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Monitoring Faecal Testosterone Levels across Antler Development Stages in Spotted Deer (*Axis axis*) in Trincomalee, Sri Lanka

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Abstract

This study explores the variations in faecal testosterone concentrations across different antler development stages in spotted deer (*Axis axis*) within Trincomalee, Sri Lanka, from 2022 to 2024. Ten faecal samples were collected from individual deer at each of the five defined antler stages: Pedicel Formation, Velvet, Velvet Shedding, Hard Antler, and Casting. These faecal samples were collected by tracking the herd and using the hand-and-glove method within 30 minutes of defecation. Testosterone metabolites were analysed using a validated methanol-based radioimmunoassay (RIA) technique. Statistical evaluations, including one-way ANOVA and Tukey's Honest Significant Difference (HSD) test, were performed to determine hormonal differences across these stages. Results demonstrated significant testosterone variations *($p<0.05$)* between antler stages, with the highest concentrations recorded during the Velvet Shedding (12.91±0.89 ng/g) and Hard Antler (11.25±1.03 ng/g) phases, aligning with peak reproductive activity. In contrast, the Velvet (3.80±0.64 ng/g) and Casting (2.02±0.55 ng/g) stages exhibited lower testosterone levels, indicating reduced reproductive function. These findings illustrate the critical link between antler development and reproductive physiology, highlighting testosterone's role in social dominance and mating behaviour. Understanding these hormonal dynamics provides insight into the reproductive strategies of spotted deer, with implications for effective wildlife management and conservation efforts. Future research should focus on the influence of environmental factors on testosterone regulation, particularly in the context of urbanization and habitat alteration.

Keywords: *Testosterone, Spotted deer, Antler development, Reproductive cycle, Wildlife conservation*