects. Some of them are pointed below;

4.4.1 Problems of Cow Farming in Putalibazar

In the study area there are various problem faced by the farmers. Different farmers have given multiple responses about the problems of cow farming. The main problems of cow farming of the Putalibazar municipality are stated below.

The price of milk paid by relative institutions is very low even almost all farmers are not going to deliver the produced milk in any dairy institutions. Because the quantity of production is low and either consumed or costumers buy the milk from the farm. Some of the respondents reports about the high price of feeding materials like chocker and dry grass (Paral), it is due to the monopoly of the chocker centre. Lower number of firm caused the unavailability of chocker; feeding materials. Instead of improved breed cattle's local cattle's are used in cow farming in Putalibazar. This caused the lower quantity of milk production means the low output. Although there is availability of improved breed cattle's, it is unaffordable for farmers due to the high price. Even Putalibazar is not a big city; there is a lack of grass for all season. And so farmers reported for the lack of improved seeds of grass. Farmers also reported the lack of appropriate training on cattle's farming. And so it caused the lack of skilled labor in cow farming field. Besides this, according to farmers of Putalibazar, there is weak implementation of policies in cattle's farming and lack of infertile alleviation programs.

4.4.2 Prospects of Cow Farming in Putalibazar

Generally, all sectors have some problems. Similarly, cow farming also has some problems as mentioned above. However it also has greater prospects in the study area as well as all over the Nepal. Comparatively, it is more profitable than other traditional agriculture. From the market point of view, the study area is suitable for cow farming as the production of milk. Supply of milk and milk product by local producer is not sufficient in the current situation. And at the same time there is no any serious problem in transportation facility and market. Though very few respondents reported the problem of market situation and the scientific price of milk and milk product, it was very small numbers. So, it has better economic prospects to promote the cow farming in Putalibazar. Thus if all the respondent of the study

area grow up their cow farming commercially instead of engaging in other prevailing traditional agricultural activities, they can certainly receive better income. Better income helps them to improve their economic status by improving educational status, health status, social status and so the life style.

Commercial cow farming not only gives the better income to the farmers, it also generates the additional employment opportunities for people at various levels. Commercial cow farm would also be helpful to check the out migration as many people migrate either permanently or temporary in search of employment opportunities. The prevailing situation of disguised unemployment can also be removed to some extent by growing cow farming.

By using the dung and urine of cattle's in vegetable production, hygienic vegetables can be produced which may decrease the use of unhygienic vegetables by the people. It may lead the people to the healthy life style. That means the various type of disease caused by the unhygienic vegetables can be reduced.

CHAPTER - V

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

5.1 Summary of the Findings

The general objective of this study was to perform the productivity analysis of cow farming in Putalibazar municipality. This study also presents some problem faced by the farmers during cow farming and the prospects of cow farming in Putalibazar. This research was mainly based on the primary data. However, secondary data was also included as it required. This study is analytical as well as descriptive type. To meet the targeted objectives of this study, structured as well as unstructured questionnaire have been used. Collected data has been analyzed in Microsoft Excel and they were interpreted by using the simple linear production function and Cob-Douglas production function. And other objectives have been solved by elaborating the farmer's words.

(i) According to this study, it is found that the cow and buffalo are the main source of milk production. In the context of Nepal, the share of buffalo milk was found to be 66.86 percentages and that of cow was found to be 33.41 percentages. In case of Syangja, the number of improved cow was found negligible with compare to the local cow i.e. only 320 out of 48,275 which is just 0.67 percentages. And out of 8,485 milking cows, only 64 cattle are improved breed and rest of all are local. In context of milk production, out of total milk production the share of cow milk in fiscal year 2010/11 was 10.19 percentages. This was in increasing trend and it became 14.59 percentages in fiscal year 2014/15. And on the basis of this study in Putalibazar, the production of cow milk was found to be 492 liters per day at the period of study. Out of the total cow milk production in Putalibazar, the share of local cattle was 39.84 percentages while the share of improved cattle was 60.16 percentages. And there are 140 cattle in Putalibazar of 27 cow farms. Out of total cattle, local cattle were 92 and that of improved cattle were 48. Where male cattle were 30 in which 25 were local and only 5 were improved cattle.

