

Design Aspects of Double Rig Shrimp Trawls Operated off Vishakhapatnam

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Investigations were carried out to establish the empirical relationship between engine power and size of double rig trawl as well as interrelationship of its different parts and accessories. The empirical formula evolved to determine the above said relationships are presented in this communication. This study revealed that the double rig trawls operated off Vishakhapatnam has undergone changes with respect to wing and body since its introduction.

The Mexican trawls and otter boards found their way to India, with the import of Mexican trawlers during 1970s. The steady increase in the number of medium vessels operated mainly along north of Andhra, Orissa and West Bengal coast during seventies and early eighties showed that double rig trawling is an efficient method for the capture of shrimps. There were 76 imported trawlers in 1987 operated off Vishakhapatnam of which 36 were of Mexican, 15 Dutch, 14 Australian, 6 U.S., 4 Korean and 1 from Hong Kong. Although studies to establish various empirical relationship between HP of the engine and size of trawl and interrelationship of different parts of the trawl were carried out by Miyamoto, (1959), Nair & George (1964) and Nair & Nair (1972), information regarding the principles based on which double rig trawls and accessories have been made are lacking. Hence a detailed survey was undertaken in 1983 on the double rig trawls operated from medium vessels to determine the empirical relationship as well as to find out the changes if any that have taken place since its introduction.

Materials and Methods

The trawl gear survey was undertaken in the year 1983 from 62 medium trawls of 22

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and 22 m, OAL powered with 270 to 380 HP engine belonging to 20 organisations in the Vishakhapatnam area. These vessels carried out double rig trawling with four seam trawls of HR, 22 to 26 m in combination with wooden otter boards of size 2740 x 1070 mm weighing 180-200 kg. each. Twenty six trawl nets were selected for the present study as some of the designs examined were identical. The mesh size of the main webbing of the net and cod end are 50-55 mm and 35-40 mm made of 2.00 and 2.50 mm dia HDPE twisted monofilament twine respectively. The method adopted in analysing data for determining the various relationships are similar to those described by Nair & George (1964) and Nair & Nair (1973).

Results and Discussion

The trawl gear surveyed mainly fall under four categories based on the configuration of jib namely, single straight short jib, single straight long jib, double straight jib and double slanting jib as shown in Figs. 1,2,3 and 4. The Mexican type otter board used in combination with the trawl is shown in Fig. 5.

The following are the empirical relationships worked out on the various aspects of trawl gear and accessories.

The relationship between length of head rope in meters (HR) and horse power of the engine (P) is shown in Fig. 6.

