



Temporal Variation in Feeding Patterns and Its Association with Nematode Occurrence in the Oriental Sole, *Brachirus orientalis*, from Iraqi Marine Waters

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ABSTRACT

The feeding ecology of benthic fishes such as *Brachirus orientalis* is influenced by prey availability, environmental conditions, and parasitic infection. However, relationships among diet, feeding intensity, and parasitic infection in *B. orientalis* from Iraqi marine waters remain poorly understood. This study evaluated monthly variation in diet and feeding intensity of *B. orientalis* and explored their associations with nematode occurrence and selected environmental parameters. A total of 209 specimens were collected monthly from the Al-Faw coastal area of the Arabian Gulf, southern Iraq, over nine consecutive months (January–September). Feeding intensity was assessed using the Hynes stomach-fullness method, whereas diet composition was evaluated by frequency of occurrence and numerical and volumetric contributions of food items. All fish were examined for parasites, and prevalence, mean intensity, and mean abundance were calculated. Water temperature, salinity, and pH were recorded for each sampling period. Associations among feeding, dietary, environmental, and parasitological variables were assessed using Spearman's rank correlation. Feeding activity ranged from 73.0% in January to 100% in May, whereas the stomach-fullness index ranged from 2.0 to 3.8 among months. Crustaceans and mollusks were the principal dietary components, although their relative contributions varied substantially among months. Nematodes were detected in 6 of 209 fish, corresponding to an overall prevalence of 2.87%, a mean intensity of 1.33, and a mean abundance of 0.038. Infection occurred only in January, May, and September, with monthly prevalences of 7.69%, 11.11%, and 10.00%, respectively. Parasite prevalence was not significantly correlated with feeding activity, stomach fullness, or the measured environmental parameters. Only the volumetric contribution of mollusks was significantly and negatively correlated with parasite prevalence ($r_s = -0.753$, $p = 0.019$). In conclusion, feeding activity and diet composition of *B. orientalis* varied temporally, whereas nematode infection was rare and was not significantly associated with feeding intensity or the measured environmental parameters. The negative association between mollusk consumption and parasite prevalence should be regarded as hypothesis-generating and requires confirmation in larger, individual-level studies.

INTRODUCTION

Fish are an important component of aquatic ecosystems and are a major source of animal protein. Feeding ecology is influenced by habitat, prey availability, environmental conditions and seasonal variation. Benthic marine fish are highly dependent on sediment associated organisms and the benthic food web in benthic marine environments, and hence changes in prey availability can be important for their feeding activity and ecological interactions (Alhamadany *et al.*, 2021; Mohamed *et al.*, 2021). Flatfishes are important elements of benthic communities in coastal and marine environments, and are usually associated with sandy and muddy substrates. Their feeding behavior corresponds to the availability of benthic prey and may vary depending on environmental conditions, habitat, fish size and season. Therefore, knowledge on the feeding ecology of these species is important to describe their ecological role and position in marine food webs (Hunt *et al.*, 2023). The oriental sole, *Brachirus orientalis*, is a demersal flatfish species distributed in the Indian Ocean, Red Sea, Persian Gulf and adjacent marine waters. Found mostly on sandy and muddy substrates, it is regularly caught in coastal fisheries. The species is known from the northern Persian Gulf and is a benthic feeder. Some aspects of its feeding behavior and reproductive features have been studied in recent studies on its biology, indicating that *B. orientalis* has a significant role in the coastal fish assemblage of the Persian Gulf (Alghada *et al.*, 2020; Pourmohammad *et al.*, 2021). Feeding studies of *Brachirus orientalis* from the Bushehr coast of the Persian Gulf revealed that the diet was dominated by benthic invertebrates, particularly crustaceans and mollusks (including bivalves and gastropods). The vacuity index was significantly different among months in a study of 300 specimens indicating temporal variation in feeding activity (Alghada *et al.*, 2020). The analysis of stomach or gastrointestinal contents is a common method used to investigate fish feeding ecology because it gives direct information on prey identity, frequency of occurrence, abundance, and relative dietary contribution (Rijal *et al.*, 2024; Taha *et al.*, 2026). However, the difference in prey digestibility and methodological differences between dietary indices should be considered when interpreting stomach-content data (Manko, 2016). Feeding intensity is another measure of the feeding ecology of fish, and may vary according to season, availability of prey, environmental conditions and physiological requirements. Thus, the fullness of the stomach and the percentage of empty stomachs may provide useful measures of temporal variation in feeding activity. Previous work on *B. orientalis* in the Persian Gulf showed high monthly variation in stomach vacuity, supporting the importance of temporal sampling in assessing the feeding ecology of this species (Vigneshwaran *et al.*, 2020; Khorsheed *et al.*, 2026). Apart from their nutritional importance, prey organisms may play an important role in the transmission of parasites among marine fish (Buchmann & Karami, 2024). Many metazoan parasites have complex life cycles with intermediate or paratenic hosts. Fish can become infected by eating infected prey. Thus, the composition of the diet may influence the likelihood of exposure to particular groups of parasites. Recent studies have revealed the correlations between fish feeding ecology and

