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Impact of Environmental, Health, and Economic Factors on Dairy Farmers' Poverty in Shevgaon Tehsil (Dist. Ahmednagar), Maharashtra

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Abstract:

The altering climate, politics, and government initiatives have had an impact on Maharashtra's rural areas over the past two decades, mostly on farmers and milk producers. Roughly 90% of agricultural practices are influenced by variations in rainfall and climate change. For three-quarters of the world's population living in poverty, farming is their sole sustainable source of income. But rising cost of production and low income of rural farmers put them under pressure. Farmer suicides have grown commonplace as a result of misguided government policies, minimal profit less than production costs, volatile market pricing, and trader extortion.

The many farming methods and equipment use greatly lower production costs, but the influence of atmospheric variations on property losses is directly affected. Ecologically significant agricultural areas may disappear as a result of unsustainable farming and feed production for dairy. Because of stress and poor health, improper handling of dairy cows using the wrong instruments reduces the cows' output. The effects of changing environmental conditions can lead to disease in cattle, restrict export opportunities, create supply chain concerns, and exacerbate inefficiencies in production.

The sector's milk output and productivity, milk quality, and milk demand have all been influenced by the policy change in the way inputs and services are provided and used. The present study shows that LSD results in yearly economic losses of up to INR 60 million in the studied area. Between 2020 and 2023, the growth rate of total expenditure was 41%, then dropped to 13.83%. The cost of milk has drastically decreased over the last few months, going from 34 rupees per litre to 25 or 26 rupees per litre. The study shows that, irrespective of the methodological approach taken, a comprehensive understanding of the various aspects influencing the dairy farming industry's economy and the direction of future research is necessary.

Key Words: Climate, Diseases, Dairy Policy, Dairy Education, Production Costs, LSD.

Introduction:

As one of the initiatives aiming at reducing poverty, unemployment, and nutritional issues (particularly in rural areas of drought-prone areas) the dairy farming method is known to improve farmers' sustainable means of subsistence. Millions of people rely on livestock as a source of income and work in the agricultural industry. Maharashtra's livestock business encompasses not just dairy farming but also the raising of poultry, cattle, and goats. Nonetheless, the environment, politics, and agriculture and dairy policy all continue to have an impact on dairy producers' economic poverty. These are mostly the rising expense of production and the traders' theft of the illiterate farmers in the countryside. Of fact, the reason why rural milk producers are still impoverished today is because of the political and official barriers that prevent the poor farmers from benefiting from the government's initiative.

Production is impacted by variations in cropping patterns and climate fluctuations in the quality of fodder available to dairy animals. The issue is also being made worse by dosage merchants' deception and the growing cost of dosages. Every ingredient needed to make regular milk costs an extra rupee if the price of a litre increases by one rupee. The cost of labour, transportation, and feed will all go up by 4% in addition to the 1% increase in milk pricing. Controlling the cost of production is essential since the farmer who grows the milk is the one who is most affected. Coulborn characterises inflation as "too much money chasing too few goods." While Keynes defined inflation as a full employment event, the Quantity Theory of Money maintains that the only thing that can account for price increases in an expanding economy is an increase in the total amount of money in circulation. Political meddling is one issue that has always been prominent but has not been brought up because of political pressure, as was previously indicated.

Government programmes are exploited for convenience, and milk unions and sugar mills continue to be the focal points of rural politics. Under the guise of subsidies, government employees and systems continue to line the coffers of Dudh Sangh. As a result, the dairy industry's growth will continue to be jeopardised by the obstruction and deception committed by milk-producing farmers with the help of large milk processing firms and milk unions. India has a tremendous demand for milk these days, but supply is keeping up with connivance in the creation of tainted milk, despite poor production due to the demand. Why does the government system ignore this when the nation produces 15 lakh crore litres of milk compared to its requirement of around 65 lakh crore litres? Where does the remaining 50 lakh crore litres of milk originate from? The milk-producing farmers will grow and rural dairy growth will occur only if the factors that are fatal to the general development of dairying are prevented; otherwise, dairying will not be a rural notion but rather a system imposed by the educated class.

