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An Economic Analysis of Production of Milk in Jaipur District of Rajasthan

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Abstract

The present study attempts to assess the return of dairy farms and their cost structure in the Jaipur district of Rajasthan. For selecting the dairy farmers in the study area, the multi-stage random sampling technique was used. The Cobb-Douglas production function form has been applied to examine the effect of various factors of production like feeding cost, expenditure on concentrate, electricity & water, health care and miscellaneous expenses on milk production of dairy farms in different categories of farmers. Elasticity of different factors affecting milk production has also been computed. Results indicate the inverse relation between the size and per unit cost of milk production, due to economies of scale. The per litre cost of milk production was quite low in large farms as compared to small farms. The value of R^2 was around 0.98 for all the farm size, showing that the 98% of variation in the dependent variable (milk production) is due to independent variables included in the function. The study found that all the inputs like dry fodder, green fodder, concentrates and health care expenditure, have significant effect on the milk production except human labour on small farms.

The net return per lactation of milch animals was meagre because of low milk yield and high maintenance cost both on small and large herd size group. The study shows that in addition to production, the per litre price of milk is the most significant factor affecting the business of milk. The study also found that the cost of fodder and feed was the most important component (50 to 60 per cent) of the total maintenance cost. The major constraints in the production of milk were large investment, high feed cost, low per litre price of milk, low milk yield, lack of infrastructure facilities for marketing of milk, insufficient supply of inputs, and high cost of treatment of veterinary diseases.

Keywords: Milk production, maintenance, fodder, infrastructure facilities.

Introduction

In India around 33% rural household are landless and 57% have holding size of less than two hectare, but they possess more than 70% of country's livestock which contributes more than 50% of their income. It has immense contribution in the income and employment generation in rural areas. In this way, the livestock sector is backbone of the rural poor. In the livestock sector, dairying is most important source of income and employment generation in rural areas, mainly for marginal and small farmers, who have about 32 % of cultivable land but account for almost 65 % of female cattle in the country. Dairying contributes to

about 35% of the gross income of rural households and about 50% for the landless. Although India is among the largest producer of milk in the global market but its milk processing industry is not properly developed. Only 15% of milk is sold to dairies while the world average is 75 %. Huge proportion of milk in India is utilized in the unorganized sector for drinking and making paneer, sweets or other items.

More than two-third of the state's area is desert. Because of lack of irrigation facilities and very low level of ground water in Rajasthan, agriculture is heavily dependent on rainfall and this uncertainty of monsoon causes severe drought and other adverse conditions. However, there are varieties of cattle which can be adapted in such conditions and which force the people to engage in animal husbandry especially the production of milk and milk products.

Animal husbandry is a more reliable and dependable source of livelihood and income than agriculture in Rajasthan because it not much affected by failure of rains. There is no denying fact that animal husbandry plays pivotal role in promoting rural development and eradicating poverty through employment generation for unskilled and semi-skilled labour. It raises cash income and crop production. In livestock sector, dairying is the easiest and the most convenient occupation in the rural areas of Rajasthan. Since Rajasthan state has a diverse terrain ranging from arid to semi-arid region in east to the greener belts east of Aravallis and the hilly tribal areas in the south-east. North-western parts of Aravallis comprise more than half of the area which is sandy, ill-watered having high temperature and mostly unproductive. The western half is covered with sand dunes with small hillocks in between. The whole of sandy area, plain, arid land and the semi-arid land receive less than 50 cm. of annual rainfall.

The growth and progress of dairy industry in the last few decades is a remarkable achievement. The production, supply and marketing of milk in Rajasthan is highly decentralized. About 55% to 60% of the milk produced is self-consumed by the household. Only 15-16% of the total production of milk in the state enters the organized market comprising the private and cooperatives sector. Milk dealers and vendors are major players of the informal market. Vendors purchase the milk from producers and sell them in urban areas to households. While the milk dealers supply to private processing units. In Rajasthan more than 60% of the total milk production is consumed in the raw form while the remaining is processed to produce khoa, milk powders, ghee, butter, curd, cottage cheese, etc.

