Efficiency of fecal steroid hormone measurement for assessing reproductive function in the Hokkaido brown bear (Ursus arctos yesoensis)

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Abstract:
The present study aimed to establish simple systems for measuring fecal steroid hormones in order to monitor the reproductive profiles of captive Hokkaido brown bears. The efficiency of fecal sample processing at the steps of dehydration and extraction and the correlation between steroid concentrations in matched fecal and blood samples were studied. Then, monthly changes in fecal estradiol-17β and progesterone in female bears, and testosterone in male bears were examined. The procedure was finalized as follows. Fecal samples were dried at 100°C for 3 hr and extracted with diethyl ether. The diethyl ether in the extracts was evaporated and residues were reconstituted in ethanol for the assays. Hormone concentrations were quantified using enzyme immunoassays. Concentrations of progesterone and testosterone in fecal and plasma samples were correlated in the systems. The changes in fecal progesterone and testosterone concentrations were similar to those in serum concentrations of bears as reported previously. In contrast, fecal estradiol concentrations did not correlate with plasma levels probably because of the time lag in excretion. However, the changes in estradiol-17β concentrations in feces in the present study were similar to those reported in serum. In conclusion, fecal progesterone and testosterone assay systems appear practical for monitoring ovarian and testicular activities without immobilization, though methodological improvements and further validation may be required. For the fecal estradiol-17β assay, there is a need to solve the problem of excretion time lag before the system can be used in the study of reproductive physiology.

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