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Popular Article

The Role of Epigenetics in Animal Health and Breeding

Gaurav Patel^{1,2}, Utsav Surati^{1,2*}, Ymberzal Koul^{1,2}

¹ ICAR-National Dairy Research Institute, Karnal, (Haryana) India

² ICAR-National Bureau of Animal Genetic Resources, Karnal, (Haryana) India

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Abstract

This article delves into the captivating realm of epigenetics and its profound implications for animal breeding. Unveiling the intricate dance between genes and the environment, we explore compelling examples that showcase how epigenetics shapes traits in animal populations. From the impact of maternal nutrition on offspring health to the influence of stress, environmental pollution, and early life experiences on various traits, this exploration opens new vistas in breeding programs. We discuss how a nuanced understanding of epigenetic factors can empower breeders to make informed decisions, ultimately contributing to the development of animals with enhanced health, resilience, and adaptability. The article emphasizes the importance of embracing epigenetics in animal breeding to usher in a new era of sustainable and thoughtful evolution in our diverse animal populations.

Introduction

Beyond the conventional understanding of genetics, the study of epigenetics has revealed an intriguing chapter in the complex fabric of life. The field of epigenetics, which investigates heritable modifications in gene activity without affecting the underlying DNA sequence, is essential in determining the health and reproductive success of animals. With a clearer understanding of how environmental variables can leave a permanent impression on an animal's genetic makeup, this developing subject has opened new avenues.

The Genetics and Environment

According to the conventional understanding of genetics, an organism's DNA sequence primarily determines its characteristics. On the other hand, epigenetics shows that environmental influences, such as pollution exposure, stress, and food, can affect gene expression without changing the DNA sequence. Animal development and health are impacted by the dynamic interplay that results from this dance between genes and the environment.



Effects of the Environment on Gene Expression

Histone alterations and DNA methylation are examples of epigenetic modifications that function as molecular switches to turn on or off genes. This indicates that for animals, certain features and qualities can be greatly influenced by the environment in which certain genes are active. For example, alterations in gene expression brought on by stress might influence an animal's behavior, immune system, and even its propensity to contract specific diseases.

Implications for Animal Breeding Programs

Animal breeding programs will be significantly impacted by the knowledge acquired from the field of epigenetics. The goal of traditional breeding methods is to choose people who possess the desired genetic qualities. Breeders can now take into account environmental influences that could affect gene expression in addition to the genetic code, thanks to an awareness of the epigenetic landscape. Using a holistic approach can help breeders make better decisions and produce animals that are more resilient and adaptable.

Epigenetics in Veterinary Practices

Epigenetic information is becoming more and more integrated into the practices of veterinarians. Veterinarians can give individualized and focused care because they have a deeper understanding of the environmental elements that can affect an animal's health at the molecular level. This includes customized diet regimens, techniques for managing stress, and changes to the environment that can improve gene expression and general health.

Conclusion

By illuminating the dynamic interplay between genes and environment, epigenetics has unveiled an intriguing new chapter in the complex tale of genetics. This understanding provides a new angle in the field of animal health and breeding, enabling more sophisticated methods of veterinary care and breeding programmes. Our grasp of genetics will expand beyond the code itself to include the complex dance between genes and the environment they live in as we continue to explore the wonders of epigenetics.

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