Simulated light regimes affect feeding and metabolism of Antarctic krill, Euphausia superba

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ABSTRACT: The effect of different light regimes on physiological parameters (feeding activity, oxygen consumption, and activity of the metabolic enzyme malate dehydrogenase [MDH]) of Antarctic krill, *Euphausia superba*, was studied over 12 weeks under laboratory conditions. Krill were exposed to light-cycle regimes of variable intensity to simulate Southern Ocean summer, autumn, and winter conditions, respectively, using: (1) continuous light (LL; 200 lux max), (2) 12-h light and 12-h darkness (LD 12 : 12; 50 lux max), and (3) continuous darkness (DD). In all experimental groups, the food concentration was kept at high levels (~ 800 µg C L^{-1}). Krill exposed to LL and LD 12 : 12 showed an increase in all measured parameters over the experimental period. Physiological parameters of krill held under LD 12 : 12 showed a more consistent increase and remained below those of krill held under LL. No change was recorded for krill exposed to DD; clearance rates and daily C rations did not respond to the high food availability, and oxygen consumption rates and MDH activity were significantly lower ($p < 0.05$) than those of krill exposed to summer light condition. Thus, changes in the environmental light regime have an important effect on physiological parameters of krill, such as feeding and metabolic rates, and may indicate an inherent overwinter adaptation strategy triggered by the Antarctic light regime.