

This suggests that raising feed input can stimulate growth without always improving conversion efficiency proportionally.

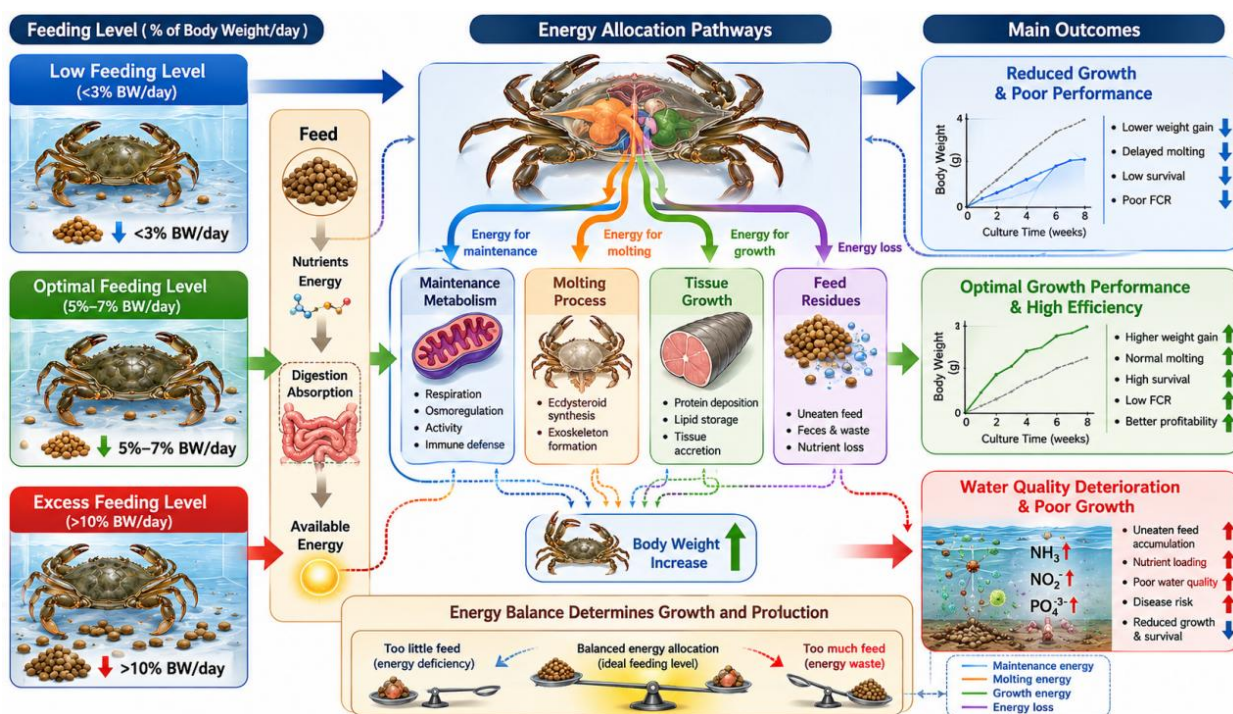


Figure 2 Conceptual model illustrating the effects of feeding level on nutrient allocation, molting activity, and growth performance in mud crab culture

Economic return therefore depends on matching feeding level with feed type and management system rather than simply maximizing ration. In a natural-feed comparison, African land snail produced the best FCR and the highest return on investment, reaching 96.8%, which indicates that biologically efficient feeding can also be financially superior. Another fattening study reported that trash fish achieved the lowest FCR among tested natural feeds and generated a positive ROI of 33.26%, supporting its continued use where supply is reliable (Andal et al., 2025). Operational studies in RAS add that feeding frequency affects labor economics even when biological performance is similar, since feeding twice daily produced the highest profit in one business analysis (Diatin et al., 2026). Feed cost remains the dominant expense in mud crab farming, so inefficient feeding regimes quickly erode margins even when survival is acceptable.

6.3 Risks associated with overfeeding and underfeeding

Both overfeeding and underfeeding impose clear risks on mud crab culture. Underfeeding suppresses growth and molting, while overfeeding promotes feed residue accumulation that can pollute the culture water. The same concern appears in RAS-based work, where inappropriate feeding is linked to slow growth, higher mortality, and declining water quality (Mayzuri et al., 2025). These outcomes are biologically plausible because mud crabs require sufficient digestible energy not only for maintenance but also for molting and tissue recovery; when intake is inadequate, available energy is diverted away from growth.

The practical consequences extend beyond growth depression to broader production instability. Excess residual feed can degrade the rearing environment, and the sustainability literature identifies water-quality deterioration as a recurring constraint that interacts with disease risk and survival across mud crab production systems. By contrast, several feeding studies reported acceptable survival when feeding was paired with water conditions kept within suitable ranges, indicating that feeding risk is partly mediated through environmental management rather than ration alone. Overall, the literature supports a moderate-feeding strategy: enough feed to sustain molting and growth, but not so much that unused feed accumulates, wastes money, and destabilizes culture conditions.