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Evaluating the Relationship between Interferon-Gamma Levels and Anaplasmosis Infection in Sheep using ELISA

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Background: Anaplasmosis, a tick-borne disease affecting livestock, leads to a significant threat in animal health and farm productivity. Interferon-gamma (IFN- γ), a cytokine involved in immune regulation, has been proposed as a potential biomarker for infection due to its role in activating macrophages against intracellular pathogens like *Anaplasma* spp. Understanding the association between IFN- γ levels and anaplasmosis could support early diagnostics and disease monitoring.

Objective: This study aims to assess the relationship between interferon-gamma levels and infection status of anaplasmosis in sheep.

Methods: The study was conducted using 30 blood samples collected from the sheep population at the OyaMaduwa NLDB farm in Anuradhapura, with diagnoses of *Anaplasma ovis* and *Anaplasma marginale* infection. Serum separated from the blood samples was analyzed using ELISA to calculate Sample-to-positive (S/P) ratios and the mean S/P values using a given formula. Statistical analyses were conducted using R Studio 4.3.2, including one-way ANOVA, correlation analysis, and logistic regression. Interferon-gamma concentration was treated as the dependent variable and *Anaplasma* infection status (positive/negative) as the independent variable. Statistical significance was declared as $p < 0.05$.

Results: ANOVA test showed no significant difference in mean IFN- γ levels between infected and non-infected animals ($p = 0.383$). Correlation analysis revealed a weak, non-significant negative association ($r = -0.165$, $p = 0.3829$). Logistic regression also demonstrated no significant predictive relationship between IFN- γ levels and infection status ($p > 0.05$), although a slight negative pattern was observed.

Conclusion: The findings from this retrospective exploration confirmed that there is no significant association between IFN- γ levels and *Anaplasma* infection status in the studied sheep population. While IFN- γ is a critical cytokine in immune response, it may not serve as a reliable biomarker for anaplasmosis in this context. Therefore, future studies with larger sample sizes are recommended to validate these findings and potentially uncover a more definitive relationship.

Keywords: Tick-borne disease, ELISA, Interferon-Gamma