Materials and Method

Objectives:
1. To investigate the state of agriculture in the study area and how its diversification has impacted fodder.
2. To determine the approximate financial losses incurred by disease-related environmental changes in the research field.
3. To evaluate the state of production costs in dairy farming today in comparison to the previous ten years and the current year.

Methodology:

A. Crop Diversification Index:
Planning agricultural land use has a fundamental relationship with crop diversification. Around the world, especially in underdeveloped countries, farmers try to cultivate multiple crops on their land during a farming year (Husain 1996). India tracks the Crop Diversity Index with reference to district-wise circles using Gibbs and Martin's variety Index, a useful alternative index to measure the degree of variety in the cropping pattern in an area (Gangai, 2011).

Crop Diversification Index (CDI) = $1 - \Sigma x2 / (\Sigma x) 2$
The crop's portion of the total cropped area is indicated in this instance by the letter "x." Using this strategy, crop diversification falls between 0.1 and 0.9. Higher index values typically indicate more diversification, whereas lower index values typically indicate less diversification. Increased diversification would be indicated if the index got closer to 1.

B. Estimated economic losses as a result of disease:
The sum of (A) mortality loss, (B) milk output loss, and (C) treatment costs for affected animals was calculated to represent the entire economic loss caused by illnesses in cattle. As $T = A+B+C$, the total economic loss is calculated.

1. Loss from mortality: This was calculated as the product of the number of animals that died from the disease (D) and the animal's likely market value (P). $A = D \times P$

2. Loss Due to decreased milk yield: $B = P_1$ (Per day Yield Value $\times$ Average Day after Died) + P_2 (Per Day Yield Value $\times$ Average Day after Infected)

3. Costs of treatment: $C = D + T$, D = Average Treatment Cost of Died Animal, T = Average cost of treating an infected animal.

C. Profitability Index:
The profitability index can be computed using the following ratio:

1. Profitability Index (PI) = PV of future cash flows / Initial Investment

2. Future Cash Flow PV:
Time value of money calculations must be used to determine the present value of future cash flows. To compare future cash flows to current monetary levels, the right number of periods is used to discount cash flows.
**$PV = CF1 / (1 + r)^1 + CF2 / (1 + r)^2 + ... + CF n / (1 + r)^n$**

Selection of Study Area:
The Study region located in the southern portion of the district, between $19^0 13'18''$ and $19^0 33'57''$ North Latitude and between $75^0 01'48''$ and $75^0 32'44''$ East Longitude. The tahsil as a whole consists of 112 villages. Total area of Tahsil is 1031.85 square kilometers. The area is divided into three categories: forest (11.57 sq km; 1.12%), agriculture (913.19 sq km; 88.5%), and other uses (107.38%) (107.09 sq km). The average amount of rainfall in the Shevgaon tahsil is 501.7 mm.

