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Stress and Disturbance

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Measuring faecal cortisol metabolites: A non-invasive tool to evaluate adrenocortical activity in mammals

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Stress in mammals results in the activation of the adrenal gland. Measuring faecal cortisol metabolites as an indicator of stress in animals offers the advantage of a simple sampling technique. However, we found marked species differences regarding the proportion of excreted metabolites via the faeces, the pattern of metabolites present in the faeces and the time course of their excretion. A recently established EIA (11-oxoetiocholanolone-EIA) measuring faecal 11,17-dioxoandrostanes, a group of cortisol metabolites, was evaluated in order to test its applicability across species.

Faeces of different mammals (cow, sheep, horse, pig, deer, rhino, cat, dog, hare and guinea-pig) were extracted with 80% methanol, cleaned up by Sep-pak C18 columns and subjected to RP-HPLC (Column: Novapak C18; methanol-water gradient; flow: 1 ml/min). Fractions were collected every 20 sec and immunoreactivity tested in a cortisol-, corticosterone- and the 11-oxoetiocholanolone-EIA.

In all species, immunoreactive metabolites could be detected. In ruminants, the pig, cat and hare, amounts of 11,17-dioxoandrostanes were highest, whereas in the other species with all three EIA's more or less equal amounts could be measured. In addition, the biological relevance of the recently established 11-oxoetiocholanolone-EIA could be confirmed following pharmacological stimulation or suppression of the adrenal cortex in ruminants (sheep and cattle) and horses. ACTH or dexamethasone injection resulted in an increase (2.3 to 24 times) or decrease (12% to 60% of basal levels), respectively, of 11,17-dioxoandrostanes concentrations. Thus this method could be a valuable tool across species in a variety of research fields including ethological and environmental studies.