

## Scavenging Behaviour of Red Deer *Cervus elaphus* Linnaeus, 1758 (Artiodactyla: Cervidae) in Eastern Spain

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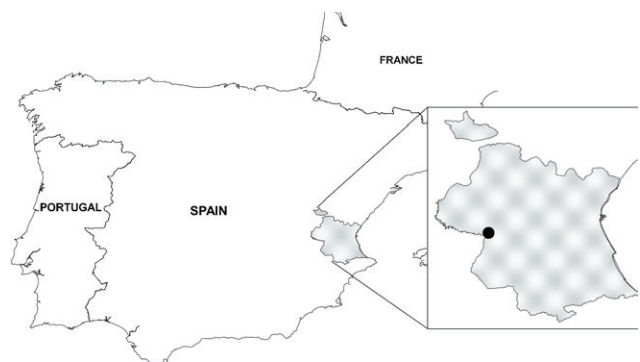
**Abstract:** A male red deer was repeatedly observed scavenging in eastern Spain. This is the first time this behaviour of the red deer being recorded by means of camera traps. Scavenging behaviour of herbivores may have implications for wildlife biologists and managers.

**Key words:** Camera-trap, golden eagle, herbivores, mammals, scavenging.

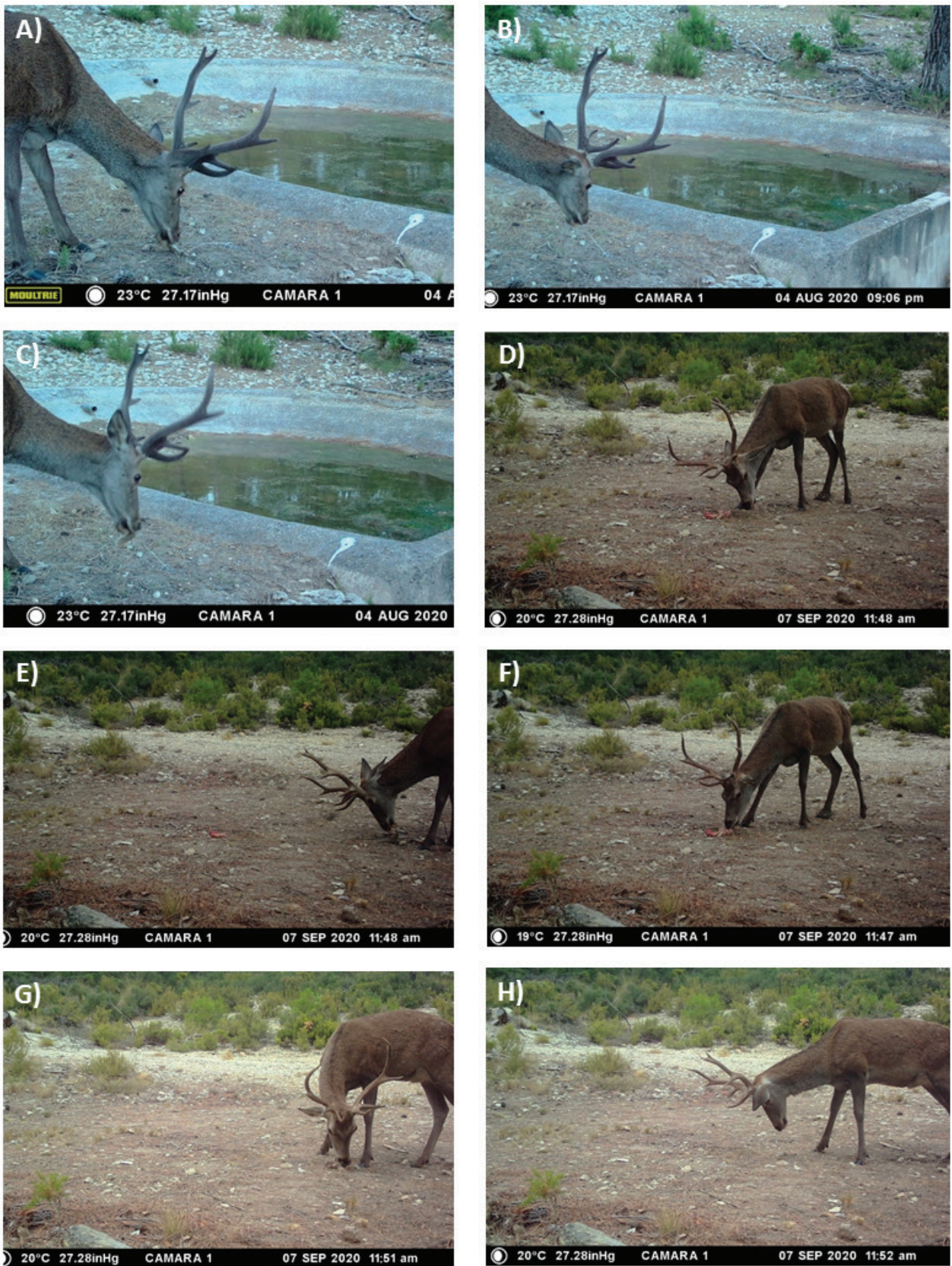
### Introduction

Herbivory plays a key role in maintaining key ecosystem services and in structuring food webs in both terrestrial and aquatic communities. Herbivores are primary consumers in the base of food chains (SCHMITZ 2008). However, there are exceptional events, in which herbivores consume meat and even exhibit carnivore behaviour (BAZELY 1989). In this situation, scavenging might occur when there is a lack of minerals in the diet. Previous studies have reported red deer (*Cervus elaphus* L., 1758) feeding on Manx shearwater *Puffinus puffinus* (Brünnich, 1764) chicks in 1987 in Rhum, United Kingdom (FOURNESS 1988). Other studies have reported similar scavenging behaviour of herbivorous species, e. g. Hermann's tortoise *Testudo hermanni* (NIKOLIĆ et al. 2016), crested porcupine *Hystrix cristata* (COPPOLA et al. 2020), Egyptian spiny-tailed lizard *Uromastyx aegyptia microlepis* (CASTILLA et al. 2011) and domestic sheep (*Ovis* sp.) (FURNESS 1988, BA-

ZELY 1989). Herbivores are adapted to digest plants using particular digestive enzymes such as cellulase as well as symbiotic microbiota (VAN SOEST 2018). Nonetheless, this diet cannot provided all the minerals needed for their development and reproduction (BAZELY 1989).



**Fig. 1.** The Iberian Peninsula and the Valencia Province highlighted in grey (left); the study area (black dot), east of Spain (right).



**Fig. 2.** A–C. Red deer scavenging on rabbit carrion. D–H. Red deer scavenging on a chicken carrion.

In this note, we report our camera-based observations on the scavenging behaviour of a red deer in a habitat in Spain.