endoparasite assemblages. Differences in dietary categories have been linked with differences in parasite assemblages among marine fishes. These relationships emphasize the significance of taking trophic interactions into account in studies of parasite transmission in fish populations (Koepper *et al.*, 2022; Baldawi *et al.*, 2026). Importantly, recent studies from southern Iraq have provided morphological evidence of infection with *Huffmanella* sp. in *B. orientalis*, showing that this fish can be a host for nematode parasites in Iraqi marine waters (Al-Mansury *et al.*, 2025). The reported finding contributes to the evidence for the significance of investigating the parasite fauna of this species and its ecological associations in the northern Arabian Gulf (Mhaisen *et al.*, 2018; Gul, 2020). The feeding biology of *B. orientalis* and the occurrence of parasites have been studied separately in the past, but the relationship between the dietary composition, feeding intensity, environmental conditions and parasitic infection in this host has not been extensively investigated in the marine waters of Iraq (Bannai, 2022). Recent research on *B. orientalis* from Iraqi waters has likewise documented seasonal feeding dynamics together with parasitological and tissue-level responses, providing direct regional support for integrating trophic and parasite observations in this species (Khorsheed *et al.*, 2026). Accordingly, the present study was conducted to investigate the seasonal variation in dietary composition and feeding intensity of *Brachirus orientalis* in Iraqi marine waters and to evaluate their relationships with the prevalence, intensity, and abundance of parasitic infection. The main dietary components, particularly crustaceans and mollusks, and their potential association with seasonal variations in parasitic infection were specifically studied. Selected environmental variables (water temperature, salinity, and pH) were also included in the study to give further ecological context to the observed seasonal patterns.

MATERIALS AND METHODS

Study Area

The study was conducted in Iraqi marine waters of the Arabian Gulf, southern Iraq. Fish samples were collected from the coastal waters of the Al-Faw area, where sandy and muddy substrates provide suitable habitats for benthic fish and their associated prey organisms. The sampling site was located in the southern Iraqi coastal region of the Arabian Gulf. Fish were collected monthly from January through September.

Fish Collection

A total of 209 specimens of *Brachirus orientalis* were collected during nine consecutive monthly sampling periods from January to September. Fish were obtained from the coastal area of Al-Faw using commercial fishing nets. Monthly sample sizes were 26 in January, 28 in February, 27 in March, 30 in April, 18 in May, 18 in June, 21 in July, 21 in August, and 20 in September. Samples were transported to the laboratory for examination. Sampling date, fish identification number, total length, and body weight

were recorded for each specimen, after which the fish were examined morphometrically, for diet, and parasitologically.

Morphometric Measurements

The total length and body weight of each fish were measured before dissection. Total length was measured to the nearest 1 mm, and body weight was recorded in grams. These measurements were used to characterize the sampled population of *B. orientalis*.

Assessment of Feeding Intensity

Each fish was opened by a longitudinal incision along the ventral surface from the posterior region of the gills to the anal opening. The gastrointestinal tract was carefully removed and examined for fullness. Stomach fullness was assessed using the Hynes stomach-fullness method. The categories were full, three-quarter full, half-full, one-quarter full, nearly empty, trace/very small food content, and empty, with scores of 100, 75, 50, 25, 12, 6, and 0, respectively. Feeding activity was expressed as the percentage of fish containing food, whereas the stomach-fullness index was calculated by dividing the total fullness score by the number of fish containing food. These measures were summarized for each monthly sampling period.

