A Comparative Study of the faecal microbiota of grey seal (Halichoerus grypus) pups and yearlings - a marine mammal sentinel species

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Abstract

Grey seals (Halichoerus grypus) can act as sentinel species reflecting the condition of the environment they inhabit. Our previous research identified strains of pathogenic Campylobacter and Salmonella, originating from both human and agricultural animal hosts, on rectal swabs from live grey seal (Halichoerus grypus) pups and yearlings on the Isle of May, Scotland, UK. We examined rectal swabs from the same pup (n=90) and yearling (n=19) grey seals to gain further understanding into the effects of age-related changes (pup versus yearling) and three different natal terrestrial habitats on seal pup faecal microbiota. DNA was extracted from a subset of rectal swabs (pups n=23, yearlings n=9) using an optimised procedure, and the V4 region of 16S rDNA sequenced to identify each individual's microbiota. Diversity in pup samples was lower (3.92 ± 0.19) than yearlings (4.66 ± 0.39) although not significant at the p=0.05 level ($p = 0.062$), but differences in composition of the microbiota were ($p < 0.001$). Similarly, differences between the composition of the microbiota from pups from three different terrestrial habitats (PH, RR and TS) was highly significant ($p < 0.001$). Pairwise tests showed significant differences between all three habitats: PH vs TS ($p = 0.019$), PH vs RR ($p = 0.042$) and TS vs RR ($p = 0.020$). This preliminary study suggests a general trend, that seal microbiomes are modified by both age and, in pups, different terrestrial habitats. Furthermore, knowledge of the microbiota species present has the potential to be used in determining the environmental quality index.

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