

EFFECTS OF STARVATION AND LIPID REMOVAL ON DIFFERENTIAL FRACTIONATION OF $\delta^{13}\text{C}$ AND $\delta^{15}\text{N}$ AMONG KRILL TISSUES

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Stable isotopes of carbon and nitrogen are frequently used tools for elucidating trophic relationships among aquatic organisms. Changes in an individual's physiology as a result of diet, age, reproductive capacity and other factors are likely to produce variations in stable isotopic ratios that might confound interpretation of trophic relationships. We examined the effect of two key issues in the physiology of Antarctic krill - starvation and lipid characteristics - on $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$. Krill were maintained in the laboratory for 10 weeks and were either starved or fed a mixed diet of the phytoplankton *Gemingera criophylum* and *Pyramimonas geldicola*. Krill for stable isotope analysis were sampled from the tanks at two weekly intervals, while moults were removed daily and batched weekly. Following each sampling event, krill were measured and sexed, then dissected so that the eyes and portions of muscle and carapace could be analysed separately. Lipids were extracted from the remaining body and further muscle and carapace dissected and analysed to examine the effect of lipid removal. For laboratory reared krill there was no significant change in either $\delta^{15}\text{N}$ or $\delta^{13}\text{C}$ in the eyes of fed or starved animals. However the moults showed a significant increase in $\delta^{13}\text{C}$ in fed and starved krill over time and in $\delta^{15}\text{N}$ in starved krill. $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ varied between tissues of fed and starved krill, and the effects of removing lipid were not uniform between the tissues. To test whether wild krill showed similar variation we caught adult female krill during the summer of 2003/04 and processed them in the same way. In most cases $\delta^{13}\text{C}$ was not significantly different between tissues, while $\delta^{15}\text{N}$ varied between tissues, both before and after lipid removal. Our results suggest that while interpreting $\delta^{13}\text{C}$ values is relatively unambiguous, elucidating food web structure via $\delta^{15}\text{N}$ requires some caution.