Beiträge zur
JAGD
&WILD
forschung · 34

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Investigations on health status in German European brown hares (*Lepus europaeus*) with regard to diseases possibly affecting juvenile mortality

Key words: European brown hare, population decline, juvenile mortality, *Yersinia* spp., Coccidiosis

Introduction

A decline of European brown hare populations has been observed within Germany since the 1960s (Petrov, 1976; Stubbe et al., 1994). Reports in literature accounted population decline possibly to juvenile mortality (Marboutin & Hansen, 1998) and considered infectious diseases of secondary significance in adult hares (Frölich et al., 2003). To further clarify causes of juvenile mortality, free-ranging juvenile and young European brown hares (*Lepus europaeus*) from Lower Saxony, Germany, were investigated regarding their health status and infectious diseases.

Material and methods

Individuals up to 35 days of age were traced at night using thermal imaging cameras. Hares (n = 134) were captured, examined in a veterinary check-up including recording body condition and body metrics, and were individually marked. Blood samples for antibody detection were collected using blood-sucking bugs (*Dipetalogaster maximus*, *Rhodnius prolixus*) according to Thomsen & Voigt (2006). Nasal and rectal swabs were taken for bacteriological investigations and faecal pellets for parasitological investigations. Swabs and faeces were stored in liquid nitrogen until further investigation. Swabs were processed for routine bacteriological examinations. Blood-plasma samples were investigated for antibodies against *Yersinia* spp. (*recom*Line Yersinia IgG, Mikrogen) and European brown hare syndrome virus (Serology kit, IZSLER, PRRD 010120). These investigations were completed by histopathological, bacteriological and virological investigations on hares from winter hunts.

Results

A non-specific mixed bacterial flora was cultured from the majority of the rectal and nasal swabs. The main cultured bacteria were Gram-positive. Twenty-eight swabs (2 nasal swabs, 26 rectal swabs) revealed Gram-negatives, mainly Escherichia coli. *Yersinia (Y.) enterocolitica* was isolated from one and Pasteurella pneumo-

tropica from 3 rectal swabs. Of 25 faecal samples available for parasitological investigation 18 (72 %) contained coccidia. Histopathology of hunted hares revealed coccidia in the intestines of 61.8 % young and 35 % adult hares. All samples investigated were negative for T*oxoplasma gondii* by immunohistochemistry. *Yer-sinia enterocolitica, Y. pseudotuberculosis, Y. fredericksenii, Y. kristensenii* and *Yersinia species* were isolated from faeces of 18 individuals of shot hares. More than 60 % of these hares aged ≤ 6 months. Two hares revealed growth of *Y. pseudotuberculosis* and *Y. enterocolitica*.

Discussion and conclusions

So far, our results demonstrate that coccidia and bacteria of the genus *Yersinia* are prevalent among juvenile and young free-ranging hares in our study region. Both pathogens are able to cause severe disease especially in young hares and are likely to contribute to increased juvenile mortality and local population decline.

Zusammenfassung

Seit den 1960er Jahren wurde eine Abnahme der Populationsdichte des europäischen Feldhasen (*Lepus europaeus*) in Deutschland mehrfach beschrieben. Berichten zufolge spielt wahrscheinlich die Sterblichkeit bei Junghasen eine bedeutende Rolle, während die Infektionskrankheiten bei adulten Feldhasen eine untergeordnete Position einnehmen.
Um die möglichen Ursachen der Junghasensterblichkeit zu klären, wurde eine Studie bezüglich Gesundheitsstatus und Krankheiten bei freilebenden Junghasen aus Niedersachsen durchgeführt. Diese Studie hat ergeben, dass Bakterien der Gattung *Yersinia* und Endoparasiten (Kokzidien) in unserem Studienkollektiv weit verbreitet waren. Sowohl Yersinien also auch Kokzidien sind in der Lage, massive Erkrankungen bei Junghasen auszulösen was zum Rückgang von lokalen Populationsdichten führen kann.

Summary

Since the 1960s, a decline of European brown hare (*Lepus europaeus*) populations within Germany was described. Within literature population decline was attributed possibly to juvenile mortality but considered infectious diseases of secondary significance in adult hares. To further clarify causes of juvenile mortality, free-ranging juvenile and young European brown hares (*Lepus europaeus*) from Lower Saxony, Germany, were investigated regarding their health status and infectious diseases. Our results show that bacteria of the genus *Yersinia* and *endoparasites* (coccidia) were widely distributed among our study individuals. *Yersinia* and coccidia both are able to cause severe disease among juvenile and young hares and are likely to contribute to local population decline.

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