(ii) In analyzing the fit during OLS regression in fitted production function models; Simple linear and Cobb-Douglas, R^2 value is significant enough around 97 percentages in both

models which shows that these models able to establish the relation between inputs and the output. From the simple linear model, the marginal physical productivity of labor was found to be 28203.34 means that increase in one unit of labor can increase the output by 28203.34 rupees. Similarly, marginal physical productivity of capital was found to be 653.801, means that increase in one unit of capital (Rs. 1,000) can increase the output by 653.801 rupees. Again, with the Cobb-Douglas model, it was found that the output elasticities of labor and capital (α and β respectively) were 0.593 and 0.611 respectively; meaning that, holding the capital input constant, 1 percent increase in labor input would led on an average of 0.593 percent increase in the output. Similarly, holding the labor input constant, 1 percent increase in the capital input would led on an average of 0.611 percent increase in the output. Adding the two output elasticities, it was obtained 1.204 (which is greater than one) signifying that the production of cow farm was characterized by increasing returns to scale.

(iii) According to the farmers, there are a lot of problems in cow farming in Putalibazar, out of them the main problems are; the high price of the feeding materials due to the monopoly of firm, lower output of local cow and the high price of improved cow are the major problems faced by the farmers. Lack of appropriate training on cow farming and the improved grass seeds are also the problems around the cow farming in Putalibazar. Besides this, the cow farming would be the more profitable than other traditional agriculture as the supply of milk is insufficient by the local farmers in the Putalibazar is main prospect of cow farming in the study area.

5.2 Conclusions of the Study

According to the major findings of this study, some conclusions have been drawn which are pointed with respect to the specific objectives of this study:

(i) From the findings of this study, we can clearly say that the share of cow milk in milk production is lower than that of buffalo's share as the share of cow milk in total milk production was found to be just 33.41 percent in the context of Nepal. Similarly in the case of Syangja, it was found to be 14.59 percent in fiscal year 2014/15 but it is in increasing trend. And it is seen that the local cattle has the vital role in the cow farming as the negligible number of improved cattle were in cow farming in Syangja. In context of Putalibazar at the

time of this study, from 27 different cow farms, out of 140 cattle there were 30 male and 110 female cattle. And there were 92 local cattle and 48 improved. According to the findings of this study, 67 milking cattle out of 92 local cattle contribute 39.84 percent of total milk production per day. While it was 60.16 percent for 43 milking cattle out of 48 improved cattle.

(ii) The result obtained from the ordinary least square estimation in fitted production models like Simple Linear and Cob-Douglas Production function, shows that the value of parameters obtained in both models supports the economic theory. The findings with the marginal physical productivity of labor and capital from the simple linear model gives the conclusion that the labor is more effective than the capital at cow farming in Putalibazar. This is again supported by the findings of Cob-Doulas production function which reveals that the output elasticity of labor is greater than that of the capital. And with the addition of two output elasticities giving the result greater than unity, concludes that the production function of cow farming is characterized by increasing returns to scale.

(iii) According to the findings of this study, there are a lot of prospects of cow farming in Putalibazar but low implementation of government policies. So, there should be strong or hard and fast rule to implementation of government policies.

5.3 Recommendations

Looking the current trend of consumption and the market of the dairy products we can say that, cow farming is one of the most important business taking cows as a milk producer. By increasing the cow farming in greater extent, the earnings of farmers can be increase. Larger quantity of milk and milk products are still imported in Nepal, so, by increasing the production we can save large amount of forex flow to abroad annually.

The study underlines the possibilities of efficiency improvement of cow farming in Putalibazar. Though the many prospects of dairy farming in Putalibazar, it is still in infant phase. So there should require efficient improvement in labor and capital productivity. The increasing trend of demand for dairy products in Nepali market suggests that the effective and optimal use of labor and capital in this field. The use of Labor for production process should be replaced by use of machineries (capital) to achieve the effective production system

and change the production system from the labor oriented to capital oriented. Here the production function of cow farm in Putalibazar was increasing returns to scale, that's why both the labor and capital should be increased to increase the output production of cow farming in Putalibazar. From this particular study some suggestions can be induced which are beneficial to the farmers and will help to increase the revenue flows by using the optimal capital and labor in the future.

