Effect Of Temperature On Milk Production Of Desi Cows In Mahagaon, Yavatmal District, Maharashtra

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1. Introduction

Dairy cattle production is influenced by a range of factors which include environmental, physiological and management ones. The environmental temperature is especially important as cattle need to regulate their body temperatures within a certain physiological range. An increased environmental temperature makes it harder for cattle to dissipate heat and may cause impairment of their normal physiological functions, feed intake and productive performance.Milk production is an important indicator of dairy productivity. Heat stress is a known environmental factor affecting milk yield of lactating dairy cattle. Tao et al. have reported that heat stress can reduce milk production and that the reduced feed intake is a considerable contributor to the reduction in milk yield under heat-stressed conditions [1]. Indigenous or desi cattle are an important component of India's livestock sector. These cattle are widely maintained by rural households and are adapted to local climatic and management conditions. According to the Basic Animal Husbandry Statistics 2025, the indigenous and non-descript cattle remain an important source of milk production in India. The average milk yield of indigenous/non-descript cows was 3.86 kg per cow per day on the national level in 2024–25 [2].
Maharashtra has a number of indigenous cattle populations. Research conducted at Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani has examined climatic effects on milk production of Deoni cattle, an indigenous cattle breed of Maharashtra. Thorat, Thombre and Narwade have investigated monthly lactation milk yields and climatic parameters using long-term records and have reported an association between climatic conditions and milk production [3].Thorat et al. have examined seasonal variation in peak milk yield of Deoni cattle in the Marathwada region using sixteen years of records from 1995 to 2010. The post-monsoon conditions were reported to be more favourable for peak milk production than the conditions of the hot season. The reported average daily peak milk yield of Deoni cows was 2.60 kg [4].
Yavatmal has a pronounced seasonal temperature pattern. Climate data for 1991–2020 indicate that the mean daily maximum temperature increases from 28.4°C in January to 41.3°C in May, and the mean daily minimum temperature increases from 14.7°C in January to 26.6°C in May. Temperatures decline after the summer period [5].Recent research has also demonstrated the importance of temperature for indigenous cattle. Yadav et al. have analyzed livestock and climatic data from Haryana over a sixteen-year period and have reported that the high temperatures combined with high humidity could reduce milk production and that the indigenous cattle showed greater climatic resilience than some other dairy groups [6].
Yavatmal experiences high summer temperatures and the examination of temperature and milk production in locally maintained desi cows is scientifically relevant. The present study examines the seasonal temperature pattern and corresponding variation in milk production of desi cows in Mahagaon, Yavatmal district, Maharashtra..

2. Literature Review

The impact of heat stress on lactating animals has been widely studied, but there are few published studies that have investigated the effect of temperature on milk yield. Tao et al. (2020) conducted a review study to assess the impacts of heat stress on lactational performance of dairy cows. They concluded that heat stress decreases milk yield and that the negative effect of heat stress on feed intake is a major contributor to the decrease in milk production. In their review, they also evaluated the relationship between thermal stress and lactational performance [1].
Thorat, Thombre and Narwade (2016) conducted a study to determine the effect of climatic factors on monthly lactation milk yield of Deoni cattle breed. The researchers used data collected from Cattle Cross Breeding Project, Vasantrao Naik Marathwada Krishi Vidyapeeth,

Parbhani. Their study provides climatic evidence related to effect on monthly lactation milk yield in the Maharashtra region for the local breed [3].

Thorat et al. (2016) investigated the influence of season on peak milk yield of Deoni cattle of Marathwada region. The researchers analysed data from 16 years, 1995 – 2010. They determined that average daily peak milk yield was 2.60 kg and that the post-monsoon season was the best for obtaining peak milk yield, followed by the south-west monsoon season, the cold season and the hot season [4].

Thorat, Thombre and Shinde (2017) analysed micro-environmental factors and lactation length of Deoni cows. This study used secondary data from Cattle Cross Breeding Project, VNMKV, Parbhani for the period 1995 – 2010. The aim of the research was to determine the effect of micro-environmental factors on lactation length of Deoni cows. The researchers identified that lactation length was influenced by micro-environmental factors. Their findings support those of other researchers on the relationship between environment and productive performance of Deoni cattle [7].

