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**EGY A TERMÉSZETTEL**

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of a red deer (*Cervus elaphus*) driven hunt, which took place in late December 2020, and an extreme climatic event like the snowstorm Filomena in early January 2021 on the circadian activity patterns and feeding behaviour of red deer. Our ultimate goal was to generate knowledge that may inform us about wildlife and environmental vulnerabilities in the current global change scenario, where anthropogenic ecological impacts and climate events are forecasted to be increasingly frequent.

To do so, we conducted a camera-trapping survey from November 2020 to February 2021, totalling 1740 camera-trap days. Our sampling design consisted of 29 camera traps systematically deployed in a 4695 ha fenced game estate in Toledo (Spain) with a minimum distance of 1 km among the nearest cameras. We obtained 1740 cumulative hours monitoring, which provided 126,892 photos of 20 different vertebrate species; we identified 5929 red deer individual's records using this information. We analyzed red deer daily activity patterns and temporal variations in feeding behaviour using the densityPlot function (library overlap, R 3.6.3. software).

According to our results, red deer present a fast capacity to recover their usual activity pattern and feeding behaviour after the occurrence of both unusual and intense natural and anthropogenic disturbances. Remarkably, our results showed two maximum of red deer activity and feeding behaviour before perturbations: sunrise and dusk. During the big game hunt, a significant reduction of feeding behaviour was detected at sunrise and during the morning, followed by an increase in activity and feeding behaviour during the evening (when the big game hunt had finished). The successive days deer recovered their normal activity pattern and feeding behaviour after, which was already plausible one and a half-day after the hunting. The snowstorm event had similar consequences, with animals adopting a more diurnal activity pattern on the first day of snow. After that, deer recovered their normal activity pattern and feeding behaviour in only one day. Our results suggest that time patterns of red deer activity and behaviour at the fenced game estate do not stretch on much, stressing the strong resilience of this species to short-term solid perturbations. Nevertheless, further analyses on the consequences of spatial patterns inside the fenced area would be useful to fully understand their activity and behaviour.

### **Rutting vocal displays in a game species, Mongolian gazelle *Procapra gutturosa***

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Purpose/Objective: The Mongolian gazelle is a traditional ungulate game species of Mongolia. During the rut in December, males held harems and defend them against other males with aggressive displays attended by remarkable long series of rutting barks. Data regarding the acoustic structure of the barks are scarce, whereas information about other male and female call

types produced during the rut is lacking. The purpose of this study was to describe vocalisations produced by male and female Mongolian gazelles during the rut.

**Material/methods:** Calls were recorded from 10 to 25 December 2017 in Transbaikalia, Russia, using four automated SongMeter SM2+ recorders (900 hours in total). The devices were mounted at 0.5 m above the earth in places of concentration of the Mongolian gazelle harem groups, at a minimal distance between devices of 1 km. We also used a manual recorder Marantz PMD 660 with Sennheiser K6-ME66 microphone to determine the situation during calls. During the manual recordings (8 hours in total), the distance to animals was 150-500 m. Male callers were identified by visible vapour from the mouth or nose; female callers were identified by stomach and nostrils movements during the calling. Acoustic analyses were made using Avisoft SASLab Pro software.

**Results:** Male and female calls were classified into types based on spectrograms. Males call types included the nasal and oral barks, the closed-mouth snorts and the open-mouth running calls. Female calls included the oral and nasal “cat” calls and the closed-mouth snort. Male nasal and oral barks were produced in series up to a few dozen calls, each duration up to 100 ms. In the oral barks, visible frequency bands ranged between 500 and 750 Hz; in the nasal barks, the maximum energy was higher than 800 Hz. Male nasal snorts were noisy calls without harmonic bands of 200-250 ms, produced at a strong expiration when an animal spotted people or a car. The low-frequency (200-300 Hz) tonal-noisy open-mouth running call (up to 500 ms) was produced during an intense inspiration, commonly within series of barks emitted during fast female chasing.

Female cat calls (duration from 80 to 500 ms; fundamental frequency 400-500 Hz, sometimes up to 1000-1500 Hz) occurred singly or in irregular series. The cat calls were commonly low-intense but occasionally as loud as male barks. Females produce cat calls during contacts with other females within a harem or when running from a chasing male. Female snorts were similar to male snorts but were often made in irregular series and were never interspersed with barks. **Conclusion:** This is the first investigation of calls produced by male and female Mongolian gazelles during the rut. In contrast to males, the female calls were surprisingly high frequency for such large animals and acoustically indistinguishable from the calls of neonate Mongolian gazelles described in a previous study.

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### **Effect of human presence on red deer behaviour in game farming: new stag vocalisations identified from automated recordings**

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**/Objective:** Human presence modifies the behaviour of animals on game farms. The impaired behavioural repertoire is undesirable for game animals, so game managers try to retain wild-type behaviour in trophy red deer bred on the farms. The purpose of this study was to highlight the apparently lacking forms of vocal behaviour (contact calling) in untamed European red deer