Significance of Study:
Drought invariably necessitates extensive investigation or in-depth analysis because it is a component of climate. The state of Maharashtra's Ahmednagar district is located in an arid region. When a rain shadow area is present, it indicates an unfavourable or unevenly distributed climate. In order to ensure that the cost minus profit does not approach the level of the milk producer in the research area, other significant factors are the increase in production costs, the state of the milk procurement team, and the thievery of the trader. The third significant problem is that private milk union fraud, a lack of subsidies, and fluctuating milk prices put milk producers in constant danger. Thus, the research was chosen to focus on the aforementioned topic area.
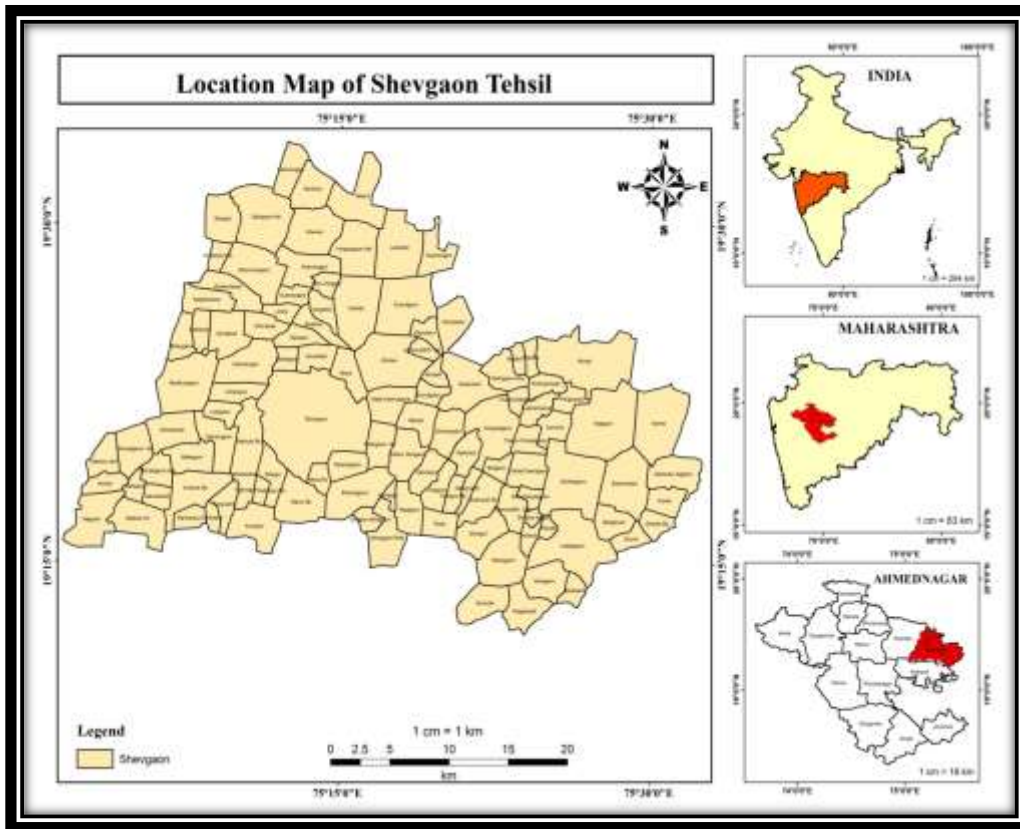
Interpretation and Findings:

Farming Economics for Dairy:

Crops Output and Rainfall:

Table No. 1 Rainfall, Rainy Days and temperature

Sr. No.	Year	Annual Rainfall (in mm.)	Rainy Days	Average Temperature (in ^{0}C)
01	2014	383	38	28.3
02	2015	407	39	28.2
03	2016	699	53	27.8
04	2017	640	52	27.6
05	2018	292	36	28.9
06	2019	621	52	27.6
07	2020	834	66	27.1
08	2021	738	61	27.3
09	2022	553	48	28.2
10	2023	465	38	28.3
Mean Rainfall		549		
SD Value		200.86		
Skewness Value		0.533		

A study of the Pearson product moment correlation coefficient indicates that rainfall has a negative relationship with all of the crops in the tehsil and the main crops that are considered. Rainfall and rainy days were shown to have a significant positive connection **($P < 0.7890$)** in the research area. In the study region, where rainfed agriculture is the norm, these fluctuations in rainfall variability have a major impact on crop yield. There was a correlation between the major rainfall unpredictability of the minor season and a decline in agricultural production yield.

