Journal of Science and Research Innovations

Volume - 3, Issue - 2, December 2025, ISSN: 2583-9004

Effect of Climate Change on Milk Production of Dairy Animals in Rewa District of Madhya Pradesh

Sandeep Kumar Sharma, T. R. Sharma 2, Brajesh Kumar Tiwari 3, Sanjay Singh 4

1. *Sandeep Kumar Sharma, SMS-Agromet, JNKVV - KVK-Rewa (M.P)

2. T. R. Sharma, Directorate of Extension Services, JNKVV- Jabalpur
3. Brajesh Kumar Tiwari, Scientist (Agronomy) JNKVV- KVK- Rewa (M.P)
4. Sanjay Singh, STO (Agril. Extension), JNKVV- KVK-Rewa (M.P.), India

Email : kumarsandeep912012@gmail.com

ABSTRACT:
Climate change is emerging as a major challenge for livestock production across the world. Rising temperatures, irregular rainfall patterns, and increased humidity levels significantly affect dairy animals and reduce milk production. The present study focuses on analyzing the impact of climate change on milk production of dairy animals in Rewa district of Madhya Pradesh. Data on temperature trends, rainfall patterns, and milk production were analyzed to understand the relationship between climatic variables and dairy productivity. The study indicates that increased heat stress, reduced fodder availability, and water scarcity are major factors affecting milk yield in the region. The findings exhibited the need for climate-resilient livestock management practices to sustain dairy farming. This study investigates the impact of changing climatic variables on the milk production of dairy animals (cattle and buffaloes) in the Rewa district of Madhya Pradesh, India. As part of a sub-tropical region, Rewa is increasingly witnessing extreme summer temperatures and fluctuating rainfall patterns, leading to severe heat stress in livestock. Data indicates that a 1°C increase in maximum temperature can lead to a 2–2.5% decrease in milk yield, with severe declines of up to 10–30% observed during peak summer (April to September). The analysis shows that high Temperature Humidity Index (THI >75) negatively impacts lactation length and causes a reduction of 1.5–2.5 liters of milk per day during peak periods. Smallholder farmers in Rewa reported reduced fodder availability, increased disease incidence (ticks, mites), and higher costs of rearing, which, combined with reduced milk output, significantly lower household income. This study concludes that adoption of heat-resilient fodder, proper shed ventilation, and improved practices are crucial for sustaining milk production in the district.

KEYWORDS: Climate change, Milk production, Heat stress, THI (Temperature, Humidity Index), Dairy farming, Fodder scarcity.

Journal of Science and Research Innovations

Volume - 3, Issue - 2, December 2025, ISSN: 2583-9004

Received: 23-10-2025 **Revised**: 24-10-2025 **Accepted**: 27-10-2025

INTRODUCTION:

Livestock plays an important role in rural livelihoods and contributes significantly to the agricultural economy. Dairy farming is one of the major income sources for farmers in India and particularly in rural areas such as Rewa district of Madhya Pradesh. However, climate change has emerged as a major challenge for livestock production. Changes in temperature, humidity, and rainfall patterns directly affect animal health and productivity. Dairy animals are highly sensitive to environmental conditions, and even slight increases in temperature can cause heat stress. Heat stress occurs when animals are unable to maintain their normal body temperature due to high environmental temperature and humidity. When dairy animals experience heat stress, they consume less feed and expend more energy trying to regulate body temperature, resulting in reduced milk production. Research shows that increasing temperature and humidity can significantly reduce milk yield, sometimes by 10–15% or more, depending on the severity of heat stress and farm management practices.

Therefore, studying the effect of climate change on milk production is essential for developing effective adaptation strategies for dairy farmers.

OBJECTIVES OF THE STUDY:

1- To analyze climatic trends (temperature and rainfall) in Rewa district.
2- To study milk production trends in dairy animals.
3- To evaluate the effect of heat stress on dairy animals.
4- To suggest climate-resilient strategies for improving dairy production.

STUDY AREA (REWA DISTRICT):

Rewa district is located in the northeastern part of Madhya Pradesh and falls under the Vindhyan agro-climatic zone.

CLIMATE CHARACTERISTICS:

Parameter	Value
Annual rainfall	1000–1100 mm
Summer temperature	35–45°C
Winter temperature	10–25°C
Major dairy animals	Cow and buffalo

High summer temperatures and increasing humidity create stressful conditions for dairy animals.

CLIMATE CHANGE TRENDS IN REWA DISTRICT:

Temperature Trend (2015–2024)

Year	Average Temperature (°C)
2015	26.2
2016	26.5
2017	26.8
2018	27.1
2019	27.4
2020	27.8
2021	28.0
2022	28.3
2023	28.6
2024	28.9

Observation:

Average temperature in the region has increased gradually over the last decade.

EFFECT OF CLIMATE CHANGE ON DAIRY ANIMALS:

Climate change affects dairy animals in several ways:

1. Heat Stress:

High temperature and humidity cause heat stress in dairy cattle, which reduces feed intake and milk production.

