



Immune Dynamics and Parasite Burden Model in Sheep for Gastrointestinal Nematode Management

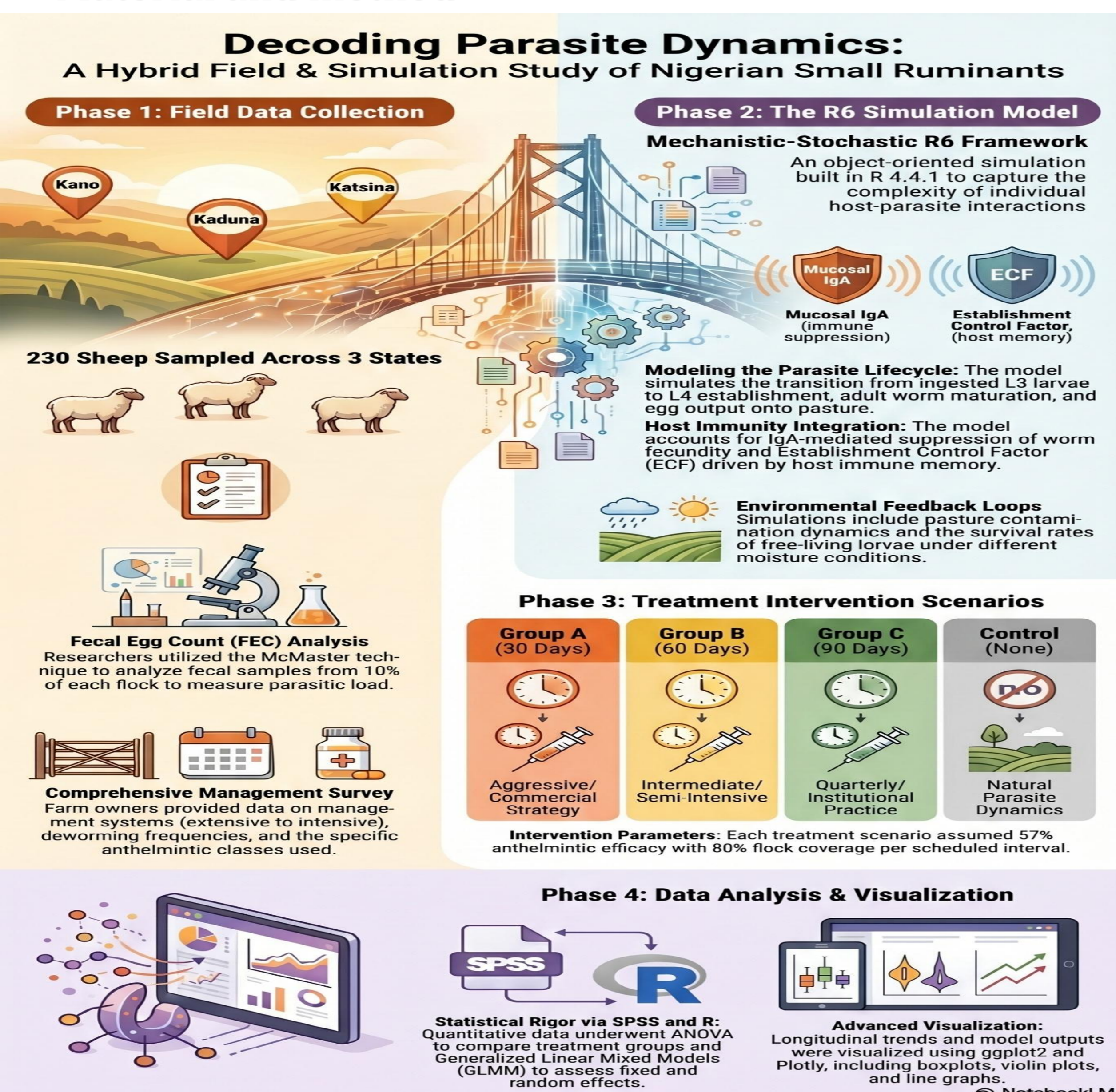
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Abstract: This study analyzed sheep parasite control in Nigeria, finding that management systems significantly dictate deworming frequency. Simulations showed 30-day treatments maximize suppression but inhibit host mucosal IgA. Conversely, 60-day intervals optimally balance efficacy with immune preservation. Sustainable management requires tailored, system-specific strategies and drug rotation to maintain host health.