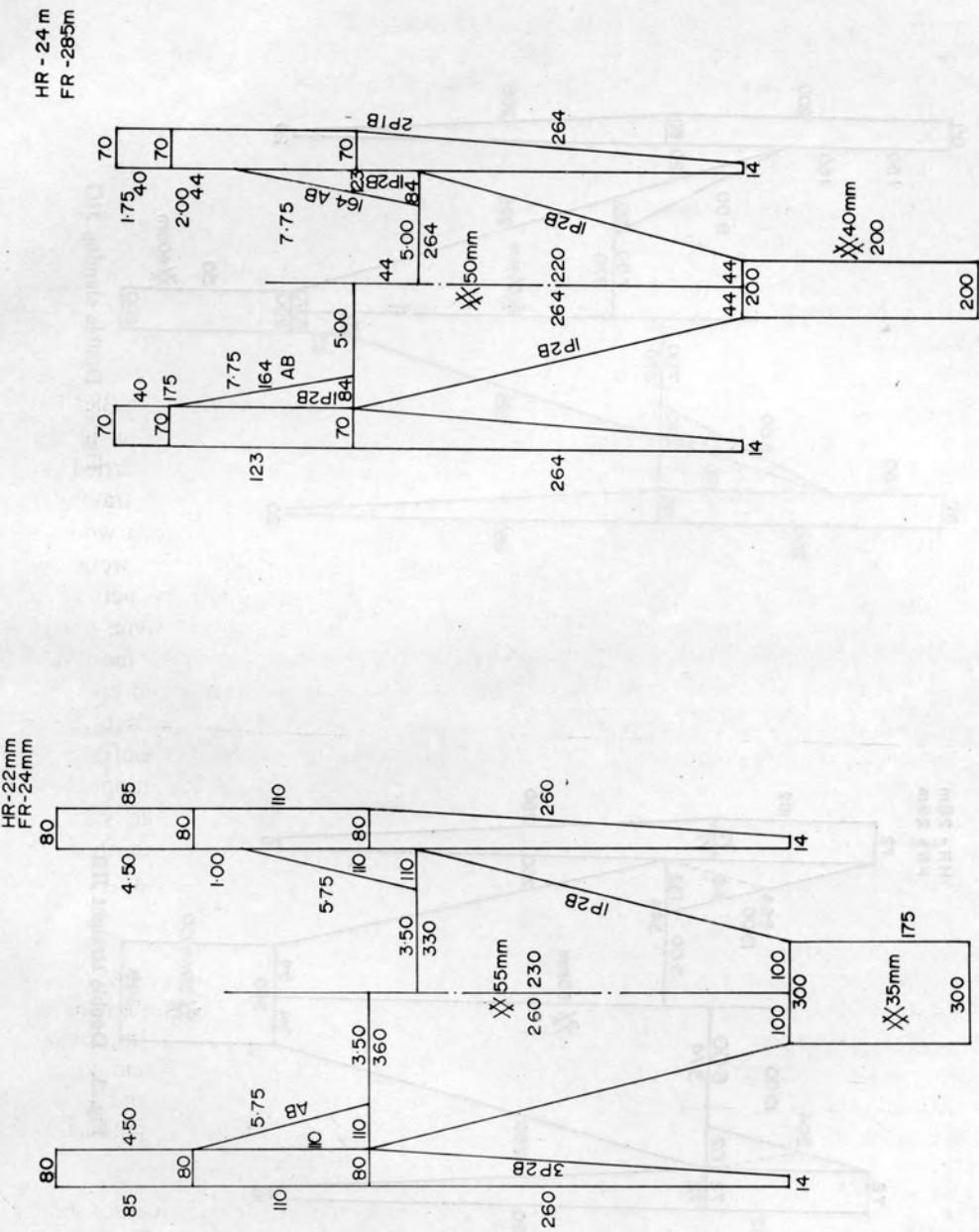


Fig. 1. Straight short JIB

Fig. 2. Straight long JIB

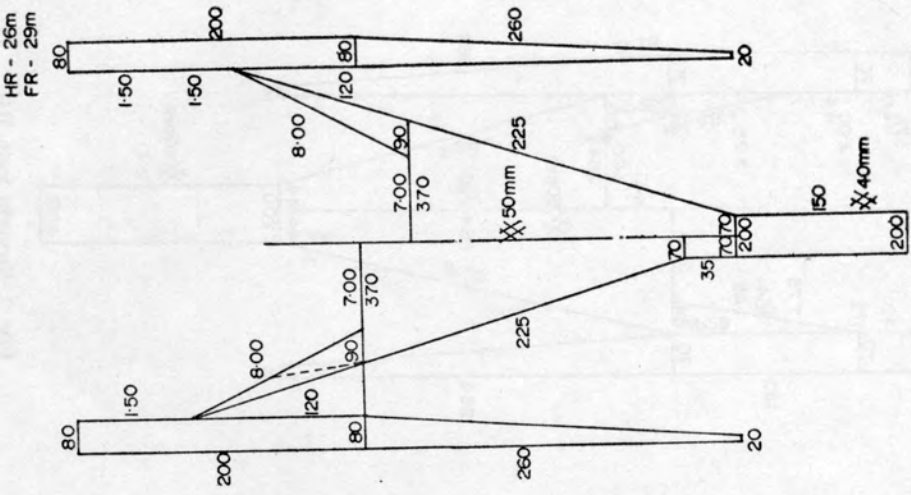


Fig. 4. Double slanting JIG

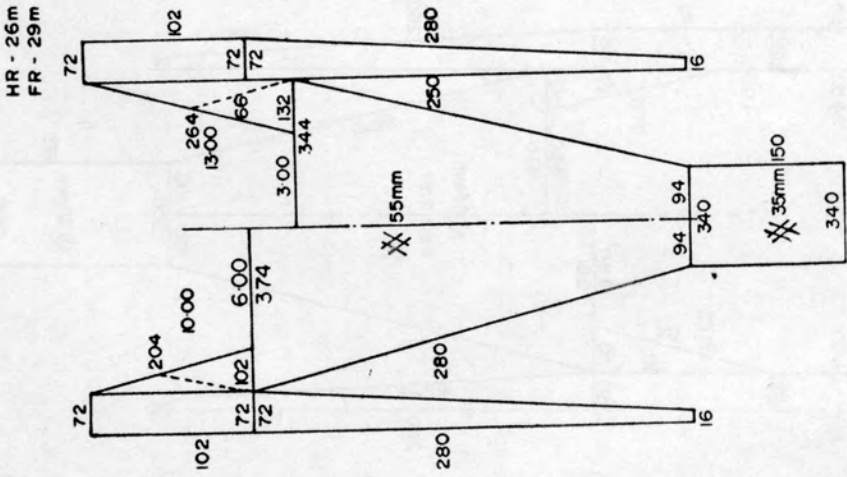


Fig. 3. Double straight JIB

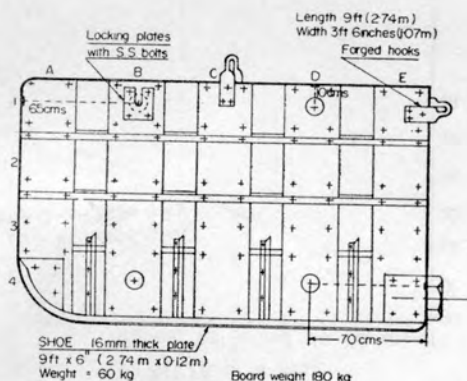


Fig. 5. 2.74 m x 1.07 m Mexican type main net door

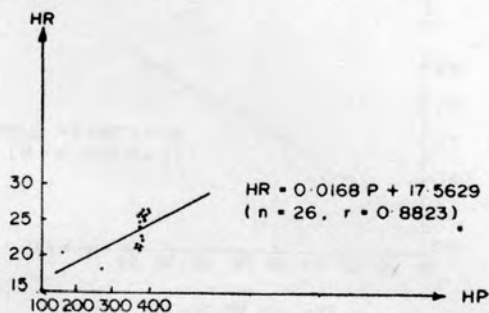


Fig. 6. HR Vs HP

$$HR = 0.0168P + 17.5629$$

The relationship between maximum belly width in meters (L) and head rope length is shown in Fig. 7.

$$L = 0.7156 HR + 0.5304$$

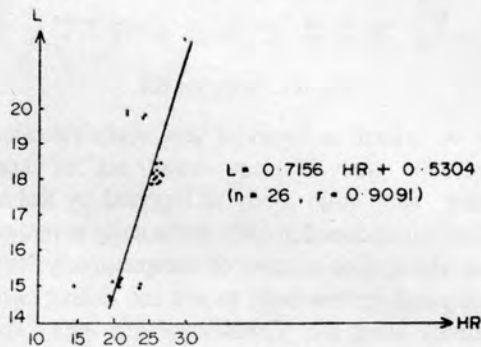


