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The effect of diet on gonad and muscle condition in farmed broodstock pāua

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Diet is a key factor influencing the physiological conditions, growth and reproductive success of abalone. While macroalgae reflects their natural diet, formulated feeds provide balanced and targeted nutrition (Li et al., 2024). In aquaculture, broodstock abalone are fed formulated feeds as these offer consistent optimised nutrition, convenience and reduced risks (Bullon, Seyfoddin, & Alfaro, 2023). Data on the dietary effects on pāua condition remain limited and can inform feed optimisation for broodstock. This study evaluated the gonad and muscle profiles of farmed broodstock pāua following a three-month feeding trial using: 1) formulated feed supplemented with amino acids, 2) feed supplemented with spirulina (SP), and 3) a fresh seaweed (FS) diet. This study compared fatty acid profiles and oocyte quality in male and female pāua under different dietary interventions in a farm setting to support farm practises. The results showed higher saturated fatty acids in the muscle of pāua consuming the FS diet. In gonad tissue females fed FS showed increased saturated and monounsaturated fatty acids. Polyunsaturated fatty acids (PUFAs) were enhanced in male and female abalone consuming the SP diet. Histological analysis indicated higher counts of normal oocytes in pāua fed formulated feeds, likely due to the more balanced nutritional profiles. In conclusion, the FS diet supported muscle tissue fatty acid profiles, while the SP diet promoted higher gonadal PUFAs. Female pāua exhibited higher gonadal fatty acid levels than males across all treatments. These findings suggest that a combined feeding strategy incorporating fresh seaweed and formulated feeds may optimise broodstock condition and reproductive performance. This work contributes to identifying optimal broodstock diets and supports the long-term sustainability of pāua aquaculture by improving broodstock condition, which is an essential factor for successful spawning of the next generation of pāua and enhanced gamete quality.

Keywords
Abalone, Nutrition, Aquaculture, Fatty acids, Histology.

References

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