(i) Result shows that the both production function models Simple Linear and Cob-Douglas satisfies and supports the economic theory, so use of these models can be effective to formulate economic plans and policies of cow farmers in commercial cow farming in Putalibazar.

(ii) The result shows that the output elasticity of labor is lower than the capital (from Cob-Douglas production function analysis), this may mean that the cow farms are still capital intensive. So, by adding new machineries and new technology, it may provide savings in long run.

(iii) With the evident case that the production of cow farm was characterized by increasing returns to scale, every internal economic and business policy should consider that both the labor and capital should be increased to increase the output production.

(iv) Most of the farmers in study area are found to be engaged in dairy farming as their traditional occupation. There is a need to aware the farmers about the modern farm management practices to get high benefit. It is suggested that District Livestock Service Office should organize the training program.

(v) Farmers should be encouraged to keep improved breeds of cows. Artificial insemination, information about improved breed and cross breeding shall be made available to farmers in their village situation. It is suggested that District Livestock Service Office should manage appropriate program for this aspect.

REFERENCES

Acharya, N. (2012). *Livestock farming and cost of buffalo milk production*: *A case study of Ugratara VDC of Kavrepalanchowk.* Unpublished master thesis in economics, Central Department of Economics, T. U., Kathmandu.

ANZDEC Limited, NZ (2002). *Nepal agriculture sector performance review*. Kathmandu: Agriculture Development Bank.

Aryal, S. (2012). *An analysis of cost of milk production in Tasarpu VDC of Dhading district*. Unpublished master's thesis in economics, Central Department of Economics, Tribhuvan University, Kathmandu.

CBS (2012). *National Sample Census of Agriculture Nepal 2011/12,* Kathmandu: Central Bureau of Statistics.

CBS (2011). *Population Census 2011,* Central Bureau of Statistics: Kathmandu, Nepal.

Canadian Dairy Information Centre. (2002). Retrieved from http://www.dairyinfo.arg.ca

DDC, (2000). *DDC Progress Report 1998/99,* Kathmandu: Dairy Development Corporation.

Dhakal, H.K. (1999). *Development of dairy farming: A case study of Gitanagar VDC.* Unpublished master's thesis in geography, Central Department of Geography, T.U. Kirtipur.

Dhakal S.C. (1997). *Study on the quality of raw and pasteurized milk in Biratnagar city.* Promotion to Animal Production through Research and Development.

Economic point, (2013). Retrieved from http://economicpoint.com/production-function/cobb-douglas

Economic point, (2014). Retrieved from http://economicpoint.com/linear-production-function

FAO (1972). *Payment for milk on quality*. Rome: Food and Agriculture Organization of the United Nations.

Felipe Jesus, A. F. (Summer 2005). A Theory of Production. The Estimation of the Cobb-Douglas function: A Retrospective View. *Eastern Economic Journal, Vol. 31, No. 3, 427-445.*

Ghimire, S. (2015). *Productivity analysis of bottlers Nepal limited (Kathmandu Plant).* An unpublished master's thesis in economics, Central Department of Economics, TU, Kirtipur.

Gujarati & Sangeetha (2007). *Basic Econometrics.* New Delhi: Tata McGraw Hill Publishing Company Limited.

Hossain M. D. & Moyazzem, M. K. (2012). An Application of Non-Linear Cobb-Douglas Production Function to Selected Manufacturing Industries in Bangladesh. *Open Journal of Statistics, 2012,vol-2,* 460-468.

Holden, K. (1974). *An introduction to applied Econometric analysis.* J.Wiley.

ICIMOD, (2016). Retrieved from http://www.geoportal.icimod.org/-agricultureatlas/dp/index

Jabbar, M.A., Tambi, E. and Mullins, G. (1997), *A methodology for characterizing dairy marketing systems.* In market oriented small holder dairying research, Working Document No. 3. Addis Ababa: International Livestock Research Institute

Jha, U.K. (1982). *A case study of cost of milk production in Jaulakhel village, Bhaktapur district*. An unpublished master's thesis in economics, submitted to Central Department of Economics, T.U. Kirtipur.