Rajasthan state comprises 33 districts. Jaipur is largest milk producing district of Rajasthan. Although, agriculture is main occupation for majority of rural households in Jaipur district b ut because of dependence on rainfall, uncertainty of monsoon and lack of irrigation facilities, agriculture alone cannot meet their financial requirements. Therefore, they are compelled to go in for a subsidiary occupation like milk production. Jaipur dairy covers largest dairy co-operative societies and has the highest membership in the Rajasthan state. Jaipur district has been purposively selected for this study because it is the largest milk producing district of Rajasthan. In addition to it, Jaipur district has well organized milk co-operative unions with 2420 milk co-operative societies and 167473

members providing good marketing facilities for the sale of milk by the farmers. It is also connected with most of cities of the Rajasthan state and neighboring states.

Although, majority of rural households are engaged in dairying for their livelihood and supplementing the agricultural income but still, there is lack of adequate data on cost, incomes, milk production and various other factors which are a pre-requisite for any producer who undertakes dairying as a new enterprise. For the dairying to become economically viable, it is essential that with the increase in milk production, the marketed surplus increases. To raise the total milk production and its marketed surplus, it is necessary to identify the determinants of milk production because it would help the policy makers and government agencies in formulating policies for increasing the marketed surplus through establishment of efficient marketing systems. Therefore, this study was undertaken to understand the various aspects of economics of milk production in large and small herd size categories of different households in Jaipur district of Rajasthan, with the specific objectives to examine the cost structure and returns in milk production and to identify the factors affecting the milk yield and economic viability of dairying occupation.

Objectives of the Study

1. To examine the cost structure of milk production in Jaipur district.
2. To identify the determinants of milk production in Jaipur district.
3. To analyze the factors affecting the return on milk production.
4. To suggest measures to revitalize the milk production sector from the perspective of different type of farmers engaged in milk production as their source of livelihood.

Research Methodology

The multistage stratified sampling technique has been used to select the sample for this study. Jaipur district was purposively selected for the study, as it is the largest milk producing district of Rajasthan. Jaipur district consists of 13 sub-divisions, out of which 2 sub- divisions Chomu and Amber were selected randomly. And from each sub-division two villages namely, Harota and Itawa Bhopji from Chomu and, Deogudha and Radhakrishanpura from Amber sub-divisions were selected randomly. For the selected villages, the list of dairy farmers was taken and stratified into two-herd size categories based on number of milch animals (both, cows and buffaloes) were formed using cumulative square root frequency method. A sample of 30 small farmers (1-3 animals) and 30 large farmers (4-6 animals) was randomly selected in probability proportion to their number in each size group from the selected villages. The primary data on different aspects of the study were collected from the selected respondents with the help of well-structured, pre-tested schedule by survey method. The information was collected on socioeconomic characteristics of the households such as family education status, size of holding, farm building, machinery &

equipment, size and composition of herd, value of milch animals, milk production & consumption, feed inputs, breeding practices, veterinary infrastructural facilities available, veterinary and miscellaneous expenses incurred, hired and family labour employed in dairy operations, and prevailing wage rates and prices of milk, prices of inputs and outputs, quantity of dung produced, etc. The study was conducted in the year 2016**.**

Conventional double log production function has been used to estimate the input productivity and returns to scale. For this estimation the following logarithmic form of Cobb-Douglas production function is used.

$\log Y = \log A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6$

Where

Y = Per animal per day milk yield (in litres)

X_1 = Consumption of Dry fodder per animal per day (in kg)

X_2 = Consumption of Green fodder per animal per day (in kg)

X_3 = Consumption of Concentrates per animal per day (in kg)

X_4 **=** Consumption of Electricity and water per animal per day (in rupees)

X_5 = Use of Human labour per animal per day (in man days)

X_6 = per animal per day Health care expenditure (in rupees)

Where, Y = Output, X_i's = Input variables used, i=1, 2,3,4,5 and 6.

