DOI: https://doi.org/10.3126/ejdi.v34i1-2.63655

Financial Profitability of Production and Marketing of Buffalo Milk in Lalitpur District, Nepal

C. K.C.[1*] and H.K. PANTA[1]
[1]Institute of Agriculture and Animal Science, Tribhuvan University
*ckc.aec2018@iaas.edu.np

ABSTRACT

Dairying is considered as a prestigious occupation among the agricultural sub-sectors in Lalitpur. The production of milk is concentrated in the peri urban and rural areas with the increase in demand for fresh milk in the urban areas. This study was conducted to analyse the economics of the production and marketing of buffalo milk in Lalitpur district, Nepal. This research was conducted from July 2021 to July 2022 collecting data from 123 respondents including farmers, collectors, key informants, and cooperatives working for milk related functions in Lalitpur district. The cost of rearing a milking buffalo was estimated NPR 5,762 per month, with the highest share of feed cost (47.8%) followed by labor cost (21.5%) and animal cost (13.1%). Results of Cobb-Douglas production function showed an increasing return to scale for milk production. Gross income, net income (per buffalo per month), and BCR were NPR 13,828, NPR 8,066, and 1.4, respectively. The cost of producing milk at the farmer's level was far low than the National Dairy Development Board reported cost of production. The estimated mean technical efficiency was 92.41% for buffalo grower in a range of 88-98%. Average monthly marketed surplus which was 92.7% of total production was around 3.05% less than the marketable surplus. Among the four milk marketing channels for buffalo milk supply, the longest channel i.e. Farmer-Collector-Large milk processors-Consumer has the highest price spread of 50.59% and producers' share of 49.4%. The shortest channel i.e. Farmer – Collector –Consumer has the estimated price spread of 9.89% and producers' share of 91.03%. Improving production and productivity is important in order to improve profit. The extension workers are suggested to make efforts and motivate farmers to acquire technical and management knowledge to increase dairy producers' profits. Infrastructure development was below the standard for milking buffalo keeping and selling. Improving these weaknesses, study further suggest turning peri-urban regions of Lalitpur district as the primary milk production location within Kathmandu valley.

Keywords: *Buffalo milk market, profitability, benefit cost analysis, technical efficiency*
JEL Classification: Q12

1. INTRODUCTION

Agriculture has remained at the center of the economy in Nepal for a long time. Agriculture sector contributes significantly to Gross Domestic Product (GDP)

providing employment opportunities to 60.4% of the total population accounting 23.9% of the Gross Domestic Product in the fiscal year 2021/22 (MoF, 2022). The share of livestock sector on agricultural GDP is 26.62% (Sharma, 2017). This sector not only contributes to the national GDP but also ensures the flow of money from urban to rural Nepal. The dairy sector not only provides household nutrition but also ensures the flow of money (NPR 60 million daily) from urban to rural Nepal (NDDB, 2014). Buffalo rearing for milk production in Nepal is carried out under the traditional production system and in the mixed farming system, with small non-commercial holdings (NDDB, 2014). According to Ministry of Finance (2022): compared to mid-March of fiscal year 2019/20, during the mid- march of the fiscal year 2020/21, the total number of dairy buffaloes has increased. During the mid- March of the fiscal year 2020/21, buffalo milk production has increased by 2.81 percent compared to that of the previous fiscal year. Out of 2.47 million tons of total milk production in fiscal year 2020/21, 1.4 million tons (57.24%) were produced by buffaloes only(MoALD, 2021). Globally, the number of cows per hundred buffaloes has decreased tremendously during the last three decades for source of milk (Singh & Rai, 1998). Similarly, with the increase in demand for milk in the urban areas, the production of milk has become concentrated in the rural areas. The share of buffalo milk is 60% (approximately 7.21% in AGDP) & cow milk is 40% (approximately 3.84% in agriculture (AGDP) in total milk production in Nepal (MoALD, 2022). The high yield of buffalo milk suggests a high proportion of improved buffaloes, especially in accessible areas. The preference for buffaloes for milk production has led to a great demand for the high-yielding Murrah breed. This preference for buffaloes has led to a burgeoning business for buffalo traders. The buffaloes are brought from Indian border areas in the lowlands and sold for a modest profit through various centres in the country. Raising buffaloes is less profitable in Nepal because of inefficient production and marketing practices (NDDB, 2014). Recent studies in these areas have been confined to causes of single aspect only like disease incidence. Our study on economics of milk production and marketing in Lalitpur has assessed economic inefficiencies of whole mechanism. The study has identified all economic inefficiencies in the process from input to final consumption. In view of the above, the present study was carried out with the broad objective to analyze the economics of production and marketing of milk in three rural municipalities of Lalitpur district which specific objectives were to: estimate the economics of milk production; study the factors affecting marketed surplus of sample farmers; examine the economic efficiency in milk marketing through different channels existing in the study area