Joshi, D.D. & KC, T.B., (2001). *Make milk not methane gas in Nepal.* An over view on small holder dairy production and marketing in Nepal.

Kandel, S. R. (1997), *A case study of the cost of aspect of milk production in Shivanagar VDC in Chitwan district.* An unpublished master's thesis in economics, submitted to Central Department of Economics, T.U. Kathmandu.

Karki, N. B. (2010). *Cost of milk production for dairy farmers: A case study of Tansen municipality of Palpa district.* Unpublished master's thesis in economics, Central Department of Economics, T.U. Kirtipur

Kharel, N. (2005). *Dairy farming in Sikkim: A case study of turung-bikmat milk produces cooperatives society of south district.* An unpublished master's thesis in economics. Central Department of Economics, Tribhuvan University, Kathmandu.

Kon, S. K. (1972). *Milk and milk products in human nutrition.* (2nd ed.). Rome: Food and Agriculture Organization.

Korir M.K., Kibet J., Kipsat M.J., & Rirei, M. (2010). *Dairy cattle productivity after the post election crisis in Uasin Gishu district of Kenya.* A presented paper at the joint third African Associatiion of Agricultural Economists and 48th Agricultural Economists Association of South Africa Conference, Cape Town, South Africa.

Koutosoyiannis, A. (1979). *Modern Mircroeconomics, Second Edition.* London: Macmillan press Ltd.

Kwaiah, N. (2016). Retrieved from http:// http://www.economicsdiscussion.net/production-function/the-ces-production-function/18511

Lindegaard, K. (1993). *Fodder resource amongst the milk producers in Illam, Distribution of buffalo milk production and productivity in different district of EDR Nepal*. Royal Veterinary and Agricultural University, Copenhagen, Denmark.

Ministry of Agriculture (1991). A study on dairy farmer in Nepal. *Ten Years Dairy Development Plan (1990- 2000), Vol- 4,* Final Draft. Kathmandu: HMGN

NDDB (2013). *Annual report (2011/2012).* Kathmandu: National Dairy Development Board.

Nepal Population Clock, (2016). Retrieved from http://www.countrymeters.info/Nepal

Niroula, N. (2006). *An economic analysis of dairy product and its marketing system: a case study of eastern development region*. Unpublished master's thesis in economics, Central Department of Economics, T.U. Kirtipur

Pokhrel, S. (1991). *A study on cost of milk production for dairy farmers of Tikabhairab area*. An unpublished master's thesis in economics, submitted to Central Department of Economics, T.U. Kirtipur.

Pradhan, K. (1994). *A case study on livestock and cost of milk production in Panauti area of Kavre.* An unpublished master's thesis submitted to Central Department of Economics, T.U., Kirtipur.

Rob, A., Topader, A.H. & Islam, M.M., (2010). A comparative study on cost benefit analysis of crossbred and indigenous cows reared under the small holder dairy was conducted in Dinajpur district. *Bangladesh Journal of Animal Science 2010*, 39(1&2)

Shrestha, H.R. (2000). *Small holder dairy farming systems at milk shed area of Kathmandu milk supply scheme*. A study undertaken for Centre for Resource and Environment Studies (CREST) and presented to ICIMOD, Kathmandu, Nepal

Shrestha, R.G. & Bhattarai, C.R. (1992). *Dairy Development Corporation's experience in dairy extension in Nepal*. Paper presented at the Workshop on Dairy Extension in Nepal, Department of Agriculture and National Dairy Development Board, 7-9 March 1994, Lalitpur, Nepal

Shrestha, R.P., Shrestha, H.R. & Pradhan, S.M. (1992). *A comparative study on the performances of the crossbred dairy cattle.* In Proceedings of the 6th Austroasia Animal Science Congress, Vol III

Shrestha S. (1999). *Phenotypic and genetic study of native buffaloes.* In Annual Report 1998/99, Kathmandu, Nepal Agricultural Research Council

Sollod, A. E. (1996). Nepal's dairy industry marketing constraints: Milk production and methane gas. A paper presented on workshop. Kathmandu: NZFHARC.