Diet Composition Analysis

Gastrointestinal contents were examined fresh under a stereomicroscope. Food items were sorted according to recognizable morphological characteristics and assigned to the lowest taxonomic level that could be identified reliably. Because some material was partially digested, quantitative analysis was performed using broad identifiable groups retained in the dataset, particularly fish remains, crustaceans, and mollusks. Empty gastrointestinal tracts were recorded separately and excluded from diet-composition calculations.

Quantitative Analysis of Dietary Composition

The frequency of occurrence was calculated as:

$$F(\%) = \frac{n_i}{N} \times 100$$

where n_i is the number of non-empty gastrointestinal tracts in which food item i was found, and N is the total number of non-empty gastrointestinal tracts examined.

The numerical contribution was computed as:

$$N(\%) = \frac{n_i}{\sum n} \times 100$$

where n_i is the number of individuals in a given food category, and $\sum n$ is the total number of identified food organisms.

The volumetric contribution was estimated as:

$$V(\%) = \frac{v_i}{\sum v} \times 100$$

where v_i is the volume of a particular food category and $\sum v$ is the total volume of all identified food items. These indices were used to assess the relative importance and monthly variation of the major dietary components of *B. orientalis*.

Parasitological Examination

A systematic parasitological examination was performed on each fish. The external body surface, fins, gills, buccal cavity, body cavity, gastrointestinal tract, liver, spleen, and other internal organs were inspected. The gastrointestinal tract and other organs were examined while fresh for visible parasitic material. Recovered parasites were removed with fine dissecting needles and placed in physiological saline, and the number recovered from each infected fish was recorded. Following fresh examination, relevant tissues and parasitic material were preserved in 10% formalin for subsequent detailed observation.

Conventional Morphological Identification of Nematode Parasites

Recovered parasitic material included nematode worms and egg stages. Material was examined macroscopically and under a stereomicroscope, and suspected nematode structures were further examined using a compound microscope. Because molecular identification was not performed and the available material did not provide sufficient diagnostic evidence for reliable genus- or species-level assignment, the parasites recovered in the present study are reported conservatively as Nematoda. *Huffmanella* is discussed only as a taxon previously reported from *B. orientalis* and other Arabian Gulf fishes and is not presented as the confirmed identity of the present specimens.

Parasitological Indices

The prevalence, mean intensity and mean abundance of each parasite detected were calculated.

Prevalence was estimated as:

$$\text{Prevalence (\%)} = \frac{\text{Number of infected fish}}{\text{Total number of fish examined}} \times 100$$

$$\text{Mean intensity} = \frac{\text{Total number of parasites}}{\text{Number of infected fish}}$$

$$\text{Mean abundance} = \frac{\text{Total number of parasites}}{\text{Total number of fish examined}}$$

Parasitological indices were calculated for the entire study period and separately for each monthly sampling period.

Environmental Parameters

Water temperature, salinity, and pH were measured during each monthly sampling period to characterize seasonal environmental conditions in the study area. Water temperature ranged from 15 to 34 °C, salinity from 36.7 to 43.5‰, and pH from 7.6 to 8.0. These environmental parameters were examined in relation to monthly variation in feeding activity and parasitic infection to provide ecological context for the observed seasonal patterns.

Relationship Between Diet and Parasitic Infection

Dietary and parasitological observations from the same fish population were compared to explore possible ecological associations. Monthly parasite prevalence was compared with feeding activity, stomach fullness, the relative contribution of the principal dietary groups, and environmental variables. Because complete individual-level raw data were unavailable for the full dataset of 209 fish, diet–parasite associations were analyzed using monthly summarized observations rather than treating all fish as independent observations.