A = Constant term, and b_i's = Parameters to be estimated.

u = Stochastic disturbance term. This is assumed to follow normal distribution with zero mean and constant variance.

$b_i, b_2, \ldots, b_6$ are the elasticity coefficients (partial) which show the percentage change in the milk yield (Y) for one per cent change in the concerned independent variable (X_i) keeping other independent variables constant. The sum of elasticities gives information about returns to scale i.e. the percentage change in milk yield resulting from one per cent change in all inputs included in the function. If this sum equals to one; then there are constant return to scale, if the sum is less than one; then there are decreasing returns to scale and if the sum is greater than one; then there are increasing returns to scale. Elasticity for each input has been calculated and tested at 1 and 5 per cent level of significance. For testing the significance of regression coefficients, the 't' test has been used assuming that all the variables have positive effect on the dependent variable.

The costs incurred per animal per lactation are presented in Table 1. The actual purchase price was used for estimating the cost of fodder and concentrates. Home grown fodder was valued at prevailing market prices. Feeds include green fodder, dry fodder and concentrates. Total costs were Rs. 46073, Rs 42023 and Rs. 43596 on small, large and polled farms respectively. The unit cost has been found inversely related with the size of the herd i.e. higher for the smaller herd size and lower for the large herd size. Among the variable costs, the total

feed expenditure was Rs. 23234 on small farms, Rs. 24235 on large farms and Rs 24645 on pooled farms. Green fodder includes paragrass, napier grass and anjan grass. Dry fodder includes jowar straw, paddy straw, groundnut hulms etc. Concentrates include oil cakes, rice bran, husk, cotton seeds etc. But in the study area, in addition to the limited availability of green and dry fodder, barja grains, the high cost of concentrates and the falling milk-concentrate price ratio made it difficult to feed sufficient concentrates regularly which resulted in low productivity. The price of concentrates increased sharply compared to price of milk in the study area. It is often the result of non-availability of perennial pasture, lands, drinking water, balanced diet, proper medical care, negligence on the part of owners and lack of capital resources.

Human labour cost includes wages paid both to family (taking the imputed value) and hired labour engaged. The family labour has been valued at par with the average wages paid to permanent labour in the nearby area. Human labour employed on small farms, large farms and pooled farms was Rs. 7143, Rs. 4725 and Rs. 5267 respectively. It was observed that under the variable component, the employment of family labour was more on small farms compared to large farms due to availability of family members. In agriculture sector, in rural areas labour is disguisedly employed, which can be utilized by allied activities of agriculture. Family labour employed on small farms, large farms and pooled farms was Rs. 6513, Rs. 3856 and Rs. 4474 respectively. Health care expenditure was also important component in variable cost. These included actual expenditure incurred on preventive vaccinations, deworming, and disease control against incidence of diseases.

Miscellaneous expenditure including artificial insemination and consumable items amounted to Rs. 423, Rs. 471, and Rs. 435 on small, large and pooled farms respectively. Under the components of fixed costs, interest on the value of animal was found to be the higher and followed by depreciation of animal in all the farms irrespective of the farm size.

