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Popular Article

Color And Light Intensity's Impact on Kadaknath Poultry

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Abstract

About 5.0 million people are employed in the poultry industry, which contributes roughly 1% of the country's GDP and has grown to be a successful industry. Large swathes of Western Madhya Pradesh, particularly the Jhabua and Dhar Districts, as well as adjacent regions of Gujarat and Rajasthan, are home to the significant indigenous breed of chicken known as Kadaknath. Because light activates internal organs and initiates hormone production, it is essential for vision. The pineal and pituitary glands, which are situated near to the hypothalamus, allow light to enter the bird in addition to the eyes. Rods and cones, two different types of photoreceptors, are able to detect light in the retina of chickens. While rods are typified by their capacity to detect objects in the dark, they are unable to discriminate between different colors of light. In contrast, cones are able to discern between blue, green, red, and ultraviolet light as well as stronger light. Research has demonstrated that exposure to red light can elevate reproductive hormone levels, stimulate the growth of sexual organs, and impact the sexual maturity (SM) age of pullets.

Keywords: Poultry, Kadaknath, Importance of colour of light.

Introduction

India is an agriculturally based nation, with allied sectors and agriculture accounting for roughly 16.5% of the country's GDP (CSO, 2019–20). There are 535.78 million livestock people in the nation. According to the 20th Livestock Census (2019), poultry is a good source of animal protein for the majority of people worldwide. With poultry making up over 30% of global meat output and pork making up 38%, poultry is the second most popular meat in the world (FAO, 2019). After China and the United States, India is the world's third-largest producer of eggs. According to the results of the 20th Livestock Census (2019), there are 851.81 million chickens in India overall, a 16.81% rise from the previous census. Over 45.78% increase in backyard poultry and total backyard poultry

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is 317.07 million in 2019. There are 534.74 million commercial chickens, a 4.5% rise. About 1% of the national GDP and 14% of the GDP from livestock are contributed by the poultry industry (Kumar *et al.*, 2023). 19 chicken breeds are officially recognized in India (ICAR- NBAGR). With an annual growth rate of almost 8%, poultry is one of the agricultural sectors in Rajasthan that is expanding the fastest. Rajasthan is the second most populous state in the nation with 56.8 million livestock. With 14.6 million of the nation's total poultry population, the state comes in at number seventeen. At constant prices, livestock's share of the agriculture sector and overall GVA in 2020–21 was 30.13% and 4.9%, respectively.

Additionally, 129.60 billion eggs have been produced nationwide this year, up 6.19% from the year before. Andhra Pradesh (20.41%), Tamil Nadu (16.08%), Telangana (12.86%), West Bengal (8.84%), and Karnataka (6.38%) are the top five states in the nation for egg production. The per-capita egg availability in 2021–2022 is 95 nos/annuum, up 5 nos/annuum from the year before (Statistical Data on Animal Husbandry, Basic 2022). In emerging nations, poultry farming has emerged as a lucrative industry that outperforms all other animal businesses. About 5.0 million people are employed in the poultry industry, which contributes roughly 1% of the country's GDP and has grown to be a successful industry. India ranks third globally in terms of egg production (78 billion eggs) and fifth in terms of broiler production. According to the ICMR, the average person should consume 10.8 kg of meat and 180 eggs annually. However, in India, per capita availability of meat and eggs is only 2.2 kg and 63 eggs annually, respectively, and has surpassed all other livestock enterprises in developing nations. This implied that India's poultry output is low and still needs to grow significantly. The primary causes of the nation's low chicken output include the birds' low production potential, inadequate and poor nutrition, bad management techniques, and lack of veterinary care. The global demand for chicken products is rising in tandem with the growth of the human population.