Swanepoel, G. (2014). *An analysis of the dairy industry:* r*egional impacts and rational price formation.* (Unpublished M. Sc. Thesis). Department of Agricultural and Resource Economics. Colorado State University, Fort Collins, Colorado.

Timsina, K. P. (2005). *Economics of milk production in Chitwan district, Nepal*. A published M.Sc. thesis, Department of Agri. Economics, Institute of Agriculture and Animal Science (IAAS), T.U. , Rampur, Chitwan.

Uotila, M., & Dhanapala, S. B. (2013). *Dairy development through cooperative structure.* Bangkok, Thailand: FAO Regional Office for Asia and the Pacific.

U.S. Environmental Protection Agency. (2011). L*ife cycle production phase*, http://www.epa.gov/agriculture/

Wambugu, S., Opiyo, J. & Lilian, K. (2011). *Productivity trend and performance of dairy farming in Kenya*. A published report 2011, Tegemeo Institute of Agricultural Police and Development, Nairobi, Kenya.

World Bank, (2015). Retrived from http://www.documents.worldbank.org/agriculture-report/p099296

Zhu, X. & Lansink, A.O. (2010). Technical efficient and productivity differentials of dairy farms in European countries: the role of Common Agricultural Policy subsidies. *European journal of agricultural economics, 2012, Vol. 13*, No 1

APPENDIX

QUESTIONNAIRE

1. General information

Name of the respondent ……..
Sex ……... Age …… Education…..…….....
Occupation ……..……... Cast ……..…….. Ward number ……..

2. Family size by age, sex, education and occupation.

S.N.	Relationship	Age	Sex			Education	Occupation
			Male	Female	Other		
1							
2							
3							

3. Landholding size.

Types of Land	Total Area	
	Ropani	Ana
Wet Land		
Irrigated		
Un-irrigated		
Dry Land		
Irrigated		
Un-irrigated		
Pakho dry land		
Total Land		

4. When did you start cow farming?

……

5. When did you start it commercially?

……

6. Number of cows you start cow farming with?

…….

7. Did you increase the number of cow later on?

……..

8. Did you involve in any training related to cow farming?

……..

9. If yes, how long did you take, where did you take and which institution? Mention please.

……

10. What is the average age of cow at first it calving in months?

……

11. What is the average dry period of cow in your farm?

……

12. What is the average lactation period of your cow?

……

13. What is the average calving period of cow in your farm (in days)?

…….

14. Which type of shed do you have for your cattle?

…….

15. How many family members are engaged in this cow farm?

(a) Male ……..…… (b) Female ……..... (c) Hours...……..……

16. Do you have another business besides this cow farming? If yes, mention it please.

…….

17. Information about the initial investment to start cow farming.

(a) To buy cattle ……

(b) To buy calf ……

(c) To prepare shed …….

(d) Other …….

18. How do you start this cow farm?

(a) Loan

(b) Self investment

(c) Loan and Self investment

19. How much do you pay interest to the loan?

……

20. How many people are working in your farm?

.....

21. How much do you pay to the labor per day?

……

22. Cost of feeding materials per day for a single cattle.

Feeding materials	Quantity	Per unit cost	Total price
Grass fodder			
Straw			
Chocker			
Other			

22. How much is the average annual cost in treatment of cattle's?

……

23. Do you hire any land for cow farming?

……

24. If yes, how many and how much do you pay for this per day?

(a) Land size

(b) Rent

25. Cow farming system.

Cow	He calves	She calves	Milking	Dry	Total
Local					
Improved					

26. Production and selling

Cow	Milk unit		Calves	
	Production	Selling	Production	Selling
Local				
Improved				

27. Price of milk and milk product

Milk products	Per unit price
Milk	
Cheese	
Yoghurt	
Ghee	
Other	

28. Where do you sell the milk?

(a) To consumer directly

(b) To direct collection centre

(c) To distant market

29. Have you got any help or subsidies from government or non-government institution?

……..

30. If yes, what kind of help or subsidies?

…….

31. What are the main problems of cow farming?

.....

32. What should be done to solve these problems?

……..

33. What are you expecting from government in the field of cow farming?

……

34. What would you suggest the people who want to involve in cow farming?

……..