Statistical Analysis

Statistical analyses were used to describe monthly variation in feeding, diet, environmental variables, and nematode occurrence. Monthly differences in prevalence were assessed using chi-square or Fisher's exact tests, as appropriate. Spearman's rank correlation was used to explore associations between monthly parasite prevalence and feeding, dietary, and environmental variables. For these correlations, the sampling month was the statistical unit, yielding nine observations. This limitation is important because only six infected fish were detected overall. Statistical significance was set at $p < 0.05$, but correlation results were interpreted as exploratory rather than confirmatory.

RESULTS AND DISCUSSION

Monthly Variation in Feeding Intensity and Feeding Activity

A total of 209 *Brachirus orientalis* specimens were examined across nine monthly sampling periods. Monthly sample size ranged from 18 to 30 fish. Empty gastrointestinal tracts were most frequent in January (26.9%), followed by September (25.0%) and July (19.0%), whereas no empty tracts were recorded in May. Feeding activity was highest in May (100.0%) and lowest in January (73.0%). The stomach-fullness index ranged from 2.0 in March to 3.8 in June. These findings demonstrate clear monthly variation in feeding condition, although the pattern did not represent a simple progressive seasonal increase or decrease.

Table 1. Monthly fluctuations in the satiety index (feeding intensity) and feeding rate of *Brachirus orientalis*.

Months	Number of Fish Examined	Number of Empty Stomachs	Percentage of Empty Stomachs	Total Stomach Fullness Score	Number of Full Stomachs	Stomach Fullness Index	Feeding Activity
January	26	7	26.9	53	19	2.7	73
February	28	2	7.1	86	26	3.3	92.8
March	27	1	3.7	53.5	26	2	96.9
April	30	3	10	64	27	2.3	90
May	18	0	0	47	18	2.6	100
June	18	1	5.5	66	17	3.8	94.4
July	21	4	19	44	17	2.5	80.9
August	21	3	14.2	39	18	2.1	85.7
September	20	5	25	39	15	2.6	75

Monthly Variation in Parasitic Infection

Nematodes were detected in 6 of the 209 examined fish, corresponding to an overall prevalence of 2.87%. Eight nematode specimens were recovered, giving a mean intensity of 1.33 parasites per infected fish and a mean abundance of 0.038 parasites per examined fish. Infection was recorded only in January, May, and September, with monthly prevalences of 7.69%, 11.11%, and 10.00%, respectively. Because the number of infected fish was small, these monthly values should be interpreted as occurrence observations rather than evidence of a stable seasonal cycle.

Table 2. Monthly changes in parasitic infection and infection intensity in *Brachirus orientalis*.

Month	Fish examined	Fish Infected	Parasites recovered	Parasite type	Prevalence (%)	Intensity of infection	Mean intensity	Mean abundance
January	26	2	3	Nematode	7.69	1.5	1.50	0.115
February	28	0	0	-	0	0	0	0.000
March	27	0	0	-	0	0	0	0.000
April	30	0	0	-	0	0	0	0.000
May	18	2	2	Nematode	11.11	1	1.00	0.111

June	18	0	0	-	0	0	0	0.000
July	21	0	0	-	0	0	0	0.000
August	21	0	0	-	0	0	0	0.000
September	20	2	3	Nematode	10.00	1.5	1.50	0.150

Monthly Variation in Environmental Parameters

Water temperature increased from 15 °C in January to 34 °C in July and August before declining to 32 °C in September. Salinity ranged from 36.7‰ in February to 43.5‰ in August, whereas pH declined from 8.0 during January–March to 7.6 in September. These measurements demonstrate marked environmental variation during the sampling period but do not, by themselves, establish that the measured variables controlled feeding or parasite occurrence.

Table 3. Monthly variation in water temperature, salinity, and pH in Iraqi marine waters.

Month	Temperature	Salinity	Ph
January	15	37.2	8
February	16	36.7	8
March	19	37.3	8
April	24	38	7.9
May	28	39.5	7.9
June	31	41	7.8
July	34	42.7	7.7
August	34	43.5	7.7
September	32	42	7.6

Monthly Variation in Dietary Composition

Gastrointestinal-content analysis showed that *B. orientalis* consumed several identifiable food categories, particularly fish remains, crustaceans, and mollusks. Fish remains occurred mainly in March, May, June, and July and reached their highest volumetric contribution in May (21.3%). Crustaceans occurred in all nine months, with volumetric contribution ranging from 1.1% in May to 9.4% in February. Mollusks

Diet, Feeding, and Parasites *Brachirus orientalis*

showed greater month-to-month variation, with volumetric contribution ranging from 0% in September to 9.0% in August. Differences among volumetric, numerical, and frequency measures indicate that the apparent importance of a prey group depended on the metric used.

