



ID der Kurzfassung : 446

Behavioral Plasticity in *Ixodes ricinus*: Linking Energy Reserves to Host-Seeking Activity and Infection Transmission Potential

Inhalt

The seasonal dynamics of tick-host interactions are critical for the transmission of vector-borne pathogens, yet the physiological drivers of behavioral plasticity in *Ixodes ricinus* remain poorly understood. In this study, we investigated how seasonal changes in energy reserves influence host-seeking behavior and infection transmission potential. Monthly flagging of *I. ricinus* across a full year revealed significant seasonal shifts in questing activity, with peak host-seeking behavior observed in spring and autumn. To assess the impact of infection on behavior, we artificially infected ticks with the Jingmenvirus Alongshan virus strain Harz Mountain (ALSV_HM), recently identified in *Ixodes ricinus* ticks collected from game animals in Lower Saxony, Germany. Seven days post-infection, we re-evaluated their host-seeking behavior. Infected ticks exhibited altered behavioral patterns, including increased questing height and decreased sensitivity toward repellents, particularly during peak seasonal windows. To elucidate the underlying physiological mechanisms, we quantified lipid, protein, and carbohydrate levels in ticks collected at different time points and across infection states. This study provides a mechanistic link between seasonal physiology, infection-induced behavioral changes, and vector competence, highlighting the importance of integrating metabolic and behavioral data to predict and mitigate disease risk.

Keywords

Ixodes ricinus, vector-borne diseases, Alongshan Virus, Behavioral Plasticity

Registration ID

47

Professional Status of the Speaker

PhD Student

Junior Scientist Status

Yes, I am a Junior Scientist.

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Track Klassifizierung: Vectors

Typ des Beitrags: Both options possible

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