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Relative Fuel Consumption and Effective Fishing Time of Small-scale Mechanised Gillnetters, off Cochin

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The drift gillnet operation is one of the important low energy fishing methods in small scale fishing sector along the Indian coast. The gillnet operations have undergone considerable change in the form of increased length class and horse power of fishing crafts employed, which enable the vessels to operate at distant fishing grounds and with enhanced operational efficiency. An understanding of effective fishing time and fuel efficiency will lead to considerable improvement in operational efficiency of gillnetters. The analysis of the effective fishing time and relative fuel consumption among the selected length classes of gillnetters operating from Cochin Fisheries Harbour showed that effective fishing time increased with increase in length overall and the relative fuel savings was higher in length 31-35′ class vessels.

Key words: Fishing time, fuel consumption, gillnetter

The mechanization of gillnetters along the inshore waters off Cochin started in 1969 with the introduction of about 90 gillnetters. With the commissioning of Cochin Fisheries Harbour in 1977, the number of vessels increased to 130 (Silas *et al.*, 1984). Since then, the number has increased considerably. Their size varies from 26 to 40′ length overall and installed engine power varies from 60 to 90 hp. The vessels are capable of extending their fishing operations up to 6 days and have a crew complement of 4 to 6 Among these the smaller vessels are exclusively operating for drift gill netting. When the drift net operation is not much profitable from October to March, vessels above 35′ L_{OA} shift to line fishing for reef-cod, snapper and sharks.

Being one of the low energy fishing techniques, gillnetting occupies a unique position from the energy conservation point of view. The drift gillnet fishery has not undergone much advancement from its initial state. Even though the process of mechanization primarily started with gillnetters, mechanization in gillnetting is still used only for propulsion to and from the fishing ground. The handling of the gear and catch has not undergone any change from the initial practice of manual operation of the gear. Fuel cost forms a major component of the operational expenditure and it has increased continuously over the years (Panikkar *et al.*, 1990; Shibu, 2000). So far, no attempt has been made to study the relative fuel consumption and effective fishing time patterns of the mechanized gillnet operations, off Cochin. An understanding of the above factors will help to improve the efficiency of fishing operations and hence the present study was undertaken to find out the vessel classes having optimum fuel use and better effective fishing time.

Materials and Methods

The sample units for data collection were selected from the existing length classes of vessels and for making the comparison more effective, they were classified into length groups. Representative samples were drawn from each length class by simple random method and the sampling fractions were 2.1, 2.4 and 2.1 respectively of 26-30′, 31-35′ and 36-40′ length class gillnetters. A

structured questionnaire was used to collect data regarding general details of fishing craft like length overall, horse power of engine, type of gear used, investment patterns of craft and gear etc. Data on operational details like duration of voyage, depth of operation, fuel consumption, total running time of engine and effective fishing time were collected at 10 days interval for one year from January 1997 to December, 1997. The effective fishing time or actual fishing time is taken as a sum of soaking time and hauling time. As the size of the gear used was same, the shooting time of the gear was more or less constant and was not considered in calculations of effective fishing time.

Results and Discussion

Operational details of mechanized gillnetters, operating from Cochin Fisheries Harbour, during the period of study, are given in Table 1. Mean installed engine horse power of the three length classes of gillnetters viz., 26-30', 31-35' and 35-40' L_{OA}, were 60, 65 and 70, respectively. Total number of fishing trips undertaken by the three length classes were respectively, 130, 98, 99. The duration of fishing trips varied with the seaworthiness of the vessel, fish hold capacity, climatic factors and availability of resources. The mean duration of fishing trips for 26-30' L_{OA} gillnetters was 2.3 days. It increased to 2.7 days in 31-35' L_{OA} gillnetters and 3.2 days in 36-40' L_{OA} gillnetters. Thus, higher length class gillnetters had potential for increasing effective fishing time per trip, compared to smaller vessels. Mean effective fishing time varied from 177 h in small to 1879 h in medium and 2527 h in large length class gillnetters. Percentage of running time of engine to effective fishing time was highest in small length class gillnetters (97.47%), followed by medium (75.24%) and lowest in large length class gillnetters (69.88%) (Table 1.).