Basic Animal Husbandry Statistics 2025 of the Government of India reports current statistics on animal husbandry and milk production at the national level. Indigenous/non-descript cows yielded an average of 3.86 kg of milk per day during 2024 – 25 at the national level [2]. The data relates to all states of India and therefore it is not possible to use the value directly to predict milk yield for Mahagaon.

Yadav et al. (2026) analysed milk production and climatic data of Haryana State for the period 2004 – 2019. They evaluated the effect of climatic factors on indigenous cattle. Their study revealed that milk yield of indigenous cattle was affected by heat stress, which manifested itself at a temperature of more than 38 degrees Celsius and high humidity. Indigenous cattle were more resistant to climatic factors than other breeds of cattle [6].

From the reviewed studies, it can be concluded that temperature has an influence on dairy farm productivity. However, the response of different cattle breeds to climatic changes varies. Other factors such as lactation stage, nutrition, water, housing and management also influence the relationship between temperature and milk yield. It is therefore important to conduct local research to determine how temperature affects milk production in the study area.

3. **Materials And Methods**

3.1 Study Area

The study was conducted with reference to Mahagaon taluka in the Yavatmal district of Maharashtra. Yavatmal has a tropical seasonal climate characterized by considerable variation between cooler winter conditions and hot summer conditions.

3.2 Study Animals

The lactating desi cow is used for study . The cow is maintained in farm in wadad mudana Taluka Mahagaon District Yavatmal.



fig. Desi Cow from farm of wadad mudana under study

3.3 Temperature Data

monthly temperature data from January to October were used to describe the seasonal temperature pattern of Yavatmal district. The temperature data were obtained from published climatic information for the region [5]. The Indian meteorological department of Indian website used for tracking temperature records.

3.4 Milk Production

Milk production was expressed as litres per cow per day. Daily milk production was obtained by combining morning and evening milk quantities. Monthly mean milk production was calculated from the available milk-production observations.

3.5 Data Analysis

Monthly temperature values were compared with monthly milk-production values to examine seasonal variation. The changes in milk production were interpreted in relation to the corresponding changes in environmental temperature.

4. Results

4.1 Temperature Pattern

The temperature data demonstrated clear seasonal variation from January to October. The mean maximum temperature increased from 29°C in January to 42°C in May, while the average night time low temperature increased from 18°C in January to 31°C in May. Following May, temperatures declined during June and July and remained comparatively moderate from August to October [5].

The highest mean maximum temperature during the January–October period was recorded in May at 41.3°C, whereas the lowest was recorded in January at 28.4°C. Similarly, the highest mean minimum temperature was recorded in May at 26.6°C, while the lowest was recorded in January at 18°C.

Month	Average Daytime High (°C)	Average Nighttime Low (°C)	Season Category
January	29	18	Cold/Winter season (Pleasant & dry)
February	33	21	Transitioning to warmer days
March	37	25	Start of the hot summer season
April	41	29	Peak summer heat
May	42	31	Hottest month of the year
June	36	28	Monsoon arrival; drop in temp
July	30	25	Heavy rain phase; cooler daytime
August	29	24	Humid and overcast
September	30	24	Monsoon withdrawal phase
October	31	22	Post-monsoon October Heat phase

Table 1.Monthly Day and Night Temperature of Yavatmal from January–October

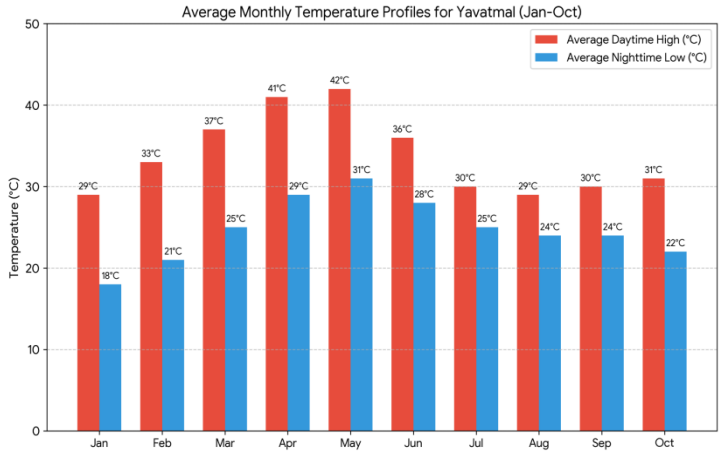


Fig. Graph showing temperature variations from January to October 2026

4.2 Milk Production

Monthly milk production varied across the study period. The highest milk production was recorded in January at 2.10 L/cow/day, while the lowest value was recorded in May at 1.76 L/cow/day.