Table 4. Monthly variation in dietary composition of *Brachirus orientalis* based on volumetric contribution, numerical contribution, and frequency of occurrence.

Month	Fish N.	Feeding fish	Fish			Crustaceans			Mollusks		
			Volumetric Contribution	Numerical Contribution	Frequency of Occurrence	Volumetric Contribution	Numerical Contribution	Frequency of Occurrence	Volumetric Contribution	Numerical Contribution	Frequency of Occurrence
January	26	19	0	0	0	5.8	10.5	6.2	0.9	18.9	15.7
February	28	26	0	0	0	9.4	5.9	19.2	4.1	8	6.2
March	27	26	6.7	4.4	11.5	2.6	4.2	7.6	2.5	14.9	19.2
April	30	27	0	0	0	6.4	14.2	28.5	4.5	9.4	8
May	18	18	21.3	9.8	14.7	1.1	5.7	11.1	0.3	3.9	9.2
June	18	17	7	3.5	6.9	2.2	11.1	5.8	5.6	35.7	27.5
July	21	17	13.2	4.5	11.1	7.2	40	11.7	0.5	6	7.4
August	21	18	0	0	0	9	6.9	11.1	9	15	20
September	20	15	0	0	0	4.1	5	6.6	0	0	0

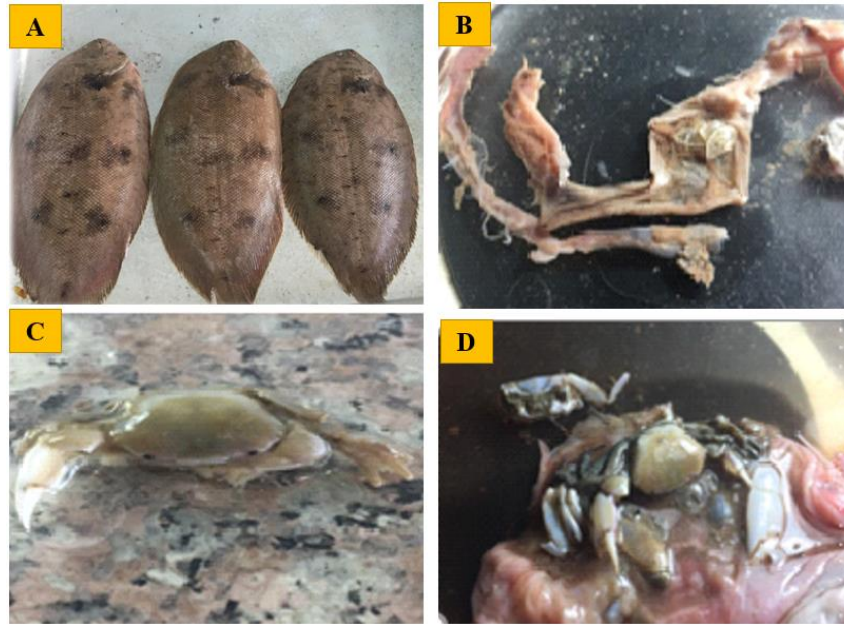


Fig. 1. Food components identified from the gastrointestinal tract of *Brachirus orientalis*.

Statistical Analysis of Feeding Activity

As an exploratory analysis, monthly feeding activity and monthly nematode prevalence were compared using Spearman's rank correlation. Feeding activity was not significantly associated with prevalence ($r_s = -0.109$, $p = 0.780$), and the stomach-fullness index was likewise not significantly associated with prevalence ($r_s = 0.239$, $p = 0.536$). Because these analyses were based on only nine monthly observations, the absence of statistical significance should not be interpreted as evidence that feeding has no role in parasite exposure.