## Materials and Methods

The study area was located in the Valencia Province, east of Spain (Fig. 1). Remains of rabbit, chicken and wild boar *Sus scrofa* were left as baits in a selected area for trapping golden eagles *Aquila chrysaetos* for studies of movement ecology (see e.g. LÓPEZ-LÓPEZ et al. 2022). Two camera traps (Moultrie M-999i model, 20 Megapixels) were placed in the area; they were programmed to take three consecutive pictures each time they were triggered, with no delay and all day-round (24 h/day). Cameras were installed to detect if targeted eagles visited carrion disposal. They were checked every day by a field technician.

## Results

On August 4<sup>th</sup>, August 26<sup>th</sup> and September 7<sup>th</sup> 2020, we recorded a red deer (in his fifth year) scavenging on small carcasses of rabbit *Oryctolagus cuniculus* and chicken *Gallus gallus domesticus* (Fig. 2). After detailed observation of all camera-trap pictures, the attendance of eagles and other carnivores such as stone marten *Martes foina*, red fox *Vulpes vulpes* and wild boars were also recorded. We also observed a single male red deer approaching to different baits having carrion with bones. All observations corresponded to the same individual in the same location.

## Discussion

Scavenging by herbivorous species might take place because they can benefit from fresh bone's magnesium, phosphorus, sodium, potassium and proteins. This is particularly important for the former three compounds as they are crucially important mineral elements for the development and growth of antlers (BAZELY 1989); these elements might be scarce in the limestone soils of the study area. In this context, scavenging could be an adaptation of deer for providing minerals through bones intake. Thereby, scavenging could help them to compensate the seasonal fluctuations of food availability and, therefore, nutrients fluctuations.

During the five years of the study and after trapping several golden eagles and Bonelli's eagles in the study area (PERONA et al. 2019), this was the

first time we observed a carrion-eating red deer. There are not many studies reporting this unusual behaviour and, to the best of our knowledge, none of them includes camera trap documents that evidence this behaviour. Therefore, this study emphasises the usefulness of camera traps for exploring of animal behaviour (see review in CARAVAGGI et al. 2017). Our observations could also be of interest for other researchers working on herbivory and species interactions. Camera traps can add new information that allows understanding conditions determining this rare behaviour on ruminant biology. The use of camera traps reduce the time spent in the field as well as the disturbance to wildlife in the course of the observations.

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