Water requirements of captive reindeer hinds with artificial feeding

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Abstract: Winter (February to April) water requirements of 40 reindeer (*Rangifer tarandus tarandus* L) were studied at the Kaamanen Research Station (69°10'N) (Soppela *et al.* 1987). In 1985 28 hinds were divided into four groups and fed with equal rations of (I) lichens (*Cladina* spp.) with 3% crude protein (CP): (II) lichens and dry hay (*Phleum pratense*) with 12% CP, (III) pelleted reindeer feed with medium (12%) CP and (IV) pelleted feed with high (17%) CP. The study was done with 12 hinds (feeding I and II) in 1986. The hinds were kept in outdoor enclosures, where clean snow was available *ad libitum* for free water intake. The animals were weighed monthly. Total body water (TBW) and daily water turnover (WTR) was measured by the tritiated water method (Holleman *et al.* 1982). Total body fat (TBF) was calculated from TBW according to Pace and Rathbun (1945). Drinking water intake was measured indirectly by subtracting the intake of feed water and metabolic water from the daily water influx or WTR. The amount of energy required to melt and warm the drinking water to body temperature (39°C) was calculated from the specific heat values of water, snow or ice at different ambient temperatures.

Total body water remained unchanged (mean TBW 68.8±0.7%) in each group from February to March. Body weight decreased in all groups except for hinds fed with high protein feed (Group IV). Total body fat decreased from 6.9 to 3.0% in hinds fed with hay and lichens from February to March ($P<0.05$). Mean TBW increased in hinds fed with lichens from March to April. In April, hinds fed with lichens (Group I) weighed less and had a higher TBW (74.6 to 68.8%) than hinds fed with medium protein feed (Group III) ($P<0.01$), whereas their (Group I) TBF was smaller (0.3 to 6.1%, $P<0.01$). The mean daily water turnover was smaller in February in hinds fed with lichens (Group I) or with hay and lichens (Group II) than other groups of hinds. The mean daily WTR remained unchanged from February to March in Group I hinds but increased in the others. The mean daily WTR in Group I increased slightly from March to April, but was still smaller than in other groups. There was a strong positive correlation between the intake of digestible CP and WTR ($r=0.738$, $n=35$, $P<0.001$).

Daily drinking water intake was smallest ($P<0.001$) in the lichen-fed hinds (Group I) throughout the feeding period. It was rather constant in this group, while it increased in other groups from February to March. The lichen group drank 0.1 l/day in March. Groups II, III and IV drank 2.0, 3.2 and 3.5 l/day respectively. In April drinking water intake was smaller in Group I than in Group III (0.1 and 3.7 l/day resectively) ($P<0.001$). The energy costs of melting and warming drinking water were smallest in the lichen-fed hinds in each month during the trial (mean 0.1 MJ/day), while hinds fed with pelleted feeds had the largest emergy costs. Hinds fed with hay and lichens (Group II) had energy costs of 0.5 MJ/day in February and 1.2 MJ/day in March. The energy costs of hinds fed

with pelleted feeds (mean of the Groups III and IV) were 1.1 MJ/day in February, 1.7 MJ/day in March and 1.9 MJ/day in April.

In conclusion, the hinds fed with medium or high protein feeds (Groups III and VI) maintained their body weight and condition, but greatly increased their water requirements and thermal energy demands. Hinds fed with hay and lichens (Group II) entered a state of malnutrition, in which body fat was depleted and body weight declined. Further, their water requirements and thermal energy costs of water intake increased throughout the trial. On a lichen diet reindeer lost weight but were able to reduce drinking water intake and energy costs.

References:

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