Small mechanized gillnetters operating from Cochin utilize engine power only for propulsion. Hauling of the gear is done manually. There is scope for introduction of mechanized system for gillnet hauling, using power take-off from main engine or by using hydraulics. This would permit longer duration of soaking and/or operation of longer fleet of nets. Considerable savings in manpower requirement in the gillnetting operation is also possible by introduction of mechanized hauling system.

Table 1. Operational details of mechanized gillnetters operated from Cochin

	L_{OA}		
	26-30'	31-35'	36-40'
1. Mean horse power	60	65	70
2. Total number of trips	130	98	99
3. Mean trip duration (days)	2.3	2.72	3.20
4. Total number of fishing days per year	304	267	317
5. Mean catch landed per trip (kg)	204.6	261.5	316.1
6. Mean effective fishing time (h)	1777	1879	2527
7. Percentage of engine running time to mean effective fishing time	97.37	75.24	69.88
8. Mean fuel consumption per trip (l)	112.68	141.68	199.49
9. Mean fuel consumption ($l.h^{-1}$)	8.47	9.82	11.19
10. Mean fuel consumption per kg of fish (l)	0.55	0.54	0.63

Average fuel consumption per trip was 112.68 l in 26-30' length class, 141.68 l in 31-35' length class and 199.49 l in 36-40' length class gillnetters. Mean fuel consumption per hour showed a similar trend and increased from 8.47 $l.h^{-1}$ in small to 9.82 $l.h^{-1}$ in medium and 11.10 $l.h^{-1}$ in large length class gillnetters.

Mean catch landed per trip was 204.6 kg in small, 261.5 kg in medium and 316.1 kg in large length class gillnetters. Fuel consumption per kg of fish landed by different length classes of gillnetters increased from about 0.5 $l.kg^{-1}$ for small and medium length class to 0.6 $l.kg^{-1}$ in large gillnetters (Table 1).

Fuel consumed per day per trip for single or multi-day operation undertaken by

Table 2. Fuel consumption per day per trip of different length class of gillnetters during single and multi-day fishing operations

Vessel class	Fuel consumption ($l.day^{-1}.trip^{-1}$)					
	1-day trip	2-day trip	3-day trip	4-day trip	5-day trip	6-day trip
26-30′	100	70	52	60	72	–
31-35′	125	77	62	72	73	–
36-40′	134	88	77	86	89	92

the vessels of three different length class is given in Table 2. For single day trips, fuel consumption ranged from 110 l for small, 125 l for medium and 134 l for large gillnetters. In small gillnetters, 36.4% fuel could be saved when undertaking 2-day trips and 53.7% saving is possible when the vessel is undertaking 3-day trips. However, percentage savings in fuel reduced afterwards, being only 45.5% for 4-day trips and 34.6% for 5 day trips (Fig.1).

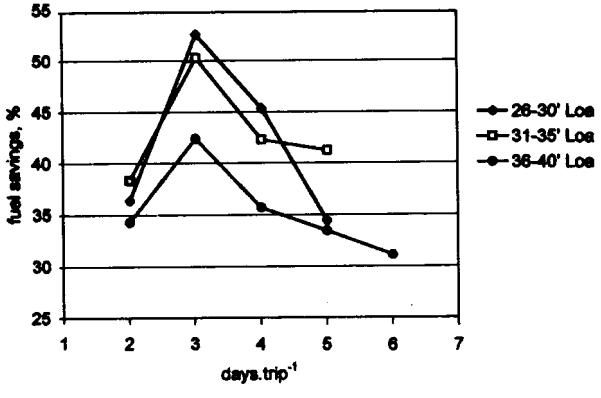

Fig. 1. Fuel savings in multi-day fishing trips compared to single-day operations in different length classes of gillnetters.

Similar trend in fuel savings was observed in the other two length classes of gillnetters (Fig.1). Fuel savings showed an increasing trend up to 3 day voyages in all length classes. As the number of days of fishing trip increased further, there was a decline in the percentage fuel savings. However, overall benefits of fuel saving in multi-day operations were maintained.

The study has revealed the importance of multi-day operation as an important fuel saving measure in gillnetting operations, which is effective irrespective of length classes. In addition, multi-day operations also provide benefits in terms of increased effective fishing time.

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