2. METHODOLOGY

Study area

The Lalitpur district has a total geographical area of 385 km^2, out of which 80 percent area is hill. The rural population of the district is 38,500 out of the population of 5.5 million (CBS, 2021). The study was conducted in three rural municipalities of Lalitpur district of Nepal. These rural municipalities are Konjyosom rural municipality (1) Bagmati rural municipality (2) and Mahankal rural municipality (3). Majority population of the study areas depend on agriculture for their livelihood. These rural municipalities are pocket areas for milk production.

Sampling and Sample size

Stratified random sampling method was applied for primary data collection. Three study rural municipalities were the strata with mostly homogeneous population groups. From the three strata, total 105 buffalo dairy farmers (35 farmers from each strata) were selected randomly for the household (HH) survey. In each municipality, various government and non-governmental organizations were contacted for the buffalo farmer's database in that particular area. A total of 123 respondents were interviewed in all three study municipalities of Lalitpur district. It included personal interviews with 105 milk producer farmers, 9 key informants and 9 individuals working in various capacities in the dairy cooperatives of the selected districts.

Data collection

Desk review of the relevant documents

The researcher conducted desktop review of all relevant documents including past research articles, reports, relevant federal and provincial government documents, and related scientific and technical reports to understand methodology and collect secondary data. The desk review also included government policies, laws, strategies and guidelines related to the study.

Household survey, KII and FGD

The study used both quantitative and qualitative data for the study. Primary data were collected using household survey questionnaire where the respondents were interviewed face-to-face with the help of EpiCollect software sending data to a safe software platform. The FGD and KII tools were used to collect information from higher level respondents. The checklist for qualitative data (such as Focus Group Discussion - FGD with key informants) were based on research objectives and indicators.

Data analysis tools and techniques

Data collected from the questionnaire survey, key informant interview, focus group discussion and rapid market analysis will be analyzed using statistical software like MS Excel, SPSS 16.0 and STATA. The total cost of production was calculated using variable and fixed costs. The variable cost of milch animals included expenditures incurred on fodder (dry and green), concentrate, labor, and others (vitamin & calcium, medicine, vaccine, breeding, technical expenses, tractor fuel, seed & manure for grass, water, electricity, communication and others miscellaneous expenses). The fixed cost comprised of depreciation on animal and fixed assets (shed and machinery) and interest on fixed capital. These costs were taken on an average monthly basis. For animal cost, the depreciation rate was calculated at 10% per year based on the assumption of a 10-year productive life for dairy animals. Similarly, depreciation rates for other fixed assets were established at 2.5-5% (shed) and 10% (machinery and equipment) respectively. The annual interest rate on fixed capital, such as the value of an animal or a cattle shed, was set at 12%. Based on the current wage rate in the area, the value of family work was imputed. The costs per animal were calculated based on the total number of adult animals on a farm using the following formulae (Ahmed, 2020),