Table 1 : Cost structure in milk production on sample farms (per animal per lactation) (In Rupees)

S. No.	Particular	Small farms		Large farms		Pooled	
I	**Variable cost**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
1.	**Human Labour**	6513	14.13	3856	9.18	4474	10.27
	Family labour	630	1.36	1043	2.48	745	1.70
	Hired labour **Total**	7143	15.50	4725	11.28	5267	12.08
2.	Feed &Fodder cost	23234	50.42	24235	56.68	24645	56.57
3.	Health care exp.	1125	2.44	978	2.35	985	2.26
4.	Interest on working capital	2356	5.12	2679	6.38	2668	6.15
5.	Electricity and water	458	0.99	576		512	1.17
6.	Miscellaneous Expenditure (Artificial insemination and consumable articles etc.)	423	0.91	471	1.42	435	0.99
Total variable costs		**41882**	**90.87**	**35349**	**90.75**	**39731**	**90.20**
II.	**Fixed cost**						
1.	Depreciation on fixed capital	234	0.50	127	0.35	174	0.39
2.	Interest on fixed capital	345	0.74	174	0.46	254	0.59
3.	Depreciation on animal	1045	2.27	1025	2.67	1125	2.58
4.	Interest on the value of animal	2567	5.58	2134	5.77	2312	5.32
Total fixed costs		**4191**	**9.09**	**3460**	**9.25**	**3865**	**8.88**
Total costs		**46073**	**100**	**42023**	**100**	**43596**	**100**

Source: Field Survey

It has been computed as per straight line method based on the market value and life of the animal and adjusted to lactation period. Depreciation on fixed capital has been computed by using straight line method of depreciation, for the items like, water troughs, buckets, cattle shed, milking cans, feeding troughs, ropes and other equipments which are very common to both small and large farms.

It is evident from the Table 1 that the feed & fodder cost was the highest input cost in dairy farming. It amounted more than 50% of the total cost in all the farms irrespective of the farm size. Small and large farmer spent more or less the same proportion on feed & fodder items. Table 2, shows that the average milk yield was 2281 litres on small farms, 2415 on large farms and 2346 on pooled farms. The cost of milk production per litre was Rs. 20.18 for small farms; Rs.17.40 for the large farms and Rs. 18.58 for the pooled farms. The per litre cost of milk production has been found lesser for large farms compared to small farms. The lesser cost in large farms was due to economies of scale, as the feed & fodder cost and other variable costs decline per unit with the expansion of scale.

Returns from dairy farm

Dairying is very significant source of self-employment to millions of people in Rajasthan state. The rapid expansion of this sector can ensure economic justice and equity because those engaged in it are mainly small holders and the landless. This sector requires small amount for investment and provide stable source of income. In milk production there are wide variations in milk yields in study area. In general, buffaloes have higher yields than indigenous cows, but the productivity of crossbred cows is more than indigenous cows and buffaloes. Extent of profitability or net return is the most important indicator of viability of cattle rearing.

Both small and large farms tried to optimize profit by using their available resources. In study, efforts have been made to work out net return generated from the dairy farming. Net return has been calculated by deducting total expenditure from the total receipt from dairy farming. Returns from dairy mainly included the income from sale of milk, FYM, calves and also the appreciation on animal. Returns per rupee of investment worked out to 0.56, 0.86 and 0.75 on small, large and pooled farms respectively.

Table 2 : Cost of production of milk (per litre)

S.No.	Particulars	Small farms	Large farms	Pooled
1.	Average milk yield (litres) per animal/ lactation	2281	2415	2346
2.	Total cost (Rs.)	46073	42023	43596
3.	Cost of production per litre (Rs.)	20.18	17.40	18.58

Source: Computed from data collected

From the returns analysis it is found that large farms were better placed compared to small farms regarding net income and returns over working costs. Because of economies of scale the working cost on large farms was low. Because the large farms purchase the required inputs in large quantity at the lower prices. The bulk purchase of inputs reduces the operating cost of milk production. The large

farms clearly received better income and could able to reduce the cost comparatively. It is due to higher milk yield in large farm because of large herd size and better management practices. Net returns was Rs. 26209, Rs. 36392and Rs 32729 on small, large and pooled farms respectively. Large farms because of lower operating and maintenance cost and higher production could generate better returns over small farms. Therefore, it is necessary that sufficient and nutritional doses of feed and fodder are given to raise their productivity.

