Recent Studies of Snow-urine Samples for Evaluation of Elk Nutrition[TWS]

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Over the past 7 years a group of collaborators have been investigating the possible utility of using urinary allantoin:creatinine ratios as an index of nutrition in Rocky Mountain elk. Research has included both controlled experiments with captive elk at the Starkey research facility in Oregon as well as studies of free-ranging, radio-collared elk in the Madison-Firehole herd of Yellowstone National Park. The captive animal studies have demonstrated a strong linear relationship between dietary intake of metabolizable energy and urinary allantoin:creatinine ratios. The relationship appears to be quite robust to different nutritional regimes and responds quickly to changes in dietary intake. Intensive sampling of free-ranging, radio-collared cow elk in Yellowstone over a 6-year period indicate that the urinary ratio exhibits pronounced seasonal and annual variation that can be correlated to changes in forage quality, due to plant senescence and green up, and quantity, due to changes in snowpack. Annual differences in mean overwinter allantoin:creatinine ratios were also correlated with overwinter calf survival. These data suggest that allantoin:creatinine ratios derived from snow-urine samples may be useful as a research tool for studying overwinter nutrition when the identity of the animals depositing the urine is known. We found significant differences in urinary

allantoin:creatinine profliles. among sex–age classes that could limit practical management applications that would require collection of anonymous snow-urine samples. A sampling and analysis protocol to alleviate these problems was developed and tested on 6 elk herds in Wyoming and Montana during the winter of 1996-97. Results of this study suggest that the urinary ratio may have promise as a management tool as well, however, additional research will be needed.