SC = TSC × MA/ TA
Where,
SC = Shed cost per milch animal
TSC = Total shed cost in NRs.
MA = Milking animals
TA = Total animals
Monthly milk yield, gross income and net income were computed using the formulas below:
Average monthly milk yield = (Total yield /PI), where
Total yield = Total milk yield in a lactation period
PI = Parturition interval in months
Monthly income from milk = Average monthly milk yield * Average milk price
Average Monthly Net Income= Monthly Gross Income - Monthly Gross Cost
Monthly gross income is the average of yearly income from milk and income of other byproducts (manure, calves and dry salvage buffaloes).
The regression model with monthly income (Total yearly income / (No. of buffalo * 12) as dependent variable and all variable costs i.e., fodder (dry+ green), concentrates, labor and miscellaneous costs as predictors was analyzed, using the equation below;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + B_3 X_3 + \beta_4 X_4$$

Where,
Y= Average monthly income per buffalo

X1= Cost of fodder (Green+ Dry)
X2=Cost of concentrate
X3=Labor cost
X4=other costs (Veterinary, medicine, breeding etc)
β_0= Intercept
β_s= Coefficient of X1, X2…

In multiple linear equation, we test the following hypothesis

Null hypothesis: H0: β1= β2= B3= β4= 0, which says that there is no useful linear relationship between y and any of the x predictors.

And, Alternative hypothesis: Ha: at least one bi ≠ 0. If at least one of these β's is not 0, the model is deemed useful.

Daily income and costs were calculated dividing total yearly income and cost, to minimize error due to lactation cycle.

General equation model for Cobb-Douglas production function is taking natural log of above regression function,

$Y = C (X_1)^{\beta 1}(X_2)^{\beta 2} (X_3)^{B3} (X_4)^{\beta 4}$
$LogY= LogC+ \beta_1 Log X_1+ \beta_2 Log X_2+ B_3 Log X_3+ \beta_4 Log X_4$

Technical efficiency

Stochastic frontier analysis was used. It is parametric technique that uses standard production functions such as Cobb Douglas production function and evaluate the maximum feasible output level for a given set of inputs. It assumes that maximum output may not actually be obtained from given inputs because of inefficiency. Two inputs; Capital and labor cost are considered to the milk yield in the analysis of stochastic production function. The function as used by Battese and Coelli (1995) is defined as

$$lny_i = f(x_i; \beta) + \varepsilon_i$$

$$\varepsilon_i = v_i - u_i$$

Where ε_i is the error term which is often labeled as the composed error term.

$u_I \geq 0$ is production inefficiency

$l_{ny_i} = l_{ny_i}^* - u_i$

$- u_I = l_{ny_i} - l_{ny_i}^*$

Technical efficiency (TE) = $\frac{Y_i}{Y_i^*} = \frac{\exp(X_i\beta + V_i - U_i)}{\exp(X_i\beta + V_i)} \exp(-U_i)$

3. RESULTS AND DISCUSSION

Status of milking animals and milk production

The literature review suggests that there are 7.56 million cattle and 5.16 million buffaloes in Nepal. Out of these, there are 1.2 million (16.2 %) milking cows and 1.63 million (31.6%) milking buffaloes. Terai has the highest number of both cattle and buffalo (45% cattle and 48% buffalo) followed by hills (43.5% cattle and 45.5% buffalo) and the least in the mountain at 11.5% cattle and 6.5% buffalo (MoALD, 2022). The average milk production per lactation is 450 liters & 850 liters for the local breed of cow & buffalo and for cross breeds it is 1650 liters & 1500 liters respectively(Garg et al., 2019). The productivity is far below the international average due to many inherent and external constraints including poor genetic potential, inappropriate feeding and health care management. There is seasonality in milk production in the country, leading to flush season and lean season. The shortage of fluid milk is more severe during the lean season i.e. March to August (Garg et al., 2019).

