

GERHART

**EQUILIBRATION KINETICS OF TRITIATED WATER AND ^{14}C UREA:
POTENTIAL FOR FIELD ESTIMATION OF BODY COMPOSITION IN VIVO**

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Abstract: Body weight and body condition indices do not necessarily reflect body composition of live animals; however, estimation of empty body water (EBW) can be used to predict body composition (fat, protein, ash). EBW can be estimated in live animals using marker dilution principles. Fat reserves are estimated from the inverse relationship between EBW and fat.

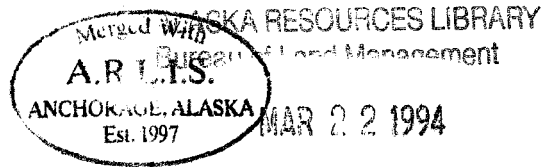
Tritiated water (HTO) equilibrates with both EBW and alimentary water, the sum of which is total body water (TBW). In contrast, ^{14}C urea (UREA) equilibrates only with EBW, as it is hydrolyzed during passage into the gut. We measured equilibration kinetics for each marker to determine usefulness under field conditions, where animals can be constrained for only a limited time.

Equilibration time of HTO in captive, rumen cannulated reindeer varied between 45 and 90 min in both June and August, while UREA

equilibrated in 9 to 18 min. The high degree of variability in equilibration time precluded use of a single Sample to approximate equilibrium tracer concentration. Pool sizes were calculated using the NIH computer program SAAM. TBW and EBW estimates for samples collected during the first 30 min post injection were compared to pool sizes calculated using the entire data set. Estimates of TBW from 30 min of HTO dilution varied within 1.5 to 15% of the total curve analysis, while estimates of EBW varied up to 19.6%. UREA EBW estimates were within 1.8 to 5.1% of total curve estimates.

The modeling approach using SAAM is dependent on an estimate of whole body water turnover. While no seasonal variation in turnover rate was found between June and August, seasonal differences are expected. We conclude that good estimates of EBW and TBW can be made from 30 min of data collection using UREA and HTO respectively, provided a reasonable estimate of the terminal rate constant can be made.

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