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Improving pack formation of an endangered carnivore: the African wild dogs (*Lycaon pictus*)

African wild dogs (Lycaon pictus) are endangered, social carnivores, historically distributed throughout sub-Saharan Africa. This species disappeared from much of its historical range and, as a result, it is listed as Endangered on the IUCN red list. The metapopulation approach is a necessity in Southern Africa, where no sufficiently large contiguous patches of suitable habitat remain. As such, knowledge on the optimum methods for artificial pack creation for reintroduced and translocated wild dogs is required. However, the optimal structure and integration of social groups used in artificial pack formation in wild dogs is not fully understood. Aims of the study are (1) defining a comprehensive ethogram for the species, (2) apply this tool for quantitative behavioral analysis, including the estrous and subsequent denning period of the animals, (3) genetically map the individual to define relatedness (4) quantify fecal glucocorticoids metabolites (fGCM) fluctuations, (5) test potentially stressful conditions and single subjects endocrine response related to hierarchy (i.e. denning, interspecific aggression, pack modifications both natural and artificial. Additionally, data will be used to test the effectiveness of fGCM to predict bonding capacity of single subjects in relation to behavioural expression, allowing to test a "predictive tool" for positive bonding success. Results provided an extensive ethogram, complemented with a video ethogram and behavioural assessment. Behavioural assessment evidenced the importance of both active and passive submission of subordinates animals for hierarchy stability. Genetic and endocrine analysis are in process. The utilization of the ethogram will assist in unifying *L. pictus* behavioural research, improve the understanding of African wild dogs behaviour and support welfare assessments and the species conservation. The ongoing data collection and analysis will provide fundamental tools for these animals management, both in the wild and in human care, promoting the long-term species conservation.

Subjects

Four African wild dogs packs were considered, housed in Limpopo lipadi private Game and wilderness reserve in Botswana, and in Khamab game reserve in South Africa. Each pack include an alpha pair and their siblings (Tot. N=36; subjects per pack 8-10).

Data collection

- Ethology: video recordings are carried out during peak hours of wild dogs activity (5:00-10:00; 16:00-19:00), resting periods (10:00-16:00. Every recording session lasted 20-40 minutes, depending on animal visibility. Continuous sampling technique (Altman, 1974) was chose with 5 minutes repetitions for each focal individual, associated with scan sampling (Altman, 1974) performed at 5 minutes intervals.
- Endocrinology and genetic: Fecal samples are collected with plastic sealable bags opportunistically from the ground when the animals move away, and only for identified individuals. Samples are separated in two aliquots, located in ice while transported, then stored at -20°C until assayed.

Data analysis

- Ethology: Behavioural videos are analyzed using the software BORIS (Behavioural Observation Research Interactive Software) (Friard, O., Gamba, M., 2016)
- Endocrinology: fGCM are quantified via EIA (Enzyme Immuno-Assay) at the University of Pretoria, South Africa.
- Genetic: analysis are conducted at the Botswana International University of Science and technology, Botswana.

Results

- Descriptive ethogram: 62 behaviours - five functional categories: *locomotory, postural*, *social*, *aggressive sexual and play*. Each behaviour was classified as a *state* or an *event*, provided with a short description and (when possible) references. 12 Behaviours are described for the first time as no published reference was found.
- Video ethogram: short clips of 34 behaviours were selected.
- Assessment of the intra and inter-specific behavioural expression before, during and following estrous were described. Packs with stable alpha dyad appears to have higher hunting success rate and lower intra-subjects aggressive behaviours.
- Definition of genetic relatedness and differences in fecal glucocorticoids metabolites concentrations of adults of different rank, juveniles and pups will shortly be obtained.

Expected results and next steps

- Evaluation of any behavioural and endocrine modification related to denning and subsequent hierarchy modifications
- Assessment of a parallelism between fGCM and behavioural expression
- Test the utility of fGCM as predictive tool for bonding success
- Discrimination between nongenetic related individuals and genetic proximity in relation to bonding success.

References

Altmann, J. (1974). Observational study of behavior: sampling methods. Behaviour, 49(3), 227-266.

Friard, O., & Gamba, M. (2016). BORIS: a free, versatile open-source event-logging software for video/audio coding and live observations. Methods in Ecology and Evolution, 7(11), 1325-1330.