It is observed that the farmers could increase the returns from milk production by applying more green fodder, dry fodder, concentrates. The amount of inputs needs to be raised for getting the higher gross returns. The better quality of feed, veterinary aid and cow breeds should be made available for dairy farms in sufficient amount and they need to be ensured at reasonable and stable prices. There should also be mechanism for ensuring stability of prices of milk and milk products through the year to make the dairy enterprise as a supplementary and gainful occupation. The higher return and profit for the dairy farms, by and large depend on milk yield and marketing network and sales promoting services.

Table 3 : Returns from dairy farm per animal per lactation

S. No.	Particular	Small farms	Large farms	Pooled
1.	Returns from milk	67789	73426	71435
2.	Value of FYM	1674	1754	1713
3.	Value of calves	1565	1565	1565
4.	Appreciation on animal	1654	1670	1612
5.	Total returns	72282	78415	76325
6.	Total cost	46073	42023	43596
7.	Net returns	26209	36392	32729
8.	Rate of return	0.56	0.86	0.75

Source: Computed from data collected

The indigenous breeds of milch are not profitable for economic purposes as the quality, quantity of milk, manure and fat are comparatively of low grade However, the large farms attempted to improve the quality of indigenous milk-producing animals by way of cross breeding with exotic proven bulls to increase the milk production. To increase the return from the dairying the qualitative cattle feed, artificial insemination facilities, proper infrastructure facilities for the milk production and marketing facilities and organized institution set-up are required. Trading in livestock is a major economic activity in the region which assures of an advantages condition to the people**.**

Revenue from the sale of milk was computed by taking the actual sales price and quantity sold. About 50% rural household keep large proportion of milk for the domestic consumption. Therefore, the value of self-consumed milk has been computed on the basis of prevailing market price. Revenue from the sale of FYM was computed on the basis of its sold quantity and prevailing market price. To calculate the gross income from milk, the value of calves, FYM and appreciation

on animal has been added to revenue receipts from sale of milk. There is huge potential of employment generation in rural areas through dairying. In the study area, dairying provided definite and regular income and employment to a large segment of rural families throughout the year and thus, improved the quality of their life. The milk producers in the co-operative sector get income of of Rs.250 to 1,500 per day for the milk supplied by them to the dairy societies.

Income from the sale of milk has been computed on the basis of actual receipts from the sale of milk. The value of self-consumed milk has been calculated on the basis of prevailing market price of milk. Income from sale of FYM has been calculated on the basis of quantity of FYM available for sale multiplied by its market price. The value of calves at the time of birth and FYM and appreciation on animal were added to get gross income.

In dairy there is huge potential of employment generation and also reduction in poverty in the rural areas. The most attractive feature of dairying is that it provides definite, regular income and employment to large section of rural families throughout the year, improving their economic and social status in the society. The milk producers in the co-operative sector get an income of Rs.200 to 1000 per day for the milk supplied by them to the dairy societies.

Particulars	Small farms	Large farms	Pooled farms
Intercept	0.223 (0.132)	0.414** (0.121)	0.213*** (0.091)
Dry fodder (Kg) X_1	0.081** (0.037)	0.142** (0.039)	0.223*** (0.033)
Green fodder (Kg) X_2	0.231** (0.117)	0.217*** (0.079)	0.143** (0.061)
Concentrates (Kg) X_3	0.284*** (0.094)	0.332*** (0.127)	0.492*** (0.073)
Electricity and water(Rs.) X_4	0.206*** (0.074)	0.032** (0.017)	0.019** (0.070)
Human labour (man days) X_5	-0.142 (0.070)	0.342*** (0.132)	0.136** (0.049)
Health care (Rs.) X_6	0.321*** (0.091)	0.030** (0.015)	0.021** (0.012)
Coefficient of multiple determination (R^2)	0.981	0.983	0.976
Returns to scale	0.981	1.095	1.34

Note ** Significant at 5% level *** Significant at 1% level

Factors influencing milk production

For the different sizes of farm groups the elasictities coefficients for different inputs included in the production function have been calculated by using Cobb-Douglas production function. The results are shown in the Table 4. One major component of total maintenance cost is that of feed and fodder cost. Major part of region is comparatively dry, rainless, and hot. In this region, water scarcity is

the main problem in the development of live-stock rearing. It rains only for three months and this is the only time when this area has the required feed available for milch animals.