Table 2. Monthly Milk Production of Desi Cows in Relation to Yavatmal Temperature

Month Mean maximum temperature (°C) Mean minimum temperature (°C) Mean milk production (L/cow/day)

Month	Average daytime temperature (°C)	Average night time temperature (°C)	Mean milk production (L/cow/day)
January	29	18	2.10
February	33	21	2.05
March	37	25	1.98
April	41	29	1.88
May	42	31	1.76
June	36	28	1.85
July	30	25	1.98
August	29	30	2.04
September	30	24	2.01
October	31	22	1.96

The milk production across the ten monthly observations was approximately 1.96 L/cow/day. Milk production decreased progressively from January to May as temperature increased. From May onwards, milk production increased as the temperature declined, reaching 2.04 L/cow/day in August.

The reduction in milk production from January to May occurred alongside an increase in mean maximum temperature from 29°C to 42°C. The largest reduction was observed during the warmer months from March to May.

5. DISCUSSION

The present study has examined seasonal temperature variation and milk production of desi cows in Mahagaon, Yavatmal district, Maharashtra. The temperature data demonstrated a distinct seasonal pattern and indicated that temperatures increased from January to May and subsequently declined.May was the warmest month during the study period and had a mean maximum temperature of 42°C and a mean minimum temperature of 31 °C. Milk production was lowest during this month at 1.76 L/cow/day. In contrast, January had the lowest mean maximum temperature and the highest milk-production value of 2.10 L/cow/day.The observed seasonal reduction in milk production during the warmer months is consistent with established scientific knowledge regarding heat stress of dairy cattle. Tao et al. have reported that heat stress can reduce lactational performance, and that reduced feed intake was an important contributor to reduced milk yield [1]. The findings are also relevant to research conducted on indigenous cattle in Maharashtra. Thorat, Thombre and Narwade have investigated climatic parameters and monthly lactation milk yields of Deoni cattle and have demonstrated the relevance of climatic conditions to milk-production performance [3].High environmental temperature can affect cattle by various physiological and behavioural mechanisms. During hot conditions, cattle may reduce feed intake and alter their behaviour to limit heat production. Increased water requirements and changes in physiological heat-dissipation mechanisms may also influence productive performance. Reduced nutrient intake can subsequently affect the amount of nutrients available for milk synthesis.Nevertheless, temperature is not the only factor influencing milk production. Breed, stage of lactation, feed quality, water availability, animal health, housing and farm management can all contribute to differences in milk yield. Consequently, seasonal changes in milk production should be interpreted in the context of the overall environmental and management conditions.

6. **Conclusion**

The study demonstrated substantial seasonal variation in temperature in Yavatmal district from January to October. Temperature increased from 29°C in January to 42°C in May while night temperature increased from 18°C to 31°C during the same period.Milk production showed seasonal variation corresponding to changes in temperature. Milk production decreased from

2.10 L/cow/day in January to 1.76 L/cow/day in May coinciding with an increase in mean maximum temperature from 28.4°C to 41.3°C. After May, milk production increased as environmental temperatures declined reaching 2.04 L/cow/day in August.The observed pattern is consistent with previous research indicating that high environmental temperatures can adversely affect milk production of dairy cattle, including indigenous cattle. The findings suggest that the hot period may represent a comparatively challenging period for milk production of desi cows in the Mahagaon region.

Overall, seasonal temperature variation appears to be an important environmental factor associated with variation in milk production of desi cows in Mahagaon, Yavatmal district, Maharashtra. Further studies involving long-term observations and individual animal records could help establish the relationship more precisely.

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