Environment and Fodder Crop Diversification:

Crop substitution refers to the replacement of the cotton crop, which is either displaying signs of specialisation or turning into a monoculture. It is evident from the aforementioned study that there is a lack of available fodder as a result of changes in cropping pattern and crop type. Dry fodder was made from the leftovers of conventional farming methods. A milk production mismatch between wet and dry feed might vary significantly. Higher doses are needed instead, which raises production costs and keeps the net balance at zero as costs are greater than total production.

Table No. 2 Crop Diversification Index of Two Decade (2000-2020)

Sr. No.	Crops	Crop Diversification Index (2000)	Crop Diversification Index (2020)
1	Sugarcane	0.067	0.661
2	Cereal Crops	0.665	0.194
3	Cotton	0.215	0.684
4	Fodder Crops	0.003	0.003
5	Onion	0.049	0.041
6	Vegetable	0.001	0.003
7	fruit Crops	0.001	0.003

Source: Calculated by Author form different Authorize Data.

Table 2 shows that in 2000, cereal crops outperformed cotton crops in terms of crop diversity index value; in 2020, sugarcane crops outperformed cotton crops in terms of index value. Cereals were the principal crop in 2000; by 2020, sugarcane and cotton will have replaced them. It discovers that in order to gain from agricultural diversification during the past 20 years, farmers are moving from low-value, low-yielding crops to high-value, high yielding crops. Crop diversification, then, stands a fair chance of achieving the goals of food security, employment creation, income growth, and the advancement of sustainable agriculture.

Impact of Diseases:

LSD (Lumpy Skin Disease) causes large financial losses since it causes lasting debility in affected cattle as well as poor development, decreased milk supply, sterility, miscarriages, and even death. Furthermore, hides may suffer severe, permanent damage that reduces their market value. The first characteristic that characterises the direct economic impact of LSD is its frequency. This depends on the quantity of vectors, the susceptibility of the host, and the application of defence mechanisms.

Table No. 3 Total Loss Due to LSD

Sr. No.	Impact Measures	Costs in Millions
1	Loss of Direct Mortality (A)	00.57
2	Loss Due to Decreased Milk Yield (B)	20.41
3	Loss on Treatment Costs (C)	38.60
Total Losses Due to LSD		**59.58**

Source: Calculated by Author form different Authorize Data.

As mentioned earlier, the economic losses resulting from LSD were measured using three data sets from research sample survey studies and data based on findings accounting for the values of various criteria stated in calculation. These three data sets indicate that LSD causes INR 59.58 million in total annual economic losses in the research area. A little over 65.13% of the losses were attributable to disease, with animal mortality accounting for the remaining 34.86%. The biggest loss (68.45%) across all loss components was caused by milk loss (direct and indirect), which was followed by opportunity cost (21.55%) and growth reduction (10%). The results of this study show that the total yearly economic losses in the study area due to LSD range from INR 60 million.

Growth in Capital investment and Annual feed and health cost:

Table No. 4 Growth in Capital investment and Annual feed and health cost.

Sr. No.	Growth in Capital Investment			Growth in Annual feed and health cost		
	Capital Parameter	Growth (%) 2010-20	Growth (%) 2020-23	Feed and Health Parameter	Growth (%) 2010-20	Growth (%) 2020-23
1	Animal Cost	40	16	Veterinary Aid Cost	30	09
2	Transportation Cost	50	16	Cost of Concentrated Feed	52	02
3	Construction Animal Shed	33	14	Cost of Dry Fodder	56	08
4	Construction Calf Shed	40	16	Cost of Green Fodder	51	04
5	Chaff Cutter Cost	40	09	Cost of Electricity & Water	61	12
6	Milking Machine	43	12	Labour Cost	52	05
	Average Growth	**41**	**13.83**	Average Growth	**50.33**	**06.66**

Source: Calculated by Author form different Authorize Data.

Milk and sub-product Income (Annual Per Cow):

Table No. 5 Milk and sub product prices rupee per litter or kg.

