

7 Synergistic Effects of Feed Types and Feeding Strategies

7.1 Fresh versus formulated feed

Fresh trash fish remains the dominant feed in mud crab fattening because it is familiar to farmers, protein-rich, and often profitable under short production cycles. Several studies nevertheless identify clear operational weaknesses of this strategy, including unstable supply, seasonality, short shelf life, disease-transfer concerns, and deterioration of water quality when wet feeds are poorly handled (Hadi et al., 2024). In direct fattening comparisons, trash fish also does not consistently produce the best biological response, since alternative fresh feeds such as chicken intestine or African land snail sometimes generated better growth or feed conversion than low-value fish controls.

Formulated feeds, by contrast, are being developed to improve storage stability, handling convenience, and nutritional control, even though their growth advantage over trash fish is still inconsistent. A 30-day fattening trial using dry pellets made from fishery and seafood by-products found that one formulation improved growth response and meat protein content, whereas the trash fish control still achieved better feed and protein efficiency and remained more profitable overall (Senarathna et al., 2021). Other formulation studies similarly reported that artificial diets did not significantly improve growth, molting, or feed efficiency when dietary protein was moderate or when water quality fluctuated strongly, indicating that formulation quality and culture conditions jointly determine whether pellets can replace fresh feeds effectively.

7.2 Mixed feeding and health outcomes

Mixed feeding modes appear promising because they can compensate for the nutritional limits of any single feed source while reducing dependence on trash fish alone. In silvofishery culture of *Scylla olivacea*, combining tilapia with blood clams produced much higher absolute growth and better production than single tilapia feeding, although survival remained similarly high across treatments at 93.33%-96.67% (Wahida et al., 2022). Broodstock evidence points in the same direction: mixed diets combining natural and artificial feeds generally improved spawning output, hatching success, survival, and final body weight relative to either diet alone.

The health value of mixed or diversified feeding lies not only in growth promotion but also in its effects on molting, tissue quality, and system stability. Feed diversification can lower nutritional gaps and reduce overreliance on a single raw material, which is important because mud crab performance depends on feed, rearing system, and environmental management as an integrated package (Diamahesa and Rahmadani, 2024). Related feeding trials also show that improved diet design can raise meat quality or functional performance even when gross growth differences are small, as seen in iso-protein diets where growth was unchanged but meat quality tended to improve in one carbohydrate-lipid ratio, and in formulated feeds supplemented with herbal extracts that increased feed utilization, growth, and molting response (Figure 3).

7.3 Feed quality and strategy matching

Optimizing feeding regimes therefore requires matching feed quality to biological stage, farming objective, and delivery method rather than searching for one universally superior diet. Evidence from formulated-feed studies suggests that mud crabs respond to relatively narrow nutritional windows: feeds around 32%-40% protein and roughly 6%-12% lipid have been associated with favorable growth, while a semi-moist broodstock diet containing 42% protein and 12% lipid produced the strongest somatic and reproductive gains in female mud crabs. At the same time, ingredient quality and physical form matter, because mangrove clam showed strong nutritional suitability as a basal ingredient and high-lipid semi-moist feeds were readily accepted with positive weight gain across treatments (Aaqillah-Amr et al., 2022).

Feeding strategy must also fit ration size, frequency, and pellet stability to the rearing environment. Review evidence indicates that trash fish at about 15% of body weight often gives strong growth and feed efficiency, whereas a raw-fish dosing trial found significant effects of ration level on absolute weight gain and specific growth rate (Annisa et al., 2024). However, feeding frequency in RAS did not significantly alter growth or survival in two recent studies, even though once-daily feeding maximized biological performance in one case and twice-daily feeding gave the best economic return in another, showing that strategy optimization should balance growth, labor, water quality, and