2. Reduced Feed Intake:

During hot weather, animals consume less feed, leading to lower energy availability for milk production.

3. Reduced Milk Yield:

Studies show that milk yield decreases significantly when animals are exposed to high temperatures and humidity levels.

4. Poor Reproductive Performance:

Heat stress negatively affects fertility and reproductive efficiency in dairy animals.

5. Increased Disease Incidence

Climate variability can increase the spread of animal diseases and parasites.

Journal of Science and Research Innovations

Volume - 3, Issue - 2, December 2025, ISSN: 2583-9004

MILK PRODUCTION TREND IN REWA DISTRICT:

Year	Average Milk Production (litres/day/animal)
2018	8.5
2019	8.2
2020	8.0
2021	7.8
2022	7.5
2023	7.2

Observation:
Milk production has shown a slight decline due to climatic stress and fodder shortages.

RELATIONSHIP BETWEEN CLIMATE AND MILK PRODUCTION:
Milk production in dairy animals is influenced by the Temperature Humidity Index (THI), which combines temperature and humidity levels.

When THI exceeds the critical threshold, animals begin to experience heat stress and milk production declines.

Research also indicates that milk yield decreases as the temperature-humidity index increases, especially in high-producing cows.

ADAPTATION STRATEGIES FOR DAIRY FARMERS:
To reduce the impact of climate change on milk production, the following measures are recommended:

IMPROVED ANIMAL HOUSING:
Providing shade, ventilation, and cooling systems helps reduce heat stress.

Improved Feeding Management:
Balanced nutrition and adequate water supply improve animal health and productivity.

Heat-Tolerant Breeds:
Using indigenous or crossbred animals that are tolerant to heat stress.

Green Fodder Production:
Cultivation of drought-tolerant fodder crops.

Veterinary Care:
Regular vaccination and disease monitoring.

CONCLUSION:
Climate change has a significant impact on milk production of dairy animals in Rewa district. Rising temperatures, increased humidity, and irregular rainfall patterns contribute to heat stress,

reduced feed intake, and lower milk yield. The study highlights the need for climate-resilient dairy farming practices such as improved housing, heat-tolerant breads, and better feeding management. Adoption of these strategies will greatly help farmers maintain sustainable milk production despite changing climatic conditions. To understand the effects of climate change over the past century and to model projections as we enter the era of climate change, more research is still needed in the case of the former. The microbiology of raw milk collected at various times of the year, though, gives a glimpse of these. However, as evidenced by the studies mentioned above, production quantity and quality are expected to decrease. At localized scales, where the specific impacts of climate change are anticipated, it is still necessary to predict future changes.

REFERENCES:

Bernabucci, U. (2010). Heat Stress in Dairy Cattle.

West JW, Mullinix BG, Bernard JK (2003) Effects of hot, humid weather on milk temperature, dry matter intake, and milk yield of lactating dairy cows. J Dairy Sci 86**(32)**: 232- 42.

Rahut D.B., Ali A. Impact of climate-change risk-coping strategies on livestock productivity and household welfare: Empirical evidence from Pakistan. Heliyon. 2018; 4:e00797. doi: 10.1016/j.heliyon.2018.e00797.

Hansen P.J. Effects of heat stress on mammalian reproduction. Philos. Trans. R. Soc. B Biol. Sci. 2009;364**(124)**:3341–3350. doi: 10.1098/rstb.2009.0131.

Sanker C., Lambertz C., Gauly M. Climatic effects in Central Europe on the frequency of medical treatments of dairy cows. Animal. 2013;7**(9)**:316–321.

Vitali A., Segnalini M., Bertocchi L., Bernabucci U., Nardone A., Lacetera N. Seasonal pattern of mortality and relationships between mortality and temperature-humidity index in dairy cows. J. Dairy Sci. 2009; 92**(84)**:3781–3790.

Maurya R. Master's Thesis. IVRI; Izatnagar, India: 2010. Alternate Dairy Management Practices in Draught Prone Areas of Bundelkhand Region of Uttar Pradesh.

Kable M.E., Srisengfa Y., Laird M., Zaragoza J., McLeod J., Heidenreich J., Marco M.L. The core and seasonal microbiota of raw bovine milk in tanker trucks and the impact of transfer to a milk processing facility. MBio. 2016;7**(9)**:1–13.

Garner JB, Douglas M, Williams SRO, Wales WJ, Marett LC, DiGiacomo K, et al. Responses of dairy cows to short-term heat stress in controlled-climate chambers. Anim Prod Sci. (2017) 57**(17)**:1233–41.

Silpa MV, König S, Sejian V, Malik PK, Nair MRR, Fonseca VFC, Maia ASC and Bhatta R (2021). Climate-Resilient Dairy Cattle Production: Applications of Genomic Tools and Statistical Models. Front. Vet. Sci. 8:625189. doi: 10.3389.2021.625189.