Con il Patrocinio di

Università degli Studi di Messina



78° CONVEGNO SISVET

UNAHOTELS Naxos Beach Sicilia

GIARDINI NAXOS

Posters

FECAL GLUCOCORTICOID AND ANDROGEN METABOLITES IN GREY KANGAROOS (*MACROPUS GIGANTEUS*) ADAPTING TO A NEW ENVIRONMENT

Laura Menchetti[1], Elena Fraticelli[1], Gaia Andrea Bevinetto[1], Rupert Palme[2], Livio Galosi[1], Giacomo Rossi[1], Gioia Gaiot[3], Renato Piccinini[3], Raffaello Gambi[3], Matteo Cerquetella[1]

[1]School of Bioscience and Veterinary Medicine, University of Camerino, Matelica (MC), Italy; [2]Department of Biological Sciences and Pathobiology, University of Veterinary Medicine, Vienna, Austria; [3]Parco Zoo Falconara, Falconara Marittima (AN), Italy

Many zoo animals may experience changes in their housing facilities, typically to enhance management and social conditions. However, they may initially perceive these environmental changes as threats to their homeostasis, making them potential stressors. To restore balance and welfare, animals activate adaptive mechanisms, primarily involving the hypothalamic-pituitary-adrenal (HPA) axis. This leads to the release of hormones such as steroids that help them cope with acute stressors. On the other hand, excessive or prolonged activation of the HPA axis can result in poor welfare and pathological conditions. This study aimed, for the first time, to monitor HPA axis activity by measuring fecal glucocorticoid (GCM) and androgen metabolite (AM) levels in grey kangaroos (*Macropus giganteus*) following their transfer to a new managed care environment. Three kangaroos – two females born in 2022 and a male born in 2021 – were relocated from Parco Natura Viva (VR, Italy) to Parco Zoo Falconara (Falconara Marittima, AN, Italy), housed in an enclosure of approximately 420 m^2, equipped with a covered shelter and environmental enrichments. A fecal sample was collected from all three kangaroos before departure. Upon arrival at the new facility, fecal samples were collected daily for the first 10 days and weekly for the following three months, covering the period from January 20 to April 9, 2024. A 5α-pregnane-3β,11β,21-triol-20-one (1) and an epiandrosterone (2) enzyme immunoassay were used to measure GCMs and AMs, respectively. Data analysis was conducted using descriptive statistics and correlation analysis (Spearman's correlation coefficient, ρ).

GCM concentrations ranged from 14.0 to 262.4 ng/g, while AM concentrations ranged from 1.8 to 103.2 ng/g. The GCM trend was similar across all three kangaroos, with elevated levels (above 100 ng/g) in the first few days, followed by a decline. By day 10, all animals exhibited stable GCM levels below 100 ng/g for approximately 40 days. In mid-March, an increase was observed, with GCM levels exceeding 100 ng/g in two subjects. Similarly, AM levels declined after the first few days, dropping from an average of 34.3 ng/g (SD=21.5 ng/g) during the first week to 9.2 ng/g (SD=3.6 ng/g) over the following 40 days. However, while AM levels remained low in the two females throughout the observation period, the male exhibited a marked increase from mid-March, surpassing 100 ng/g. A strong correlation was found between GCM and AM metabolite levels ($\rho=0.741$, $p<0.001$). The initial reduction in GCM and AM levels could suggest a rapid adaptation of the animals to the new environment. The increase observed in March may indicate the presence of a new environmental stressor or physiological seasonal changes. Regarding AM values, it is important to note that fecal testosterone metabolites may interfere with measurements, as adrenal and gonadal androgens share common metabolic pathways in feces. Therefore, while GCMs and AMs appear to be promising non-invasive indicators of HPA axis activation, it is essential to account for physiological seasonal variations in both sexes and to integrate these data with behaviOral Communication(s) observations and contextual information to accurately identify potential stressors.

References

1. Touma C, Sachser N, Möstl E, Palme R. Effects of sex and time of day on metabolism and excretion of corticosterone in urine and feces of mice. Gen Comp Endocrinol. 2003 Mar;130(3):267-78. (02)00620-2.

2. Palme R, Möst| E. Biotin-streptavidin enzyme immunoassay for the determination of oestrogens and androgens in boar faeces. In: Görög S, editor. Advances in Steroid Analysis '93. Budapest: Akademiai Kiado; 1993. p. 111-7.