Cost of production per month per buffalo

The most important cost item was nutritional costs accounting for NRs 2754.44 (47.8%) of total costs, followed by labor cost NRs 1240.71 (21.5%), animal costs NRs 754 (13.1%), vitamin/ calcium & others cost NRs 504.14 (8.74%) and shed 255 (4.42%) of the total costs. Table 2 shows the average variable costs, average fixed costs and average total costs for three rural municipalities; Konjyosom rural municipality, Bagmati rural municipality and Mahankal rural municipality. The variable costs per adult milk animal were 4524.9, 4394.6 and 4578.42 NRs respectively for Konjyosom rural municipality, Bagmati rural municipality and Mahankal rural municipality. The overall variable cost of livestock producers was 4499.3 (78.1%) NRs per milking buffalo. The fixed costs per adult milk animal were 1251.25, 1238.9, and 1298.1 NRs respectively, and the overall fixed cost of livestock producers was 1262.74 (21.9%) NRs per milking buffalo. The total costs per adult milk animal were 5776.1, 5633.5,, and 5876.5 NRs respectively, and the overall total cost of livestock producers was 5762 NRs per milking buffalo.

Table 1. Cost of production per buffalo per month

Particulars	1	2	3	Overall (%)
A. Variable cost				
Fodder green+ dry	1556.6	1497	1584.9	1546.14 (26.8)
Concentrate	1188	1153.7	1283.14	1208.3 (21)
Labor	1289.14	1212.9	1220.14	1240.71 (21.5)
Vet med others	491.14	531	490	504.14 (8.74)
Total VC	4524.9	4394.6	4578.42	4499.3 (78.1)
B. Fixed cost				
Shed	252.8	250.3	262.2	255 (4.42)
Other	197.7	195.75	205.1	199.5 (3.46)
Animal	747	740	775	754 (13.1)
Equipment	53.8	53.27	55.8	54.3 (0.94)
Total fixed cost	1251.25	1238.9	1298.1	1262.74 (21.9)
C. Total Cost	5776.1	5633.5	5876.5	5762 (100)

Source: Field Survey, 2022

Note: 1: Konjyosom rural municipality, 2: Bagmati rural municipality and 3: Mahankal rural municipality

Factors affecting income from milk

From regression analysis for buffalo's milk income, it can be seen in table 3 that R^2value is 0.612 which implies that about 61.2 percent of variation in monthly income from milk in the study area was explained by the independent or explanatory variables under consideration. Coefficient of fodder and concentrate were found to be highly significant statistically at 1 percent level of significance. Coefficient of fodder (6.764) and concentrate (3.17) were significant at 1 percent level of significance. The analysis for buffaloes revealed that milk income could be increase through feeding more fodder and concentrate economically.

Table 2. Result of regression model for cost of production

Particulars	N	Constant	Fodder (X_1)	Concentrate (X_2)	Labor (X_3)	Others (X_4)	F	R^2	Adj. R^2
Monthly income	105	-3422.3	6.764**	3.17**	2.44	1.02	39.492**	0.612	0.60

Source: Field Survey, 2022

** And * indicates significant at 1% and 5% level of significance respectively.

Estimates of parameters of Cobb-Douglas income production function of sample farms

The Cobb-Douglas production function estimate for sample buffalo farms revealed that milk yield could be increased through feeding more fodder and concentrate

economically. The table again shows that for buffalo the expenditure on fodder and concentrate were found positive and significant at 1% and 5% level and labor and other cost were found positive but statistically not significant. Hence, the productivity could only be improved in the study area through fodder feeding and giving more concentrate efficiently.

Table 3. Cobb Douglas production function analysis for cost of production

Particulars	N	Constant (β_0)	Fodder (β_1)	Concentrate (β_2)	Labor (β_3)	Others (β_4)	F	R^2	Adj. R^2
Monthly yield (ln)	105	-3.34	.723**	.212*	.211	.006	44.4**	0.64	0.625

Source: Field Survey, 2022

** And * indicates significant at 1% and 5% level of significance respectively.

And, since the value of $\beta_{1+}\beta_2 + \beta_3 + \beta_4$ is greater than 1, we have increasing return to scale.

