

# Time budget assessment in captive Roe Deer (*Capreolus capreolus*) as a potential tool for predicting release success

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## Abstract

This aim of the present study is to analyze daily activity rhythms of captive roe deer and to detect possible sources of variation inducing behavioural modifications. Roe deer that had been artificially reared by humans in a wildlife rehabilitation centre (n = 3) tended to be less reactive than roe deer reared into the wild from their dams and delivered to the rehabilitation centre when already adult (n = 3). Centre bred deer spent significantly less time moving and alert, thus having more time to dedicate to feeding. These behavioural differences might probably be used to discriminate between “imprinted” and “wild” animals in rehabilitation centres, especially when the animal’s origin is unknown. This would be useful for supporting decisional processes as to the release into the wild of those individuals.

**Key words:** roe deer; time budget; imprinting.

## Introduction

Newborn kids of roe deer (or of other wild ungulate species) are often delivered to rehabilitation centres for wildlife, where they have to be artificially breed. It is often difficult to breed them without contact with man and so they can present different degrees of imprinting and abnormal behaviours (Immelmann, 1988). If released into the wild, imprinted animals are at risk of injuring themselves due to their reduced fear of man, that leads to a high frequentation of urbanized areas (possible risk of car accidents, poaching, etc.). Furthermore, imprinted bucks may become very dangerous for people, due to their aggressive and territorial behaviour.

The aim of the present study is to analyze daily activity rhythms of captive roe deer and to detect possible sources of variation inducing behavioural modifications. This may help to explain the mechanisms of adaptation of wild animals to captivity and could also give information about the effect of artificial breeding, possibly contributing to improve breeding techniques, reducing imprinting risks. Furthermore, these results may be used as a support for the assessment of the origin of roe deer delivered to rehabilitation centres, highlighting possible previous contacts with man.

## Materials and methods

The research was carried out at the “Centro Assistenza alla Fauna Selvatica” (CAFS) of Sondrio Province, located in Central Italian Alps, at 700 meters a.s.l.. The CAFS consists of a fenced surface area of 18500 m<sup>2</sup> covered with grasses (about 50% of the total surface) and trees (mainly chestnut trees, *Castanea sativa*, fir trees, *Picea abies*, and larch, *Larix decidua*). Data collection took place over two seasons: winter-spring 2002 and winter-spring 2003. Six roe deer of different sex (four males and two females) and age (four yearlings and two adults) were observed. Three of them were taken to the CAFS as newborn kids and they were bred by a human mother, therefore they were subjected to more or less pronounced imprinting procedures (“Center Bred”, CB). The other three were handed over to the CAFS in consequence of car accidents; at the moment of the delivery, they were already adult, so were submitted to no imprinting procedures (“Wild Bred”, WB). One of the bucks was lame due to an old femoral fracture. Behavioural observations were carried out by the aid of a binocular using a focal animal sampling technique (Martin and Bateson, 1993); each focal animal was observed from a fixed place for 15 minutes and the following behavioural categories were recorded: feeding, standing, lying, moving, ruminating, grooming, self-grooming and alert. Observation sessions were equally distributed into three time bands: morning (before 12:00), afternoon (12:00 - 16:00) and evening (after 16:00). The percentage of time dedicated to each behavioural activity was submitted to GLM analysis of variance using sex, age class (yearling or adult), time band (morning, afternoon or evening) and breeding system (CB or WB) as fixed

factors.

## Results and discussion

Compared to the time-budgets reported by other Authors (Perco, 1979; Ladini, 1989; Tarello, 1991; Mustoni et al., 2002) referring to the same observation season, our results showed less time devoted to rumination and more time for feeding and moving. These differences were probably due to the difficulty to observe animals into the wild during the winter season, due to short day length, high snow cover and/or reduced access to some places. However, circadian rhythms were in agreement with those reported in the existing literature, with a significantly higher percentage of time spent lying ( $P < 0.01$ ) and a lower percentage of time spent feeding ( $P < 0.01$ ) and standing ( $P < 0.05$ ) in the afternoon than in the other two time bands. Sex differences were negligible, while age effect was significant on moving ( $P < 0.001$ ) and alert ( $P < 0.01$ ); both these behaviours were higher in yearlings, probably due to the fact that young animals are usually more reactive and curious and, possibly, also to the fact that young animals had not established their own territory yet and they tended to move in order to invade the others' ones. The most interesting results were found in response to the breeding system: CB deer tended to be less reactive, significantly reducing their moving and alert behaviour, thus having more time to dedicate to feeding (Fig. 1).

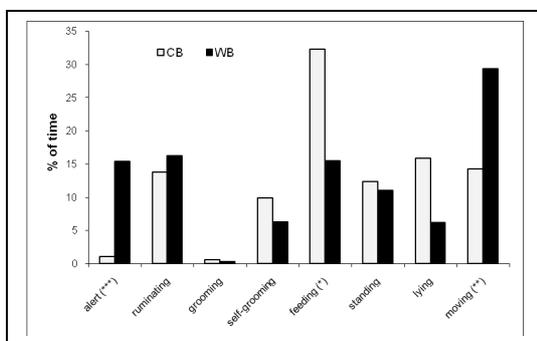


Fig. 1 - Least square means of the percentage of time dedicated to each behavioural category depending on the breeding system (CB = Center Bred; WB = Wild Bred). Levels of significance: \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ .

## Conclusions

The behavioural differences observed between CB and WB roe deer might probably be used to discriminate between “imprinted” and “wild” animals in rehabilitation centres, especially when the animal’s origin is unknown. This would be useful for supporting decisional processes as to the release into the wild of those individuals. Further investigations are in progress in order to get more detailed data about the time-budget of larger sample of roe deer in captivity. From these observations we might obtain important information for improving the management and life conditions of captive roe deer. These information will be completed by the follow-up of roe deer re-introduced into the wild from our rehabilitation centre, collecting data about their behaviour and space use into the wild in order to evaluate the success of the intervention.

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