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On-line

A comparison of specific gravity and creatinine for determining urine concentrations in captive orangutans for monitoring health status and physiology

BRYANNA B. MALBOUF[1,2,] ERIN E. KANE[j], LARA S. DURGAVICH[1] and CHERYL D. KNOTT[1,2]

[1]Anthropology, Boston University,
[2]Biology, Boston University

Biomarkers including reproductive hormones and indicators of energy balance can be used to analyze health status and physiology in wild animals. Non-invasive collection of urine or feces enables biomarker monitoring, important for critically endangered species like orangutans. Hormonal measurements must control for urine concentration, typically done using creatinine or specific gravity. Specific gravity measurement compares the density of urine with the density of water. Creatinine is a breakdown product of muscle metabolism that is excreted from the body at a relatively stable rate, and it is an indicator of relative muscle mass in many species. Here, we measure specific gravity in urine samples from captive female orangutans using a digital hand-held urine specific gravity refractometer. We compare specific gravity to previously measured creatinine values and assess the influence of time of collection and refractometer temperature on specific gravity. We found a significant positive correlation between specific gravity and creatinine concentrations (N=1021, Pearson's R=0.578, $p<0.001$). While we found no significant correlation between the time that samples were collected and specific gravity readings (N= 314, Pearson's R=0.079, p=0.17), readings from morning samples were slightly but significantly lower (N=255, mean=1.008) than afternoon samples (N=60, mean=1.009) (independent samples t-test, t312=-1.969, p=0.05). We found a significant negative correlation between specific gravity and refractometer temperature (Pearson's R=-0.23, $p<0.001$), highlighting the need to control for urine temperature when using thawed samples.

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