Evidence from other cultured fish further supports the view that system optimization can markedly alter growth and survival-related outcomes. In grass carp, the recirculating pond aquaculture system produced lower concentrations of ammonia, nitrite, and nitrate nitrogen than traditional ponds, while also improving growth rate and feed conversion, indicating that better environmental control can translate into more efficient production (Xu et al., 2025). In largemouth bass, a funnel-shaped recirculating aquaculture system generated significantly higher body weight and stronger antioxidant capacity than a traditional pond system, suggesting that improved hydrodynamics and water treatment can enhance both growth and physiological condition (Xu et al., 2025). Similar trends have also been reported in hybrid grouper, where fish reared in a recirculating aquaculture system showed better growth performance and lower *Vibrio* concentrations in tissues than fish in a simulated pond system, linking farming mode to both productivity and health protection. Although these studies involve species other than Chinese sea bass, they provide a strong comparative basis for expecting measurable effects of farming systems on growth performance and survival.

Against this background, evaluating the effects of different farming systems on Chinese sea bass is both scientifically necessary and practically valuable. Chinese sea bass aquaculture has advanced substantially, but the lack of integrated system-level assessment remains a barrier to the industry's high-quality development and to clearer identification of future goals (Huang et al., 2025). Experimental evidence in spotted sea bass already shows that environmental conditions characteristic of different systems, such as flow velocity, can shift growth, lipid metabolism, and oxidative stress responses, demonstrating that production settings can create biological trade-offs rather than simple uniform benefits (Li et al., 2023). Therefore, the present study aims to compare different farming systems for L. *maculatus* by focusing on growth performance and survival, with the broader goal of clarifying which culture conditions are more favorable for efficient and sustainable production. The scope of this study is to provide an evidence-based basis for farming system optimization in Chinese sea bass aquaculture and to contribute to the ongoing transition of the industry toward greater productivity, resilience, and environmental compatibility.

2 Biological Characteristics and Growth Requirements of *Lateolabrax maculatus*

2.1 Growth performance and feeding behavior characteristics

Lateolabrax maculatus is widely regarded as a promising aquaculture species because it combines rapid growth with broad farming applicability across marine and low-salinity systems (Huang et al., 2025). Growth performance in this species is strongly shaped by nutritional composition, especially dietary protein and lipid balance. Under controlled feeding trials, juveniles reared at 27 °C achieved their highest weight gain when diets contained about 47% crude protein, and feed conversion improved as protein level increased up to that point. Growth is also sensitive to dietary energy partitioning, because optimal protein-to-energy ratios differed with temperature, indicating that efficient tissue deposition depends on both feed formulation and the rearing environment rather than nutrient level alone (Lu et al., 2020).

Feeding behavior in Chinese sea bass shows a clear link to growth efficiency. Juveniles fed to apparent satiation two or three times daily displayed higher weight gain, specific growth rate, feed efficiency, and protein efficiency ratio than fish fed less frequently, while performance was not meaningfully improved beyond twice-daily feeding. Feed quality further modifies this response. Diets with an n-3/n-6 polyunsaturated fatty acid ratio near 0.66 produced the highest final body weight, weight gain, specific growth rate, and protein efficiency ratio, together with the lowest feed conversion ratio (Dong et al., 2023). Recent neuroendocrine evidence also indicates that feeding and growth are physiologically integrated, with temperature- and salinity-responsive stress pathways activating anorexigenic and growth-inhibitory signals that ultimately suppress intake and growth under unfavorable conditions (Li et al., 2023).

2.2 Environmental adaptability and stress response

Chinese sea bass is a euryhaline species with unusually broad salinity tolerance, which explains its suitability for culture in seawater cages, brackish environments, and freshwater ponds (Zhu et al., 2023). Available evidence indicates that the species can survive from freshwater to high-salinity seawater conditions, although growth is not