Profitability of milk production

From the calculation, gross income per milch buffalo was found to be NRs. 13134, NRs. 13317, and NRs. 12954 for the study areas Konjyosom rural municipality (1), Bagmati rural municipality (2) and Mahankal rural municipality (3) respectively. And, the overall gross income per milch buffalo was NRs.13828.5 per month. The net income per milch buffalo per month was found to be NRs. 8080.9, NRs. 8384.3, and NRs. 7758.5 for the study area 1, 2 and 3 respectively. And, the overall average net income was NRs 8066.5. The average BCR was found to be1.4, which indicates the return of NRs. 1.4 for investment of each NRs. 1. Thus, this livestock farming was found to be beneficial.

Table 4. Gross income, net income and BCR analysis

Particulars	Area			
	1	2	3	Overall (SE)
Income from Milk (A)	13134	13317	12954	13137 (282.53)
Other income (B)	723	700.8	681	691.5 (109.21)
Gross Income (A+B)	13857	14017.8	13635	13828.5 (312.1)
Gross cost	5776.1	5633.5	5876.5	5762 (153.5)
Net income	8080.9	8384.3	7758.5	8066.5 (285.4)
BCR	1.4	1.49	1.32	1.4 (0.048)

(Note: SE = Standard Error of mean) *Source:* Field Survey, 2022

Note: 1: Konjyosom rural municipality, 2: Bagmati rural municipality and 3: Mahankal rural municipality

Marketable and marketed surplus

The overall average milk production per farm of the sample households was found to be 666.58 ltr per month with an average of 4 buffalo per farm. On calculation of marketable surplus by deducting the WHO stated household requirement for Asian family of 1 ltr of milk per day (30 ltr per month) from average milk production per month, the overall marketable surplus per household was found to be 636.6 litres (96.05% of total milk produced in a month). However, the overall marketed surplus was found to be 616.3 liters per month (96..8% of total production). The marketed surplus is less than marketable surplus by around 3.2%.

Table 5. Marketable and marketed surplus of the farms

Area	Buffalo no	Average production per month	Daily WHO recommendation family requirement (%)	Marketable surplus (%)	Marketed surplus
1	2.9429 ± 1.6	485.42±246.24	30(6.18)	455.42± 246.24(93.82)	438.7± 236.98(90.36)
2	4.7429± 2	753.9±358.55	30(3.98)	723.93± 358.55(96)	705.07± 353.9(93.5)
3	4.5714± 2.7363	760.4±522.18	30(3.945)	730.39± 522.18(96.05)	705.1± 507.165(92.7)
Overall	4.0857± 2.28757	666.58±409.35	30(4.5)	636.58± 409.35(95.5)	616.3± 400(92.44)

Source: Field Survey, 2022

Note: 1: Konjyosom rural municipality, 2: Bagmati rural municipality and 3: Mahankal rural municipality

Factors affecting marketed surplus

The regression model with marketed surplus as dependent variable and predictors (Productivity/ milk yield per buffalo, ethnicity, family size, forms sold (ghee, khuwaa, raw milk or others) and number of milk animal was analyzed. On analysis, the calculated F value was 397.34, was found highly significant at 1% level of significance. It can be seen in (Table 7) that R2 value is 0.953 which implies that about 95.3 percent of variation in marketed surplus in the study area was explained by the independent or explanatory variables under consideration. Coefficient of average milk yield (0.960) and buffalo number (1.731) were found to be statistically highly significant at 1 percent level of significance. It indicates that with increase in the productivity and higher units of production, the farmers tend to sell more milk for income.