Introduction

- Gastrointestinal nematodes (GINs) are a primary parasitic constraint on sheep productivity, especially within tropical and subtropical production systems.
- Frequent deworming suppresses host immunity and accelerates drug resistance, while infrequent treatment allows for dangerous parasite buildup and pasture contamination.
- Most models oversimplify host heterogeneity and immune responses. There is a need for a mechanistic, individual-based framework that integrates genetic, immunological, and parasitological data

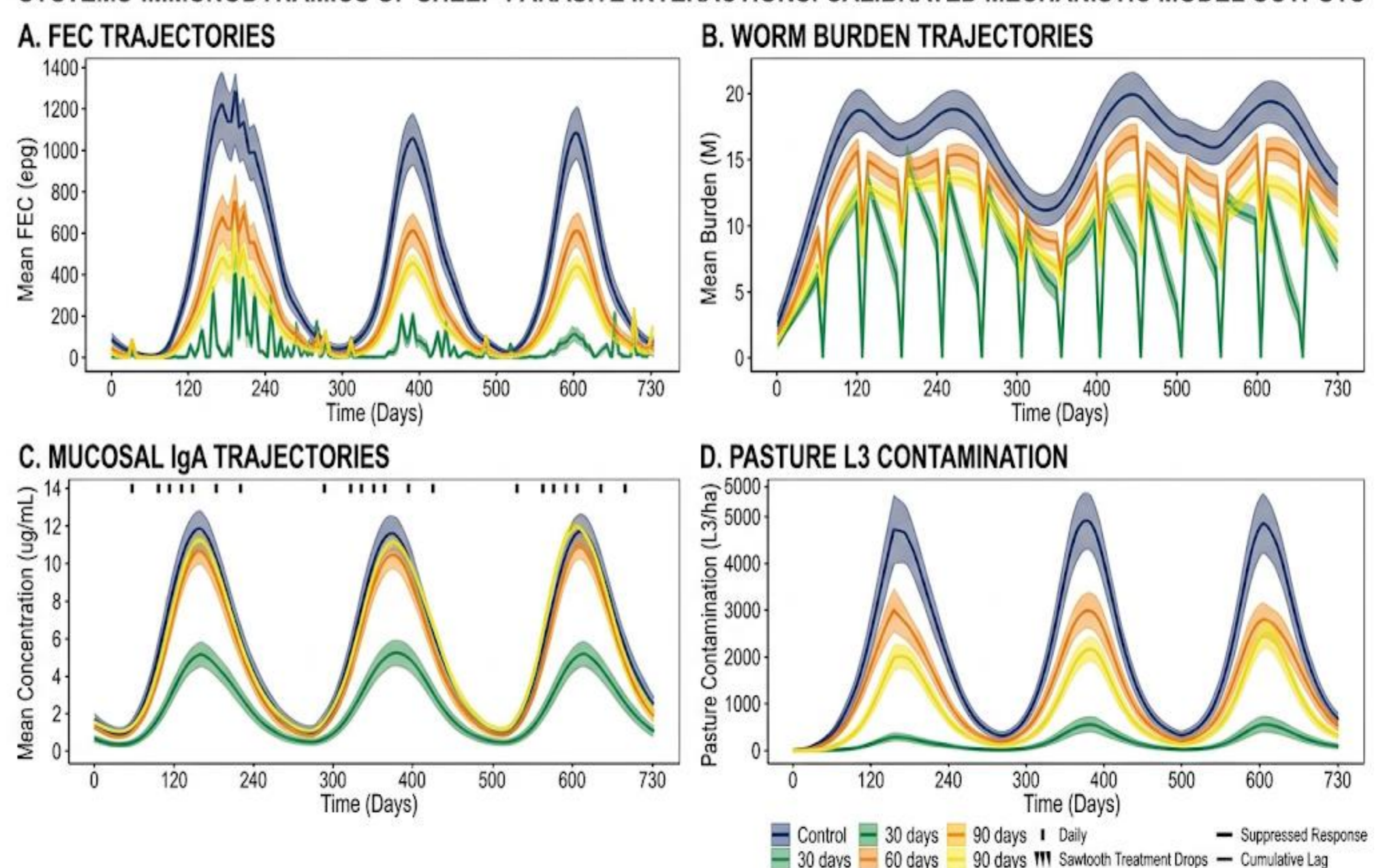
Material and method



Results and discussions

- Significant correlation between system type and treatment frequency ($p < 0.05$).
- Intensive Systems: 100% used quarterly or bi-monthly flock-wide "blanket" deworming.
- Extensive Systems: Favored annual or reactive individual treatments.
- Drug Efficacy: Imidazothiazoles showed more consistent EPG reduction compared to Benzimidazoles, which exhibited high variability in intensive setups.

SYSTEMS-IMMUNODYNAMICS OF SHEEP-PARASITE INTERACTIONS: CALIBRATED MECHANISTIC MODEL OUTPUTS



Conclusions

- Treatment frequency strongly influenced parasite burden, immunity, and pasture contamination
- Frequent deworming effectively reduced infection but suppressed immune responses
- Longer intervals increased reinfection and environmental contamination
- The 60-day interval provided the most balanced control strategy
- Sustainable GIN management requires system-specific and evidence-based approaches

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