In most of the cases feed and fodder cost was 50 to 60 per cent of the total cost. The net return per lactation of a milch buffalo was very low due to high maintenance cost and low milk yield of milch buffaloes in all the groups. Price of milk, marketing and health facilities were significant factors affecting the milk business, besides production level. Vendors and milk dealers dominate the informal market where, the vendors generally purchase the milk from producers and sell them to urban households. Milk vendors were making huge profits by adopting various types of malpractices. The operation of milk co-operative societies in the rural areas had positive impact on the marketed surplus of milk.

It can be seen from the Table 4 that the value of co-efficient of multiple determination (R^2) was 0.98 for small farms which implies that 98% variations in milk production have been caused by variables included in the function. From a purely statistics viewpoint, the estimated regression line fits the data quite well. The elasticity of dry fodder (X_1), green fodder (X_2), concentrates (X_3), electricity and water (X_4) and health care (X_6) are 0.081, 0.231, 0.284, 0.206 and 0.321 respectively. These results implied that one per cent increase in the variables, keeping others constant would increase the milk production by 0.081, 0.231, 0.284, 0.206 and 0.321 per cent respectively. It is clear from these values that expenditure on health care has important bearing on the quantity of milk and return from dairying. On the other hand, one per cent increase in expenditure on human labour would reduce the milk production by 0.142 per cent as the elasticity coefficient of human labour was found to be negatively significant. All the selected variables except human labour were found positive and significant.

As per the table 4, for large farms, it can be seen that the value of R^2 is 0.983, which shows that the independent variables included in the function explains 98 per cent of variation in dependent variable (milk production) on large farms. The elasticity coefficients of all the independent variables were positive and significant. The elasticity coefficients of dry fodder (X_1), green fodder (X_2), concentrates, (X_3), electricity and water (X_4), human labour (X_5) and health care (X_6), are 0.142, 0.217, 0.332, 0.032, 0.342 and 0.030 respectively. Keeping other variables constant one per cent increase in the above mentioned variables would increase the milk production by 0.142, 0.217, 0.332, 0.032, 0.342 and 0.030 per cent respectively.

Milk production depends upon the breed of animals (indigenous or cross breed), size of herd (small or large), calving period of milch animals, and quantity and quality of feeding, health care and management practices adopted by the milk producers. The household keeps a part of milk production for self-consumption and remaining milk is sold to outsider and used for making milk product like khoa, milk powders, ghee, butter, curd, cottage cheese, etc. The pattern of supply of milk depends on total amount of milk produced, price of milk and milk

products, quantity of milk needed for family consumption and marketing network for the supply and sale of milk. There are various other factors which affect the cost of milk production. The expenditure incurred on preventive vaccinations, deworming, and disease control against incidence of diseases has also been found significant.

The high cost of concentrates and its limited availability, and declining milk-concentrate price ratio made it difficult to feed adequate concentrates regularly which resulted in low milk productivity and gross return. The price of concentrates increased sharply compared to price of milk in the study area. It was a result of several reasons such as non-availability of perennial pasture, lands, drinking water, balanced diet, proper medical care, negligence on the part of owners and lack of capital resources.