Fig. 7. L Vs HR

The relationship between depth of belly (D), length of bossum (Bm), minimum width

of belly (B), width of side wedge (W) and height of jib (J) in meters to the maximum belly width (L) are shown in Fig. 8 (a,b,c, d & e).

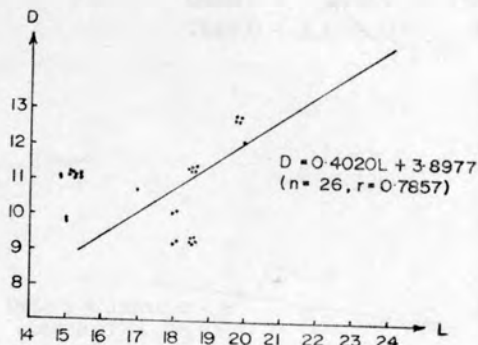


Fig. 8 (a). D Vs L

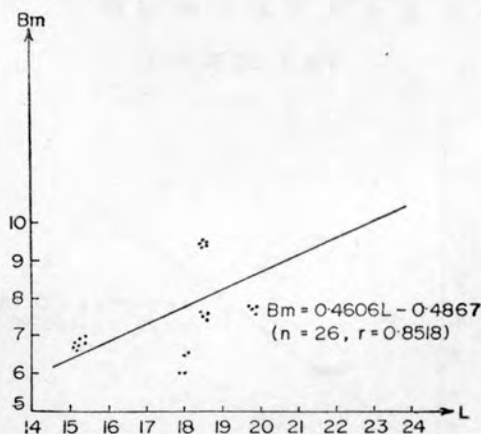


Fig. 8 (b). Bm Vs L

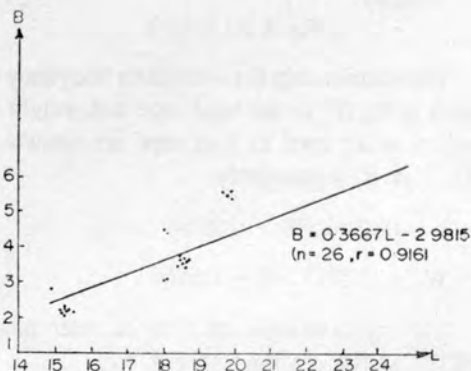


Fig. 8 (c). B Vs L

$$\begin{aligned} D &= 0.4020 L + 3.8977 \\ E_m &= 0.4606 L - 0.4867 \\ B &= 0.3667 L - 2.9815 \\ W &= 0.0782 L + 2.6390 \\ J &= 0.2952 L + 0.7197 \end{aligned}$$