Table 6. Regression model on factors affecting marketed surplus

Particulars	N	Constant	Milk yield (X_1	Ethnicity (X_2	Family size X_3	Forms sold X_4	Animal number X_5	F- value	R^2	Adj. R^2
Marketed surplus per animal	105	-16.88	.96**	2.95	-0.51	.314	1.73**	397.34**	0.953	0.95

Source: Field Survey, 2022

** And * indicates significant at 1% and 5% level of significance respectively.

Marketing channels and price spread

Table 7 below shows the channels of milk selling and the price spread of milk marketed in the Lalitpur market through various channels of trade for buffalo milk.

Channel 1 = Farmer - Collector - Large milk processors - Consumer (Raw fresh milk)
Channel 2= Farmer – Collector - Seller (Khowaa / processed) – Consumer
Channel 3= Farmer – Collector – Small dairy – Consumer
Channel 4= Farmer – Collector - Consumer

The producers, who sold their produce through channel- 1, 3 and 4 received the price of NRs. 92.4, followed by channel -2 (NRs 85). The price spread was found highest (50.59%) in channel-1 followed by channel-2 (38.4%), channel-3 (22%) and channel-4 (9.89%) respectively. The producers' shares in consumers' rupee were found 49.4%, 61.6%, 78% and 90.11% of in channel-1, channel-2, channel-3 and channel-4, respectively.

Table 7. Marketing channels and Price spread

Particulars (N)	Channel-1 (70)	Channel-2 (12)	Channel-3 (15)	Channel-4 (8)	F-value
Farm gate price (NRs.)	92.4	85	92.4	92.4	1017.975**
Consumer price (NRs.)	187	130	118.5	101.5	
Price spread (%)	50.59	38.4	22	9.89	
Producer's share in consumer price (%)	49.4	61.6	78	90.11	

Source: Field Survey, 2022

Technical efficiency

The technical efficiency of milk production is presented in Table 8 below. The buffalo farmers had a mean technical efficiency level of 92.41 percent that shows around only 7.59% level of increases in output can be achieved without additional resources. From the table it can be noted that about 14.30 percent of the respondent farmers were operating at 88-90 percent efficiency that indicates milk production can be increased by 10-12 percent without any additional resources. Around 34.30 percent of the respondent farmers were operating at 90-92 percent efficiency level that indicates a scope for improvement of milk production by 8-10 percent. Again, 26.66 percent of the sample farmers were operating at 92-94 percent efficiency which shows there is a wider scope for increasing the output level by 6-8 percent. The average technical efficiency of 92.41 percent shows 7.59 percent of milk production can be increased without any additional resources.

Table 8. Technical efficiency in production

Technical efficiency rating (%)	Frequency	Percentage	Mean
88-90	15	14.285	
90-92	36	34.285	
92-94	28	26.66	92.41%
94-96	17	16.2	
96-98	9	8.57	
Total	105	100	

Source: Field Survey, 2022

Problems of buffalo milk production

The Table 9 below shows the problems faced by the dairy farmers during the production of milk. The important problems faced by buffalo dairy farmers were disease and breed selection in milk production. For fresh milk sellers, various disease incidence problems ranked first with the score of 3.59, followed by purity of breed (3.23), breeding problem (3.06), poor veterinary and medicine facilities (2.85), low profitability (2.39) and lack of concentrate and dry feeds (2.29).Similarly, for processed sellers lack of market for fresh milk was ranked the first with the score of 5, followed by lack of concentrate and dry feeds (4), lack of veterinary and medicine facilities (3.72), Breed selection and Disease (3.61), Breeding (3.5) and Low profitability (3.17).

Table 9. Farmers' problem ranking

Fresh milk seller (n=87)			Processed milk seller (n=18)		
Problems	Score	Rank	Problems	Score	Rank
Disease	3.59	**I**	Lack of market for fresh milk	5	**I**
Breed selection	3.23	**II**	Lack of concentrate and dry feed	4	**II**
Breeding	3.06	**III**	Lack of vet and medical facilities	3.72	**III**
Poor vet and medical facilities	2.85	**IV**	Breed selection and Disease	3.61	**IV**
Low profitability	2.39	**V**	Breeding	3.5	**V**
Lack of concentrate and dry feed	2.29	**VI**	Low profitability	3.17	**VI**

Source: Field Survey, 2022

The only problem for middlemen during marketing was poor road condition during rainy season with the score of 5. For collectors, only one problem was identified with the score of 5.

