

LONG-TERM FEEDING EXPERIMENTS: HOW DOES HERBIVORY VERSUS CARNIVORY AFFECT KRILL CONDITION?

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Growth and maturation of the Antarctic krill, *Euphausia superba*, are closely linked to the quality and quantity of their food supply. In the wild, early krill maturation is favoured in years when the food supply is good, as these conditions promote gonadal development and spawning. In poor-food years, maturation can be delayed, resulting in a limited time for offspring to develop to a viable stage and condition to survive the winter. While krill are predominantly herbivorous, the addition of heterotrophic material to their diet might be crucial to their growth and survival. To compare the influence of herbivory and carnivory on the condition of krill we conducted long-term (9 months), laboratory-controlled feeding trials. We examined differences in mortality rates, tissue mass and lipid compositions of krill kept on one of three diets: (1) low diatom concentrations, (2) high diatom concentrations, and (3) a mixture of diatoms and minced bivalves (clams). Over 9 months krill mortality was similar for krill maintained on all three diets. Dry mass of two major organs, the digestive gland and the abdomen, increased significantly on the mixed diet. Lipid class and fatty acid profiles were examined, with emphasis placed on the ratio of storage (triacylglycerol, TAG) to structural (phospholipid, PL) lipid and key essential omega-3 polyunsaturated fatty acids, PUFA: 20:5 (EPA), 22:6 (DHA). The TAG : PL ratio increased in krill on the mixed diet, as did the EPA : DHA ratio. Overall, these findings indicate that provision of clams in the diet improved krill condition over the 9 month feeding trial, while increasing the diatom concentration alone appeared to have no effect. This suggests that heterotrophic input into krill diets might be a fundamental requirement for maintaining optimal fitness in this species.