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Studies on Baits for Lobsters

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Baits constitute an important component and represent a major expense in trap fishing for spiny lobsters. Fishing experiments were carried out with five kinds of baits namely mussel, sea urchin, cattle hocks, animal guts and diesel oil, in order to assess their efficacy in attracting lobsters. 61.2% of total catch was landed by using mussel as bait followed by diesel oil (27.7%), sea urchins (9.3%) and cattle hocks (1.7%), while animal gut was ineffective. Though mussel was the best among baits tried, in places where they are not available, diesel oil could prove to be a cheap alternative bait for lobsters.

Key words : Spiny lobsters, bait preference, lobster traps

Baits constitute an important component in exploitation of spiny lobsters (Genus : *Panulirus*) with traps and the role of bait is crucial where the principle involved is that of luring. The early literature reflects the long held view that spiny lobsters are scavengers feeding opportunistically on dead animal matter. This belief was perpetuated by extensive use of fish heads and stale baits in baited traps. Western rock lobster *Panulirus cygnus* is basically a scavenger feeding on sedentary or semi-sedentary reef flora and fauna. (Phillips *et al.*, 1980). Mary (1982) reported that many of the crustaceans taken in the trap in California were scavengers attracted to baits. Bardach *et al.* (1972) say that spiny lobsters may act as scavengers; but exhibit a marked preference for fresh foods. George (1967) has reported that spiny lobsters are omnivorous feeders, frequently of a scavenging type. Berry (1971) described the distribution of *P. homarus* in southeast Africa as being correlated with the availability of brown mussel, *Perna perna* on inshore reefs. Miyamoto & Shariff (1961) have referred to the use of fresh mussel (*Perna* sp.) as bait for lobsters. Mohan Rajan *et al.* (1981) have mentioned about the occasional use of sea urchins (*Echenes* sp.) as bait for lobsters while fishing with traps. After analysis of stomach contents and from laboratory observations, Kanciruk (1980) concluded that the belief of spiny lobsters being scavengers is generally untrue. *Palinuridae* in general can be considered as omnivorous with great emphasis on animal foods.

Spiny lobster fishery of India is constituted by six shallow water species and two deep sea forms. *Panulirus homarus* and *P. polyphagus* are commercially most important. Trap fishing accounts for more than 40% of lobster landings in south west coast of India. Baits represent a major expense in trap fishing. No study has been carried out in India so far, to evaluate the

efficacy of different types of baits in lobster fishing. Performance assessment of five different kinds of baits tried are presented here.

Materials and Methods

Fishing experiments using 5 different kinds of baits were carried out from selected lobster fishing centres in south-west coast of India. They included four baits of biological origin viz., mussel (*Perna* spp.), sea urchins, cattle hocks, animal gut and diesel oil.

Live mussel thriving in the rocky intertidal zones in the vicinity of lobster grounds were prised with chisel and gathered before setting out for fishing. An encrusted mass of about 50 to 100 numbers was introduced into one trap before setting it on the sea floor. Fully ripe specimens of sea urchins were picked up by fishermen by diving before commencement of fishing operations. After the spines are scrapped off, the globular shell is broken to expose the roe. Fully ripe roe is the edible attractant portion in sea urchin (Mohan Rajan & Meenakumari, 1984). About 200 to 300 g of freshly cut small intestine of ruminants were put into a perforated plastic container and introduced into another trap. Cattle hocks (terminal portion of cattle leg) cut 2 cm above the fetlock along with hooves were obtained from slaughter houses and two or three of them were suspended with twine in the hind portion of the trap. Half portion of a mud brick, of size 10x5x3 cm, was cut and soaked in diesel oil by keeping it completely immersed for an hour and was introduced into another trap. Brick functions as an absorbent and holding medium for diesel oil which gradually leaches out into the water. A fully soaked brick piece was found to retain traces of diesel even after 24 h in water.

Fishing experiments were carried out using modern lobster traps developed by CIFT (Mohan Rajan *et al.*, 1988) from Kadiapatnam (8°08' N ; 77°11'E) and Enayam (8°13' N ; 77°11'E) in Kanyakumari district of Tamil Nadu. The fishing grounds were located at a distance of 0.5 to 3 km from the shore at depths ranging from 8 to 15 m. Local fishermen were engaged to set and retrieve the traps by skin diving. Four logged catamaran was the fishing craft employed to reach the fishing ground and back. The soak period was 24 h. The positions of the traps were rotated every day, providing equal chances for all traps to be tried from every point of setting.

Results and Discussion

For a bait to be effective in functioning as a lure in fishing, it should endure till lobsters come out and start feeding. The advantages of mussel are that they are not fed upon by other organisms because of the shell; they remain alive and do not get drifted away by currents. Sea urchins with exposed roe are spread in the trap at the time of setting in the morning. By dusk when lobsters venture out for feeding, bait is often found exhausted by either having drifted away in the current or fed upon by other organisms. A portion of it is also wafted away when trap is lowered through water for setting. Effect of diesel oil continues to be present for the entire period of fishing. Fleshy materials like cattle hocks become target of predatory fishes. The presence of predators in the vicinity of traps also could become a deterrent to lobsters.