Kadaknath

Large swathes of Western Madhya Pradesh, particularly the Jhabua and Dhar Districts, as well as adjacent regions of Gujarat and Rajasthan, are home to the significant indigenous breed of chicken known as Kadaknath. However, pure Kadaknath birds are extremely uncommon in Dhar and the surrounding regions of Gujarat and Rajasthan due to rampant crossbreeding with RIR and other species (Thakur *et al.*, 2006). Among India's recognized and registered chicken breeds, Kadaknath is the most distinctive and well-liked variety. This breed's distinctive hyperpigmentation in the black color has garnered a lot of notice. The fibromelanosis (Fm) phenomenon, which is brought on by an excessive amount of eumelanin deposition in nearly every area of the body, including the muscles and



internal organs, is the cause of the hyper-pigmentation. Native to India, Kadaknath is a slow-growing chicken with a low–moderate potential for egg production (Haunshi *et al.*, 2022). When placed in their natural habitat and allowed to roam freely, Kadaknath birds exhibit a notable level of disease resistance when compared to other exotic varieties of poultry. In addition, Kadaknath birds may survive in unfavorable situations such as inadequate housing, bad management, and inadequate feeding. They are also adaptable to extreme climatic conditions such as summer heat and winter stress. The Kadaknath breed is divided into three primary varieties: which are found in Jhabua District. They are Golden Kadaknath, Pencilled, and Jet Black. The Kadaknath breed is not very good at producing eggs, but its black meat is highly tasty and well-liked. Tribals and Adivasis in the Jhabua District of Madhya Pradesh use its flesh, which is more valuable, to cure a variety of human ailments (Thakur *et al.*, 2006).

Importance of colour of light

Because light activates internal organs and initiates hormone production, it is essential for vision. The pineal and pituitary glands, which are situated near to the hypothalamus, allow light to enter the bird in addition to the eyes. Light detection and transduction are two aspects of the broiler's visual system that may be affected by these basic mediators. Light affects the development of circadian rhythms and the synchronization of numerous vital physiological systems, including body temperature, metabolism, and hormone secretion, which control growth, maturation, and reproduction. Rods and cones, two different types of photoreceptors, are able to detect light in the retina of chickens. While rods are known for their capacity to detect objects in the dark, they are unable to discriminate between different colors of light. In contrast, cones are able to discern between blue, green, red, and ultraviolet light as well as stronger light (Kram *et al.*, 2010). Poultry have a more sensitive visual system and superior visual skills than humans due to their bigger visual range, stronger harmonic sensitivity, and larger color spectrum. Broilers' skulls allow light in particular to flow through and be recognized by additional retinal photoreceptors (Baxter *et al.*, 2014). The eyes of poultry have five different kinds of retinal cone photoreceptors. These photoreceptors, which are intimately correlated with the activity and growth of poultry, generate the perception of light hues by taking in light at maximal sensitivities of roughly 415, 450, 550, and 700 nm (Osorio and Vorobyev, 2008). Between the cerebral hemisphere and the cerebellum, the pineal gland is a photosensitive area that can accept light signals and stimulate the release of the chemicals melatonin and serotonin. As a result, it plays a significant part in many endocrinological activities as well as circadian rhythm. It has been established that the main environmental factors influencing the physiology, behavior, immunity,



and growth performance of birds are light quality, duration, intensity, and wavelength (Olanrewaju *et al.*, 2016). Two key elements influencing poultry productivity are the amount (intensity) and quality (color) of light. In addition to giving the chickens light, light affects their behavior, growth and development, and physiological reactions as well as their ability to produce. Research have demonstrated that blue and green light can enhance layer chicken growth, aid in their calmness, and strengthen their immune system (Pyrzak *et al.*, 1987). It has been demonstrated that exposure to red light raises levels of reproductive hormones, encourages the growth of sexual organs, affects pullets' age at sexual maturity (SM), and enhances productivity. A common strategy to increase manufacturing efficiency is light management. Programs with restricted lighting increase chicken productivity through improvements in FCR, body weight, immunological function, and general health. According to preliminary research, chickens should be exposed to light levels between 1.08 to 10.76 lx. More recent studies, however, have shown contradictory outcomes, such as a decrease in BW, behavioral synchronization, and a rise in foot pad lesion at 1 lx.

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