Relationship Between Environmental Parameters and Parasite Prevalence

Spearman's analysis showed no significant association between monthly nematode prevalence and temperature ($r_s = -0.099$, $p = 0.799$), salinity ($r_s = -0.030$, $p = 0.940$), or pH ($r_s = -0.097$, $p = 0.805$). Thus, within the nine-month study period, none of the measured environmental variables showed a detectable monthly association with nematode prevalence.

Relationship Between Dietary Composition and Parasite Prevalence

Exploratory analysis showed no significant association between fish-remain contribution and prevalence for volumetric, numerical, or frequency measures. Crustacean contribution was also not significantly associated with prevalence for any of the three measures. Mollusk volumetric contribution showed a significant negative association with prevalence ($r_s = -0.753$, $p = 0.019$), whereas mollusk numerical contribution ($r_s = -0.475$, $p = 0.196$) and frequency of occurrence ($r_s = -0.287$, $p = 0.454$)

were not significant. The volumetric result should be interpreted cautiously because the analysis was based on nine monthly observations and only six infected fish.

Overall Interpretation

Taken together, the evidence supports a cautious ecological interpretation. Monthly feeding condition and prey composition varied in *Brachirus orientalis*, whereas nematode infection was rare and irregularly distributed during the sampling period. The association involving mollusk volume was the clearest statistical signal, but it remains exploratory. This interpretation preserves the internal consistency of the study and avoids proposing mechanisms that the available data cannot support.

Comparison with previous work

The present feeding results broadly agree with **Alghada *et al.* (2020)**, who reported crustaceans and mollusks as important components of the diet of *B. orientalis* on the Bushehr coast. Differences in the magnitude of monthly values are expected because sampling sites, years, prey availability, and environmental conditions differ. The reproductive studies of **Pourmohammad *et al.* (2021)** and **Al-Niaeem *et al.* (2026)** also provide useful regional context because seasonal biological activity may influence energy allocation and feeding. Reproductive status was not measured in the present study and should therefore be considered a possible background factor rather than an explanation demonstrated by these data. Related studies also show that dietary composition can influence tissue-level and physiological responses in fish, reinforcing the value of interpreting feeding ecology together with broader indicators of organismal condition (**Baldawi *et al.*, 2026**).

Mollusk Contribution and Nematode Prevalence

The negative association between mollusk volumetric contribution and prevalence was the strongest dietary signal. However, several features argue against a causal interpretation. First, the relationship was detected for volumetric contribution but not for numerical contribution or frequency of occurrence. Second, the effective sample size was nine monthly observations. Third, only six fish were infected. Fourth, the study did not examine mollusks as potential intermediate or paratenic hosts. The result therefore indicates only that months with greater mollusk volume tended to coincide with lower nematode prevalence; it does not demonstrate that mollusks prevented infection, reduced transmission, or acted as non-hosts.

Environmental Variables

Temperature, salinity, and pH changed considerably across the study period, but none showed a significant association with monthly prevalence. This finding should be interpreted narrowly and does not imply that environmental conditions have no influence on nematodes. Environmental factors may act indirectly by altering the abundance or distribution of intermediate hosts and other prey organisms. The present analysis simply

did not detect a monthly association within nine observations. The small number of infected fish further limited the statistical power to detect weak environmental relationships.

Feeding Intensity and Nematode Prevalence

Neither feeding activity nor stomach fullness was significantly associated with nematode prevalence. This does not exclude a role for feeding in parasite exposure. A fish may consume a large quantity of food without consuming the specific prey that carries an infective stage. Conversely, infection may persist after the relevant prey has passed through the digestive tract. Trophically transmitted parasites depend on specific food-web pathways, and the presence of a prey group in the stomach is not sufficient to demonstrate its participation in transmission (Marcogliese, 2002; Lagrue *et al.*, 2011; Shnawa *et al.*, 2026).

