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Monitoring stress hormone metabolites as a useful, non-invasive tool for welfare assessment in farm animals

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Abstract

A multitude of endocrine mechanisms are involved in coping with challenges. Glucocorticoids, secreted by the adrenal glands, are in the front line of the battle to overcome stressful situations. They are usually measured in plasma samples as parameters of adrenal activity and thus of disturbance. Unfortunately, collecting blood samples itself can disturb an animal. Thus, non-invasive methods for the determination of glucocorticoids or their metabolites have become increasingly popular. The pros and cons of various non-invasive sample materials (saliva, excreta, milk, hair/feathers and eggs) for glucocorticoid determination are given. Above all, faecal samples offer the advantage that they can be collected easily. In faecal samples, circulating hormone levels are integrated over a certain period of time and represent the cumulative secretion of hormones. Thus, the levels are less affected by short fluctuations or the pulse-like nature of hormone secretion. However, using this technique to assess an animal's adrenocortical activity is not especially simple. Whether frequent sampling is necessary or single samples will suffice depends upon the study's aim (whether one is examining the impact of acute or chronic stressors). Background knowledge of the metabolism and excretion of cortisol/corticosterone metabolites is required and a careful validation for each species and sex investigated is obligatory. The present review also addresses analytical issues regarding sample storage, extraction procedures and immunoassays and includes a comprehensive list of published studies (up to 2011) describing the use of such methods in farmed animals. Applied properly, non-invasive techniques to monitor glucocorticoid metabolites in faecal samples of various species are a useful tool for welfare assessment, especially as they are easily applied at farm or group level.

Keywords: *animal welfare, corticosterone, cortisol, faeces, farm animals, stress*