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Does chemical composition of antler bone reflect the physiological effort made to grow it?

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Source

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Abstract

In a previous study, antler bone chemical composition was found to differ between base and tip. If such variation is in part due to the physiological effort made to grow the antler, composition trends should differ between antlers from deer population differing in mineral or food availability, or body reserves. To assess this, we examined cortical thickness and bone composition along the antler shaft, and compared trends between antlers from two populations: captive, well-fed, health-managed deer (n=15), and free-ranging deer with lower food quality and no health treatment (n=10). Significant and clear divergent trends supporting greater physiological exhaustion in free-ranging deer and high or moderate predictive models were found for cortical thickness (R(2)=61.8%), content of Na (R(2)=68.6%), Mg (R(2)=56.3%), K (R(2)=40.0%), and Zn (34.6%); lower predictive power was found for protein (R(2)=25.6%) and ash content (R(2)=19.5%); and poor predictive power was found for Ca (R(2)=4.3%), Fe (R(2)=11.1%), and Si (R(2)=4.7%). A second part of the study assessed similar antler structures grown at the beginning (brow tine) and end (top tine) of antler growth within captive deer. Greater cortical thickness and ash content was found for brow tine, as well as a smaller protein, K and Mg content. In contrast, no difference was found for Ca, Na, Zn, Fe or Si. The results suggest that thickness and mineral composition reflect the physiological effort made to build antler bone.

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