EVALUATION OF FAECAL GLUCOCORTICOID METABOLITE LEVELS IN RESPONSE TO NEW SOCIAL AND HANDLING CONDITIONS IN AFRICAN LIONS (*Panthera leo bleyenberghi*)

Paula Serres Corral — Final Degree Project — June 2020

INTRODUCTION

Glucocorticoids are important mediators of the physiological stress response, thus, important stress markers. The monitorization of the hypothalamic–pituitary–adrenal (HPA) axis through faecal cortisol metabolites (FCM) determination is a non-invasive technique useful to understand how handling and social conditions affect the physiological status of zoo animals, assessing long term responses.

OBJECTIVE

The aim of the study was to evaluate, through FCM levels of all individuals of the pride before and after the loss of the dominant member, if the HPA axis activity was modified due to changes in social and handling conditions.

MATERIAL AND METHODS

Table 1. Details of the five African lions.

IDENTIFICATION	SEX	AGE
F1 = Female 1	Female	15 years old
F2 = Female 2	Female	15 years old
F3 = Female 3	Female	15 years old
M1 = Male 1	Male	15 years old
M2 = Male 2	Male	4 years old

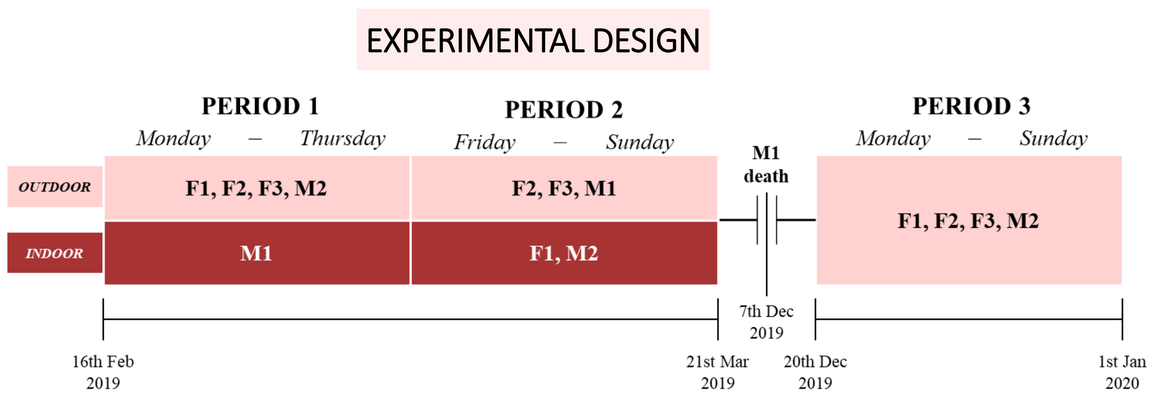

Figure 1. Sequence of the periods studied. In P1 and P2, both taking place simultaneously from February 16th to March 21st, a weekly management was made to keep M1 and M2 in separated facilities. After the death of M1 on December 7th, P3 was established and the four individuals gained outdoor access together. Sampling of P3 took place form December 20th to January 1st. *Abbreviations:* P1, period 1; P2, period 2; P3, period 3; F1, female 1; F2, female 2; F3, female 3; M1, male 1; M2, male 2.

1. INDIVIDUAL IDENTIFICATION

Figure 2. Shredded coloured waxes were used as indigestible marker for individual identification. A piece of meat covered with wax particles was given to the lions every morning.