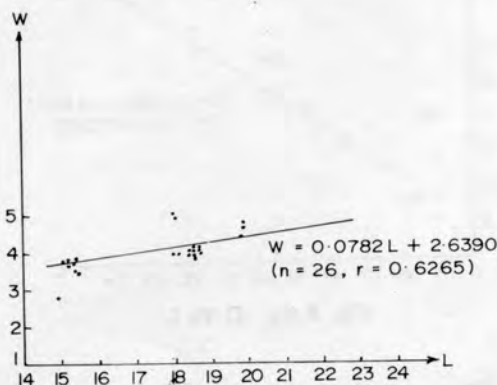


Fig. 8 (d). W Vs L

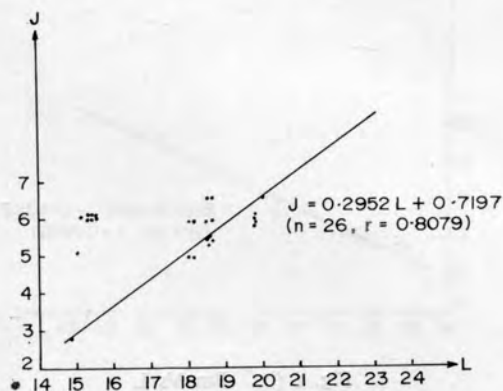


Fig. 8 (e). J Vs L

The relationship between extra buoyancy of floats in kg (F) to the head rope and weight of sinkers in kg (wt) to foot rope are shown in Fig. 9 & 10 respectively.

$$F = 0.4856 HR - 0.9964$$

$$Wt. = 2.7817 FR - 2.6566$$

The relation between area of otter board (AOB) to HR is shown in Fig. 11.

$$AOB = 0.2608 HR - 3.9239 \text{ (sq. m.)}$$

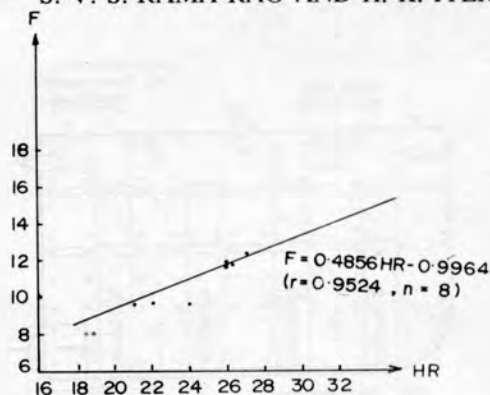


Fig. 9. F Vs HR

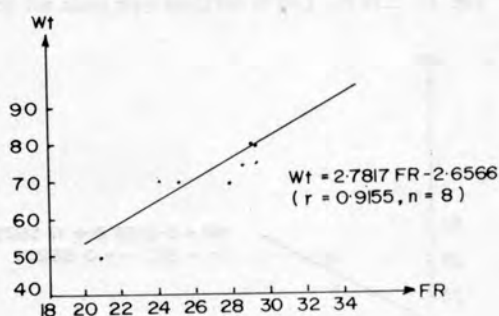


Fig. 10. Wt Vs FR

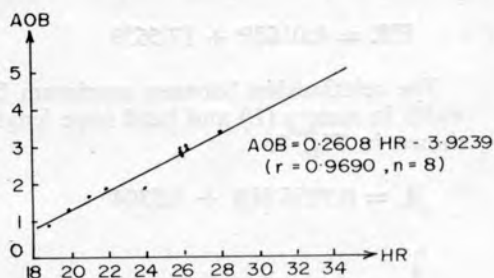


Fig. 11. AOB Vs HR

A critical analysis of the study revealed that the true Mexican trawl net of short wing and large body as reported by Robas (1969) introduced in India in the early seventies has changed to a trawl of comparatively long wing and narrow body to suit the fishing conditions along the Vishakhapatnam area. The modification effected in the existing designs of nets are aimed at obtaining maximum horizontal spread for covering larger area on the sea floor during shrimp trawling.

It is observed that more or less stretched hanging is given to head rope and foot rope along the jib and wing region of the trawl. Eventhough the design of the net has undergone, lot of variations, the otter boards used are still the same Mexican type suited for shrimping.

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