For the Pooled farms it can be seen from the table 4 that, the co-efficient of multiple determination (R^2) is 0.976 which implies that about 98% variance in milk production was caused by variables included in the function. Similar to large farms, on pooled farms also all the selected input variables had positive and significant impact on the production of milk. The elasticity coefficients for dry fodder (X_1), green fodder (X_2), concentrates, (X_3), electricity and water (X_4) human labour (X_5) and health care (X_6), are 0.223, 0.143, 0.492, 0.019, 0.136 and 0.021 respectively. These results indicate that one per cent increase in these independent variables holding others independent variables constant would increase the milk production by 0.223, 0.143, 0.492, 0.019, 0.136 and 0.021 per cent respectively.

Findings of the study showed that all the input variables selected in function indicated significant and positive impact on the production of milk except human labour on small farms. The input variables of dry fodder (X_1), green fodder (X_2), concentrates, (X_3), electricity and water (X_4) and health care (X_6) have determinant and predictable effect on the milk production. The study revealed that the major constraints in milk production were large amount of investment, low price of milk, high feed cost, inadequate infrastructure facilities for marketing of milk, low milk yield, inadequate input supply, lack of proper facilities for the veterinary treatment and diseases. It is concluded that better feeding and breeding management practices and health facilities could increase milk production. The production of milk was influenced by proper medical care (like the preventive vaccinations, deworming, disease control against incidence of diseases), introduction of economic policies affecting the availability of perennial pasture lands, drinking water and infrastructure, institutional set up, technology up-gradation, quality assurance and the like. Such influencing factors were also the constraints in development of dairying in commercial manner.

The economics of any dairy cattle herd is influenced by the production, reproduction and health status of the livestock. Lifetime performance and longevity of breeds are highly desirable characteristics that immensely influence the overall profitability of a dairy animal. It has been observed that genetic

improvement for higher milk production decreases the reproduction performance and dairy animals are often afflicted with increased susceptibility to mastitis and other milk related metabolic diseases. The increased disease incidence that accompanies genetic improvement for milk yield is, therefore, increasing the cost of milk production. To make dairying a successful and profitable business, the indigenous breeds should not only be high producing, but also sound in reproductive health. The time has come to take urgent measures for the multiplication and development of indigenous breeds in a more sustainable manner

Conclusion

In the study area more than 40% of farming rural households were small and most of the landless farmers were engaged in milk production as a subsidiary occupation. Dairying enterprise can be adopted easily to supplement the agricultural income. In this occupation, the majority were women, who were engaged to supplement their family income. As agriculture income is received after a certain time period, they needed a regular and certain income to meet their daily expenses. Conventionally, dairy and pasturing activities were aimed for self-consumption, but the regular milk sales provided them opportunity to come out from a life of subsistence to earn a market based income to improve the standard of living. The milk production by a household is consumed at home, sold to outsiders, converted into milk products like khoa, milk powders, ghee, butter, curd, cottage cheese, etc .The pattern of supply of milk depends upon amount of milk produced, quantity of milk needed for family consumption, price of milk and milk products and marketing network necessary for supply of milk. There are various other factors which affect the cost of milk production. The expenditure incurred on preventive vaccinations, deworming, disease control against incidence of diseases was also found to be significant. With the increasing urbanization the demand for milk and milk products has increased substantially which encouraged commercialization of dairying. The activity of procuring, processing and distribution of milk in urban area has generated gainful job opportunity for the rural households. It has also reduced the disguised unemployment in agriculture to a great extent.

Milk production depends upon the size of herd, breed of animals maintained, calving period of milch animals, expenditure incurred on preventive vaccinations, deworming, disease control against incidence of diseases and feeding and management practices adopted by the milk producers. It has been observed that the inadequate and poor quality of food provided to the animals caused the low productivity. The high cost of concentrates and its limited availability, and declining milk-concentrate price ratio made it difficult to feed adequate concentrates regularly which resulted in low milk productivity and gross return. The number of high yielding indigenous pure breed cattle is reducing and number of non-descript cattle is increasing. Therefore, there is need of the nutritional feed and fodder in the optimum amount to raise the productivity of

the milch animals in the state. This problem can be solved by increasing the irrigation facilities on the pasture land which can make possible the feed and fodder in adequate quantity at affordable price to small and large farms. Conscious and devoted efforts on part of the state government are needed to improve the quality, variety and productivity of fodder crops, develop grazing land, and promote agro-forestry systems in the long term interest.