Sr. No.	Income Parameter	2010	2020	2023	Growth (%) 2010-20	Growth (%) 2020-23
1	Milk (Per Litter)	12	30	35	60	15
2	Dug (Per Kg)	0.3	1	1.1	70	9
3	Calf (Per Node)	3000	10000	12000	70	17
Average Growth					66.66	13.66

Source: Calculated by Author form different Authorize Data.

Profitability Index (PI) = PV of future cash flows / Initial Investment

A. PV Growth between 2010 and 2020   = $CF1 / (1 + r)^1 + CF2 / (1 + r)^2$
   = **66.66 %**

B. PV Growth between 2010 and 2023   = $CF1 / (1 + r)^1 + CF2 / (1 + r)^2$
   = **13.66 %**

C. Initial Investment   = 50.33+6.66=56.99 %

Profitability Index (PI) 2020   = **16.33 %**

Profitability Index (PI) 2023   = **01.40 %**

Upon examining the percentages of production costs and income as presented in Tables 4 and 5 above, we discover that net income is lower than the income growth of the previous three years relative to the income growth of the previous ten years. Between 2010 and 2020, the aggregate expenditure growth rate was 41%, and between 2020 and 2023, it was 13.83%. 50.33 and 6.66 percent is the net income growth rate over this time. That is, from 2010 to 2020, the net rate of return was 16.33% year; but, from 2020 to 2023, the rate was just 1.40%. This indicates that there has been a recent increase in the cost of production.

Effect of Unstable Milk Prises:

The prices of dairy products are currently falling, which is a challenge for dairy producers who have been impacted by climate change. Production costs have increased dramatically due to rising animal, labour, and transportation costs. On the other hand, the farmers claim that this year's average realisation has decreased by seven to ten percent, with the current price of milk procurement being Rs 24-24.5 per litre. The production cost is approximately Rs 32–35 per litre. We must set the price at Rs 50 a litre in order to ensure the survival of farmers." Furthermore, the primary source of income for the farmers is milk, and in the past several months, the price of milk has decreased sharply from 34 rupees per litre to 25 to 26 rupees per litre (PiPa news Dec 2nd 2023).

As was already established, milk farmers are financially impacted by the drop in milk demand. The farmer experiences financial loss as a result of the discrepancy in the price at which milk is produced and sold. In the state, milk farmers frequently organised protests. It made the cost higher. But it was short-lived. A set of guidelines exists for cooperative milk unions. All guidelines and policies are applicable. However, the study region contains a private milk procurement centre. For private organisations, there are no limitations. There isn't a set of guidelines. It is time to control these private milk unions and put an end to this prejudice. A simple, unrestricted regulatory process ought to exist. Everyone should be treated equally under the law.

Conclusion:

The structure of the dairy farm business has seen a significant alteration in recent years. As seen by the sharp increases in milk produced per cow, there has been a sharp decline in the number of milk cows and a corresponding increase in the number of farms with larger herds. But there are still issues that require attention as a result of the absence of dairy education as a failure of dairy policy. The impacts of development policies and programmes on rural and urban livelihoods are the emphasis of this field, whereas agricultural political economy focuses on dairy policy at the national level. However, in actuality, local dramatic concerns involving dairy farmers that govern the development of farmers inclusively were at the centre of rural politics.

It finds that farmers are switching from low-value, low-yielding crops to high-value, high-yielding crops in order to benefit from agricultural diversification over the previous 20 years. The study's findings indicate that LSD causes annual economic losses in the study area totalling up to INR 60 million. The growth rate of total expenditure was 41%, then it decreased to 13.83% between 2020 and 2023. In the past few months, the price of milk has dropped significantly from 34 rupees per litre to 25 or 26 rupees per litre. The study indicates that regardless of the methodological technique used, it is necessary to thoroughly comprehend the impact of numerous factors on the economy of dairy farming and future research. Instead, if alternative routes are thought to be helpful in building stronger livelihoods, one must be acutely aware of these trajectories in order to be realistic about the political will needed to change barriers.

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