The results of fishing operations are summarised in Table 1. 61.2% of the total catch was landed by using mussel as bait whereas diesel oil gave 27.7% and sea urchins accounted for only 9.3%. The other baits did not yield any significant results.

Table 1. Details of fishing operations and performance of different baits

Centre/ Year	No. of viable fishing operations	Number and weight (g) of lobsters							
		Mussel		Diesel oil		Sea urchins		Cattle hocks	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Kadiapatnam									
1982	10	61	8490	17	3180	5	750	4	580
1983	15	36	8280	20	3390	-	-	1	85
1984	22	64	11720	37	6515	22	3185	-	-
Enayam									
1982	7	16	3235	6	930	-	-	-	-
Total	54	177	31725	80	14015	27	3935	5	665
Catch/operation		3.3	587.5	1.5	259.5	0.5	72.8	0.1	12.3
Average weight of lobster, g			179.2		175.2		145.7		113
Percentage of total catch		61.2	63.0	27.7	27.8	9.3	7.8	1.7	1.3
Frequency		54		46		7		2	

No catch was obtained using animal gut as bait.

Catch data on number of lobsters caught every day with each type of bait were analysed separately for three sets of experiments (Table 2). The first experiment involved a comparison of performance of mussel, diesel oil and sea urchin; the second that of mussel, diesel oil, cattle hocks and sea urchin and the third one of mussel, diesel oil and cattle hocks. The difference in the efficiency of baits used were compared using Friedman's test (Siegel, 1956) (Table 3). Table shows that difference between baits is significant in all the three experiments. Analysis of variance also showed the same result (Table 4). Paired comparison among the baits were made by means of least significant difference. Average catch in numbers along with least significant difference for the three sets of experiments were worked out and are presented in Table 2.

Table 2. Average daily catch in numbers of lobsters for 3 sets of experiments, and least significant difference (LSD)

Experiment	Mussel	Diesel oil	Sea urchin	Cattle hocks	LSD
1	2.6	1.5	1.0	-	1.1
2	3.2	1.2	0.2	0.2	0.7
3	2.0	0.8	-	0.0	-

Table 3. Friedman's test for comparing performance of baits

Experiment	n	k	x^2
1	25	3	9.922*
2	30	4	42.76**
3	8	3	9.81**

*, ** significant at 0.05 and 0.01 levels, respectively

The first set of experiments revealed that mussel is superior in performance to both diesel oil and sea urchin while the second experiment indicated that mussel is better than all other kinds of baits. The

overall results clearly indicate the superiority of mussel followed by diesel oil.

Table 4. Analysis of Variance : Number of lobsters caught

Source	ss	df	ms	*F* ratio
Experiment 1				
Total	322.32	74		
Between baits	31.92	2	15.96	4.01*
Between days	99.65	24	4.15	1.04
Error	190.74	48	3.97	
Experiment 2				
Total	853.2	119		
Between baits	188.13	3	62.71	10.95**
Between days	166.70	29	5.74	1.00
Error	498.36	87	5.72	
Experiment 3				
Total	29.83	23		
Between baits	16.33	2	8.16	16.33**
Between days	6.5	7	0.92	1.86
Error	7.0	14	0.5	

*, ** significant at 0.05 and 0.01 levels, respectively

Primary method of food identification in *Palinuridae* is chemoreception using antennules and tip of periopods (Kanciruck, 1980). The response of lobsters to various baits appear to be partially conditioned by the food preferences of the moment (Dow & Trott, 1956). Edible bait stimulates the sense of smell and taste (Brandt, 1969). Bait fishing and chumming to attract and excite aquatic organisms are age old practices taking advantage of chemical senses of fishes (Atema, 1980). Specific chemotactic response of an animal may be elicited by particular organic or inorganic chemicals (Neff & Anderson, 1981).

Thomson *et al.* (1977) reported that scarlet prawns (*Plesiopenaeus edwardsianus*) were attracted in large numbers to benthic oil deposits off Aruba, Dutch West Indies. Atema (1976) reported that low concentrations of Kerosene (10μg l^{-1}) attracted lobsters and stimulated feeding activity. A wide variety of other behavioural responses of lobsters to oil have been reported (Blumer *et al.*, 1973). Chemical stimulants like diesel oil can aggregate aquatic organisms or guide them into traps and act as feeding enhancers.

Lobsters are believed to detect the presence of mussel in the traps by sound generated by the latter. Even though this 'sound' was not monitored *in situ*, it was noticed that an uninterrupted buzzing noise produced by mussels is always present in the mussel beds. This sound may be within the sensory perception of lobsters. The capacity of lobsters to both produce and percieve sound is well known (Hindley, 1977).

A definite feeding rhythm was discernible in the case of lobsters during the study (Data not presented). The feeding activity in the case of lobsters was observed to be more intense during dusk and dawn with peak at the twilight hours of dusk. This observation on feeding rhythm can substantially alter the strategy of fishing by restricting the operation of the traps during this period only instead of the trap remaining set under water for all the 24 h.

Even though mussel proved to be the best bait, the difficulty in procuring them in large quantities and their non availability in certain areas, make diesel oil a cheap alternative bait for lobster fishing.

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