4. CONCLUSION

Buffalo dairy firm has improved net profit due to high gross income and low maintenance cost. Benefit-cost ratio analysis further demonstrates the business potential i.e. investment in the buffalo dairy business is financially viable and profitable. Farmers were compelled to market processed products because of inadequate transportation infrastructure in certain areas, especially during the rainy season. Key problems of the farmers are low breed purity, inadequate technical expertise, and breeding issues. The farmers have higher technical efficiency in production and increasing return to scale. There is possibility of further increasing efficiency by efficient utilization of the resources like labor and other variable costs (breeding, medicine and vaccination, water, electricity etc). Similarly, milk productivity could be improved through fodder feeding and giving more concentrate efficiently. Further investigation on determinants of technical efficiency and market efficiency is suggested to better understand the dairy business.

References

Ahmed, J. S. 2020. An economic study of dairy milk production farms in Qena governorate. *Fayoum Journal of Agricultural Research and Development. 34*(2), 59–73.

Garg, M. R., A. Feed, A, N. Specialist, and C. R. Upreti. 2019. Assessment of Feed Resources, Feeding Practices, Nutritional Status, and Future Strategies for Improving Productive and Reproductive Efficiency of Dairy *Animals including Standard Operation Procedure* (SoP of Nepal). 347.

Khalandar, S., and S. Bijla. 2019. Competitiveness of milk production: Global scenario. *International Journal of Livestock Research. 9*(12).

Krishnadas, S., Y. S. Chakrabarty, K. S. Rishikanta, and N. S. Okendro. 2019. Economics of milk production and marketing in Thoubal district of Manipur. I*nternational Journal of Current Microbiology and Applied Sciences 8*(06), 1397–1407.

MOALD. 2021. *Statistical Information on Nepalese Agriculture*-2076/77. Website:https://moald.gov.np/wp-content/uploads/2022/07/Statistical-information-on-nepalese-agriculture-2076-77.pdf (Retrieved on: 7 September, 2022)

MOALD. 2022. *Statistical Information on Nepalese Agriculture*-2077/78. Website:https://moald.gov.np/wp-content/uploads/2022/07/Statistical-information-on-nepalese-agriculture-2077-78.pdf (Retrieved on: 7 September,2022)

MoF. 2021. Economic survey (2020/21). *Ministry of Finance. Singh Durbar, Kathmandu*. website: https://www.mof.gov.np/site/publication-detail/3105 (Retrieved on: 19 April, 2022).

MoF. 2022. Economic survey (2021/22). *Ministry of Finance. Singh Durbar, Kathmandu.* website: https://www.mof.gov.np/uploads/document/file/1674635120_Economic_Survey_2022.pdf (Retrieved on: 7 September, 2022).

NDDB. 2014. *Final report on study on cost of milk production.* National Diary Development Board, Kathmandu , Nepal.

Sharma, B. 2017. Milk marketing and dairy value chain development in Nepal in relation with climate resilience effort in the present context. *Nepalese Veterinary Journal. 34*,144–151.

Singh, V. and K. N. Rai. 1998. Economics of production and marketing of buffalo milk in Haryana. *Indian Journal of Agricultural Economics. 53*(1), 41–52.

Timsina, K. and F.T. Agreements. 2016. Economics of dairy farming : a case study of Phulbari village in Chitwan. *Nepal Agriculture Research Journal. 10*, 55-63.

Upadhyay, N., B. Khanal, Y. Acharya and K. P. Timsina. 2021. Nepalese legal standard of milk and common milk products and its implications. *Journal of Agriculture and Natural Resources.4*(2), 284–294.