Use of urine samples collected from bladder and snow to indicate condition of semi-domesticated reindeer

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Arctic and subarctic reindeer respond to energetically costly winter conditions by behavioral modifications and physiological adaptations. Blood usually permit quantification of this intergrated response to variations in nutrition (Nieminen 1980). Recently the search for indicators of nutrition in animals has turned to urinalysis (see DelGiudice et al. 1988). Urinalysis has been employed by Eriksson and Valtonen (1974) for freely grazing semi-domesticated reindeer in Finland. Altogether 52 semi-domesticated reindeer (49 adult females and 3 castrated males) were used in present study. Reindeer were freely grazing in Kaamanen Reindeer Research Station or fed with rouhage (dried *Equisetum fluviatile*) or concentrates (Poron-Herkku, Raision Tehtaat Oy) during winter and summer 1989. During winter reindeer were grazing mainly *Cladina* lichens and during spring and early summer common reindeer forage plants (see Nieminen and Heiskari 1989). The blood samples were taken from the jugular vein and blood serum parameters were determined by standard methods (see Nieminen 1980). Urine samples from the bladder of castrated males were collected during slaughtering and those of living females by catheterization. After sampling reindeer were weighed. Urine samples in snow were collected from different feeding groups using the method by DelGiudice et al. (1988). Urine samples were poured into snow and collected as described by DelGiudice et al. (1988). Urine and urine-snow samples were kept at - 20°C until analysed. Urea N and creatinine were assayed by spectrophotometry. Urea and creatinine ratios were calculated. The obvious disadvantage of urinalysis in wild species may be the difficulty of urine collection. Urine collection from bladder of adult reindeer females by catheterization during spring and summer was, however, nearly 100 % successful. During winter time it was slightly difficult to collect samples because urine content in the bladders was very low. The decline in water flux of reindeer during winter is about five to sevenfold compared with that during summer (see White 1975). There were no significant differences in body weight between different reindeer groups in present study, but body weights decreased slightly during winter and spring, and the lowest body weights were measured for the adult hinds in June after calving. Significant differences were found in blood parameters between different reindeer groups at same sampling date. Some significant differences were also measured in blood parameters between different sampling dates indicating changes in nutrition and nutritional status of reindeer. The highest serum urea: creatinine (U:C) ratios were measured for *ad libitum* fed hinds and freely grazing hinds in June. There was significant positive correlation between serum urea and bladder urine urea in present study ($r = 0.504$, $n = 28$, $P < 0.01$). Significant positive correlations were also found between serum creatinine and bladder urine creatinine values ($r = 0.729$, $n = 28$, $P < 0.001$), and between serum U:C and bladder urine U:C ratios ($r = 0.920$,

n = 28, $P < 0.001$) in present study. No significant changes were measured in urine U:C ratio collected from the snow during the first 12 hours. The value of urea N measurements in reflecting the severity of nutritional deprivation is related to urea synthesis in the metabolism of dietary protein and catabolized endogenous protein. Assaying blood and urine for urea N and creatinine is relatively easy and inexpensive, and snow-urine analysis should permit more economical, continuous and sensitive monitoring of the condition of semi-domesticated reindeer during winter time.

References:

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