Hunting events effect on invidividual red deer stress level

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Objective

Hunting activities have long been recognized to have a numerical effect on animal populations through individuals removal. More recently a larger focus was brought on the non-lethal effect hunting can have through behaviour change (e.g., space use, vigilance or fleeing behaviour). Numerous studies highlight such process, however, little is known about the physiological response preceeding and driving the behaviour changes in wildlife. A measurement of faecal cortisol metabolites (FCMs) as a non-invasive, physiological parameter reflecting hypothalamus–pituitary–adrenal (HPA) axis activity is a growing method to assess stress response towards stimulus. In this project, we aim to assess red deer short-term stress response towards hunting events at the Bavarian Forest National Park, using FCMs methods, and test the effect of spatial and temporal distances on this response. We expect the FCM to be higher when being closer in space and time to a hunting event.

Data available

In order to answer this question > 40 GPS-collars were deployed on red deer females for two years each. GPS-locations of each monitored red deer were recorded every one hour during the two years following the collar deployment. In addition, prospecting early morning GPS-locations, fresh faeces samples were collected, with location and timestamp of the sample recorded. For each sample, the faecal cortisol metabolite value was analysed. Finally, all hunting events occurring within the National Park were recorded (date, time and locations).

Data formatting required

Because of the the gut retention time, faecal cortisol metabolite values from the samples do not represent the stress level of the animal when defecating but of the previous hours (between 16-21 hours, ca. 19 hours before in average). We therefore consider two events for red deer: the "stress event" and the "defecating event". From the time of the defecating event, 19 hours has to be calculated back and based on the GPS locations, define where the animal had been at that time, i.e. the stress event.

Research interest

Analyze the effect of the distance in space and of the time since the last hunting event on FCM values.

Because the longer it takes to collect faeces since the defecation event, the more FCM values can drop, it might be necessary to take the time between the defecation event and sample collection, as well as weather conditions into account. Further, multiple samples belong to the same individuals.

Optional: analyze the effect of the hunting event on red deer movement step length, i.e. the distance between two consecutive GPS locations of a red deer.