

Fatty acid and sterol composition of frozen and freeze-dried New Zealand green lipped mussel (*Perna canaliculus*) from three sites in New Zealand

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Omega-3 polyunsaturated fatty acids (n-3 PUFA), particularly docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) from fish oil have been widely investigated in terms of their beneficial effect on certain risk factors for cardiovascular disease and for reducing the symptoms of inflammatory diseases in humans. Lipids from the New Zealand Green Lipped Mussel (NZGLM) have been reported to possess anti-inflammatory activity *in vitro* and *in vivo* (1–3). The anti-inflammatory activity has been reported to reside in either the free fatty acid (FFA) fraction with fatty acids containing four, five and six double bonds, or sterols, or a polysaccharide fraction (3–4). In view of previously reported anti-inflammatory bioactivity of the NZGLM, the overall lipid profile and fatty acid and sterol composition of the NZGLM from various sites in New Zealand were investigated using thin layer chromatography (TLC) and gas liquid chromatography (GLC). Samples were either frozen (F) or freeze-dried (FD) soon after collection. It was also thought prior to the study, there may be differences in the dietary sources of phytoplankton between the sites, responsible for the bioactivity, however data collected in New Zealand reported no difference in the type of phytoplankton, but a difference in the quantity. There were no major significant differences in the major components of the lipid, fatty acid and sterol composition between FD or frozen samples, nor were there any significant differences in the major composition between sites. The only major difference was between total lipid composition of the freeze-dried and frozen samples due to the removal of water during freeze-drying.

Total lipid content on a dry weight basis in FD samples was significantly higher than frozen samples ($P < 0.05$) and there was no significant site variation. Triglyceride lipid fraction appeared to be the most prominent in the frozen and FD samples. The FFA band was the next most prominent band and was visually more prominent in the frozen samples. Sterol esters were detected in higher amounts in the frozen samples compared with the FD samples.

Polyunsaturated fatty acids were the main group of fatty acids in both frozen and FD samples (45–46%), most of which were n-3 PUFA (39–41%). Saturated fatty acids accounted for approximately one quarter of total fatty acids, with little variation between FD and frozen samples. The major fatty acids of the NZGLM were DHA (19% in both FD and frozen samples), EPA (15% in both FD and frozen samples) and palmitic acid in the FD sample (15%). Cholesterol was the most prominent sterol (31% of total sterols). This study is unique as it compares the lipid composition of the NZGLM from three sites in New Zealand with the additional effect of processing. This study showed that there were no major significant differences in lipid, sterol and fatty acid composition between the FD and frozen samples of the NZGLM for three sites in New Zealand. Food chain studies and further research is warranted to investigate the presence and role of major and minor lipid components of the NZGLM.

References

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