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Feeding Behaviour of Mud Crab *Scylla serrata*: A Comprehensive Review

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Abstract

The mud crab *Scylla serrata* is a commercially valuable portunid crab widely distributed throughout the Indo–West Pacific region. Its feeding behaviour plays a critical role in growth, survival, reproductive success, and ecosystem functioning, and is central to successful aquaculture and fattening practices. This review synthesizes available literature on the feeding habits, diet composition, feeding mechanisms, ontogenetic and sex-related variations, environmental influences, and feeding behaviour under captive conditions. Comparative tables summarize natural diets, feeding preferences, and behavioural patterns across life stages and habitats. Understanding the trophic ecology of *S. serrata* is essential for optimizing feed formulation, improving culture efficiency, and managing wild stocks sustainably.

***Keywords*:** *Scylla serrata*, Feeding Behavior, Growth, Survival.

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Introduction

Scylla serrata is an opportunistic benthic predator inhabiting mangrove forests, estuaries, and coastal lagoons. As a euryhaline and eurythermal species, it exhibits flexible feeding strategies that allow it to exploit a wide range of prey items. Feeding behaviour in *S. serrata* has been studied from ecological, physiological, and aquaculture perspectives, revealing strong links between diet, growth rate, moulting frequency, and reproductive output [1–3]. This review collates and critically evaluates existing knowledge on feeding behaviour, emphasizing comparative and applied aspects.

General Feeding Strategy

Mud crabs are omnivorous–carnivorous scavengers with a strong preference for animal prey. In natural environments, *S. serrata* functions as a mesopredator, feeding primarily on slow-moving or sessile benthic organisms, as well as carrion [2, 4]. Key characteristics of feeding strategy include: opportunistic predation, scavenging behaviour, nocturnal or crepuscular feeding peaks, strong chemosensory-driven food detection [5].

Natural Diet Composition

1 Major Food Items

Gut content analyses consistently show that *S. serrata* consumes a wide spectrum of prey, dominated by molluscs and crustaceans.

Table 01: Natural diet composition of *Scylla serrata* reported from different habitats.

Food category	Examples	Relative importance	References
Molluscs	Bivalves, gastropods	High	[2,6,7]
Crustaceans	Shrimps, small crabs	High	[3,8]
Fish	Small demersal fish, carcasses	Moderate	[4,9]
Polychaetes	Nereids, benthic worms	Moderate	[6]
Plant material	Mangrove detritus, algae	Low	[2,7]
Detritus	Organic debris	Low–moderate	[5]

Molluscs often dominate the diet due to their abundance in mangrove ecosystems and the crab's strong chelae adapted for shell crushing [6].

Feeding Mechanism and Behaviour

1. Prey Detection and Capture

Scylla serrata relies heavily on chemoreception, using antennules and maxillipeds to detect dissolved chemical cues from prey [5]. Visual cues play a secondary role, particularly in turbid estuarine waters.

2. Handling and Ingestion

Large chelae are used for grasping and crushing prey. Smaller chela manipulates food towards the mandibles and Hard parts (shells) are discarded prior to ingestion [6].

Ontogenetic and Sex-Related Variations

1 Ontogenetic Shifts

Diet composition changes with size and developmental stage.

Table 02: Ontogenetic variation in feeding behaviour of *Scylla serrata.*

Life stage	Dominant diet	Feeding characteristics	References
Larvae (zoea)	Phytoplankton, microzooplankton	Filter feeding	[10]
Megalopa	Small crustaceans, detritus	Transition to benthic feeding	[10,11]
Juveniles	Polychaetes, small molluscs	Active predation	[3,6]
Adults	Molluscs, crustaceans, fish	Opportunistic carnivory	[2,4]

2. Sex and Reproductive Condition

Females, especially berried females, may reduce feeding activity during late ovarian maturation [12] and males generally exhibit higher feeding rates and aggression, particularly during mating periods [3].

Environmental Influences on Feeding Behaviour

1. Salinity and Temperature

Feeding activity is optimal between 15–30 ppt salinity and 26–32 °C. Extreme salinity or temperature stress significantly reduces food intake [13].

2. Tidal and Diel Rhythms

Feeding peaks during high tide and night-time and reduced activity during low tide and daylight hours [5,14].

Feeding Behaviour in Captivity and Aquaculture

1. Feed Preference

In captivity, *S. serrata* readily accepts natural and formulated feeds.

Table 03: Feed preference of *Scylla serrata* under captive conditions.

Feed type	Acceptance	Growth performance	References
Trash fish	Very high	Excellent	[15]
Bivalve meat	High	Good	[16]
Shrimp waste	High	Good	[17]
Pellet feeds	Moderate–high	Variable	[18]

2. Feeding Rate and Cannibalism

Overfeeding reduces aggression, underfeeding increases cannibalism, especially during moulting [15] and individual feeding or shelter provision reduces mortality in culture systems [19].

Ecological and Aquaculture Implications

The feeding behaviour of *S. serrata* influences benthic community structure through predation on molluscs and crustaceans. In aquaculture, understanding feeding rhythms, preferences, and nutritional requirements is essential for:Reducing feed waste, minimizing cannibalism, enhancing growth and meat quality and improving fattening efficiency [15,18].

Conclusions

Scylla serrata exhibits flexible, opportunistic feeding behaviour shaped by ontogeny, sex, environmental conditions, and food availability. Its carnivorous–omnivorous diet, strong prey-handling abilities, and chemosensory-driven foraging make it a successful estuarine predator. Comparative understanding of feeding behaviour provides a foundation for improved feed formulation, sustainable aquaculture practices, and ecosystem-based management of wild populations.

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