2. SAMPLE COLLECTION

Daily sample collection

↓

Frozen at – 20ºC

3. STEROID EXTRACTION

Methanol-based procedure

4. STEROID ANALYSIS

Neogen® Cortisol ELISA kit

RESULTS

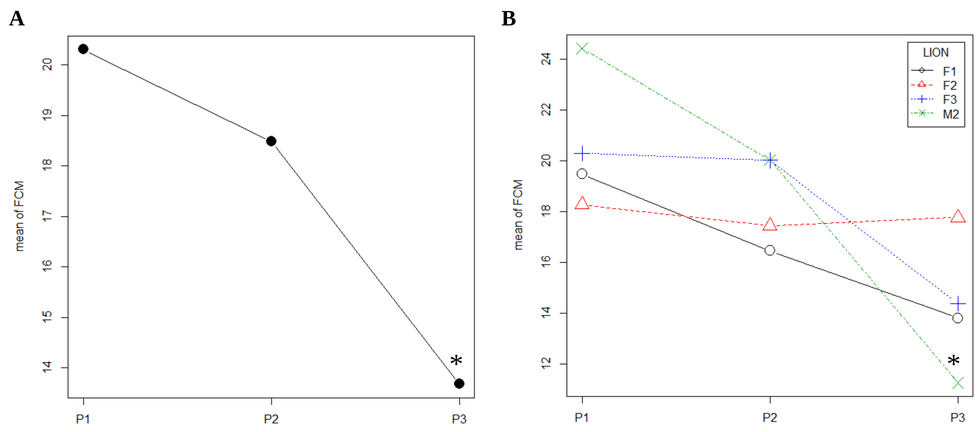

Figure 3. Plot of means of FCM (ng/g) showing (**A**) global means and (**B**) individual means along the three periods studied. The asterisks (*) indicate (**A**) significant differences between P3-P1 and P3-P2 (***p* < 0.001**) and (**B**) significant differences in M2 between P3-P1 (***p* < 0.001**) and P3-P2 (***p* < 0.05**).

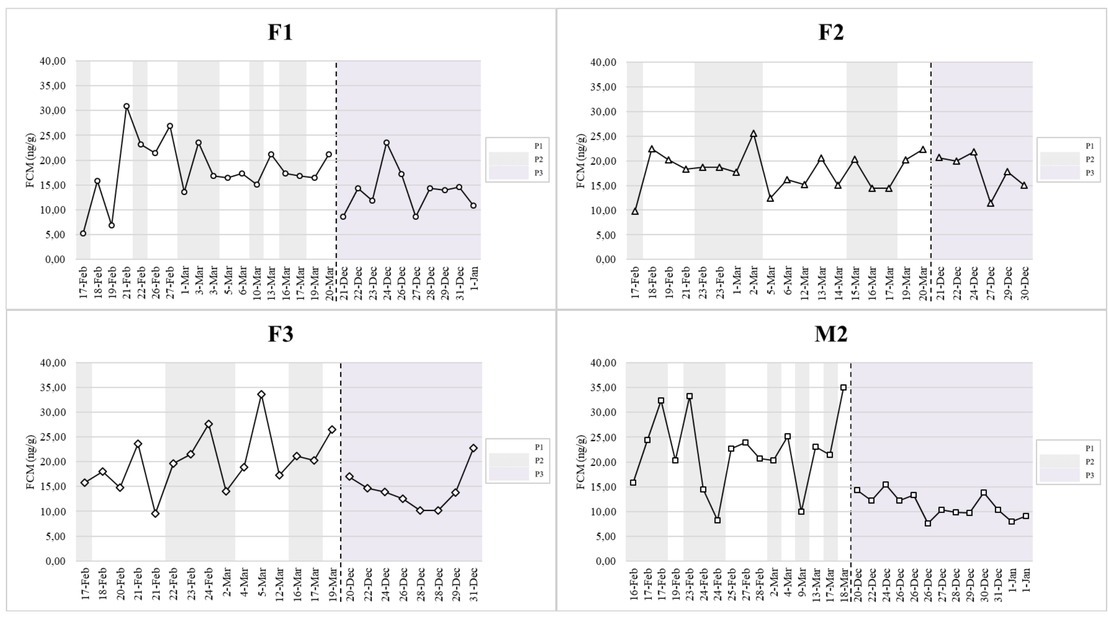

Figure 4. Concentration of FCM (ng/g) of all samples analysed for each individual represented chronologically. The discontinuous line symbolizes a jump in time from March to December. In P3, a decrease of FCM concentrations along with an important reduction on spikes amplitude was observed in M2, F3 and, to a lesser extent, F1.

DISCUSSION

Significant lower FCM levels observed in P3 compared to P1 and P2

↓

Different handling and housing conditions can induce a physiological response

Significant decrease of FCM levels observed in M2 from P1-P2 to P3

↓

Forced olfactory, auditory or visual exposure to an aggressive member can induce a physiological response

CONCLUSIONS

- ✓ A global decreased HPA axis activity was observed in P3, suggesting a less expressed stress reaction. Thus, a more stable situation was found in P3 compared to P1 and P2 that could be associated with a decreased management of the individuals.
- ✓ Additionally, in M2, the drastic decrease of FCM levels from P1 and P2 to P3, could be interpreted as a decreased HPA axis activity in P3 due to lack of sensorial exposure to M1.

Universitat Autònoma de Barcelona

FACULTAT DE VETERINÀRIA