Considering the average milk production of milch animals and other important factors affecting their milk productivity, it is suggested that better breeding practices should be promoted and made available to the farmers so that both quantity and quality of milk production can be increased. The dairy owners and household should be motivated to adopt the scientific management practices in rearing of milch animals for avoiding the incidence of diseases and focusing on better health, performance, yield and reduction in the variable cost. This can be possible through creating awareness about scientific breeding practices and adopting a policy based on the needs of the local farmers.

It is necessary that some schemes and programmes are launched to diversify the use of milk in the various items i.e. diversification and preparation of value added milk products. On the basis of market demand conditions and supply of milk, milk processing and milk product manufacturing units should be established. Mini dairies should be set up in small towns and big villages where large dairies are not economically viable. Milk processing units should assume a prominent role in promoting breeding services, input supply and health care provision, apart from collection of milk. The farmers should be trained in clean milk production; proper caring of milch animals, to improve the productivity of fodder crops and developing grazing land. Marketing of animal has been neglected but the government should organize the animal fair to ensure the fair price to the animal rearers. It has been observed that in the absence of an organized market for milch animals, the farmers are cheated by the traders and middlemen. Hence, there is need of direct linkage of processors and consumers. From equity and livelihood standpoints, the promotion of livestock rearing is essential for rural household to reduce the poverty and disguised unemployment, lessen the dependence on agriculture. It has been seen that dairying provides nutritional food products, draught power, manure and employment to support the family income. For achieving the objective of inclusive growth and to eliminate the rural-urban divide and support the agriculture sector in the state the place of dairy farming is very significant.

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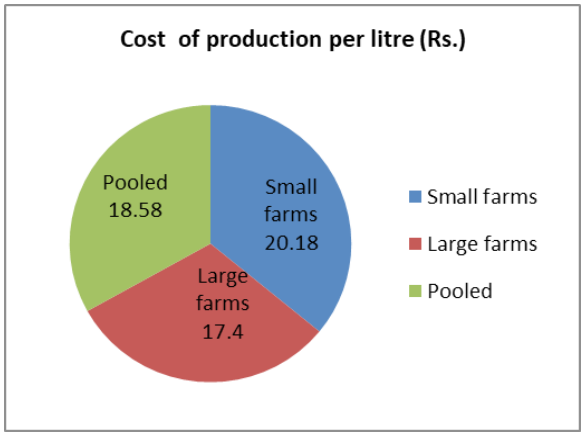
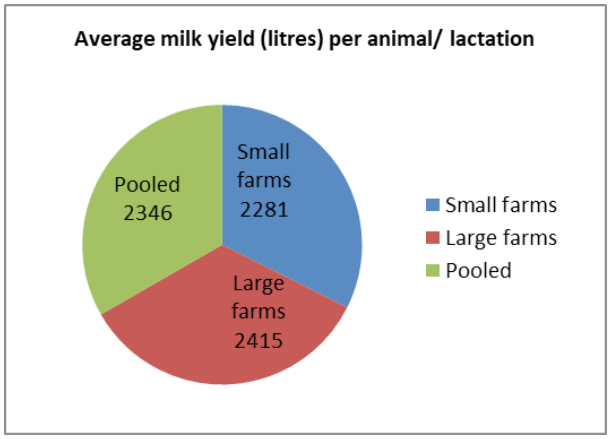

Cost of production per litre (Rs.)
Pooled 18.58
Small farms 20.18
Large farms 17.4
Small farms
Large farms
Pooled


Average milk yield (litres) per animal/ lactation
Pooled 2346
Small farms 2281
Large farms 2415
Small farms
Large farms
Pooled