Parasite Identification and the *Huffmanella* Issue

A recent Iraqi report documented *Huffmanella* sp. in *B. orientalis*, and other *Huffmanella* records are available from Arabian Gulf fishes. These studies make the genus relevant to the regional parasitological context. However, the presence of *Huffmanella* in the same host or region does not establish the identity of the nematodes recovered in the present study. Without molecular confirmation or sufficiently diagnostic morphological evidence, assigning the present material to *Huffmanella* would be unnecessarily strong. Reporting the parasites as Nematoda is therefore the more defensible approach. This distinction is important because the ecological association reported here does not require species-level identification to be informative, whereas any species-level claim would require direct evidence.

Nematode Occurrence

Nematodes were detected in six fish, with eight specimens recovered in total. The overall prevalence of 2.87% indicates that infection was uncommon in the sampled population. The occurrence of infection in three non-consecutive months does not, by itself, demonstrate a seasonal cycle. With only two infected fish in each positive month, a single additional infected fish would substantially alter monthly prevalence. The pattern is therefore better described as temporally uneven occurrence than as a confirmed seasonal cycle.

Condition of Food Remains and Interpretation

Some stomach contents were partially digested, limiting fine taxonomic identification and potentially influencing numerical estimates. This is a common limitation of conventional stomach-content analysis. Rather than assigning uncertain material to a detailed taxon, the present study retained broad prey categories that could be identified reliably. This conservative approach avoids false precision but also means that the study should be interpreted as a description of broad prey groups rather than a

species-level prey-selectivity analysis. Future work could improve prey identification through better-preserved material or DNA-based methods, particularly when food remains are highly digested (Rijal *et al.*, 2024).

Dietary Composition and Benthic Feeding

Crustaceans were present during all nine months, whereas mollusks and fish remains showed greater temporal variation. This pattern supports the general description of *B. orientalis* as a benthic feeder and is broadly consistent with previous work from the Persian Gulf, where crustaceans and mollusks were important dietary components (Alghada *et al.*, 2020; Jumma *et al.*, 2026). The present study also demonstrates why frequency, number, and volume should not be interpreted as equivalent measures. A prey group may occur in many fish but contribute little volume, or it may occur less frequently while making a relatively large contribution when present. The particularly high volumetric contribution of fish remains in May illustrates this distinction. Overall, the study combined feeding-ecology and parasitological observations in *B. orientalis* collected from Iraqi marine waters. The principal pattern was clear monthly variation in feeding condition and dietary composition, contrasted with a low and patchy occurrence of nematodes. The strongest statistical result was the negative relationship between mollusk volumetric contribution and monthly nematode prevalence. Because the analysis was based on nine monthly observations and only six infected fish, this relationship is best regarded as a hypothesis-generating ecological signal rather than a demonstrated biological mechanism.

Feeding Activity and Stomach Fullness

Variation in feeding activity indicates that *B. orientalis* remained an active feeder during most of the sampling period. Feeding activity was highest in May, when all examined fish contained food, whereas the lowest activity occurred in January. The stomach-fullness index reached its highest value in June rather than May. This difference is informative because feeding activity and fullness measure different aspects of feeding. Feeding activity describes the proportion of fish that had recently ingested food, whereas fullness reflects the amount of food present. A month may therefore have a high proportion of feeding fish without having the highest average fullness. Hyslop (1980) emphasized the importance of differential digestion and stomach capacity when interpreting stomach-content data. Modern reviews likewise recommend selecting and interpreting dietary measures according to the research question and the condition of prey remains (Amundsen & Sánchez-Hernández, 2019; Hamdi *et al.*, 2026).

CONCLUSION

The present study demonstrates monthly variation in feeding activity, stomach fullness, and dietary composition of *Brachirus orientalis* from Iraqi marine waters. Crustaceans and mollusks were important dietary groups, but their relative contributions

varied among months. Nematode occurrence was low, with 6 infected fish among 209 examined specimens, and infection was detected only in January, May, and September. No significant association was detected between nematode prevalence and feeding activity, stomach fullness, temperature, salinity, or pH. The negative association between mollusk volumetric contribution and prevalence is ecologically interesting but should be regarded as exploratory because the analysis used nine monthly observations and included only six infected fish. It does not demonstrate a protective effect or a trophic transmission pathway. Larger individual-level studies conducted over more than one year, supported by molecular parasite identification and examination of potential intermediate hosts, are needed to test this relationship.

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