

Review

BIGFIN SQUID CULTURE: THE INDONESIAN EXPERIENCE

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ABSTRACT

Squid is an important marine resource, but over-exploited in many cases. To counteract the reduction of squid due to intensive fishing, researchers at RICF have carried out culture of bigfin squid in floating net cages for 2 years. The newly hatched bigfin squid (*Sepioteuthis lessoniana*) grow to marketable size (100-200 g) in 3 months and become spawners (200-300 g) after an additional 2 months. Each female can produce 300 eggs per spawning. The survival rate of juveniles is low.

INTRODUCTION

The total quantity of bigfin squid *Sepioteuthis lessoniana* comes from capture fishery. Consequently, this resource shows a tendency of large yearly fluctuations (Tab. 1). Bigfin squid fetch high prices in both domestic and international markets. The landings started to increase in 1992 as the result of intensified fishing. Locally it had an impact on the squid population, e.g., in Sape Strait (Iskandar *et al.* 1992).

Realising that squid culture may be important in the near future, the Research Institute for Coastal Fisheries (RICF) has studied squid culture in floating hatcheries. The spawners are reared in floating net cages provided with egg collectors. The eggs are incubated in other net cages where they hatch after 15-20 days. The consumable size is achieved 90 days after hatching. The life cycle of cultured big fin squid was described from Thailand by Nabhitabhata (1996). In this paper, the first results of squid culture in Indonesia are reviewed.

REVIEW

Broodstock

Bigfin squid is widely distributed in South Sulawesi coastal waters. Jig, sero (set trap), and payang (traditional mini trawl) are used to capture spawners of bigfin squid. The captured spawners were put in a net cage set

beside the canoe and transported to the floating hatchery. The survival rate during 30-60 minutes of transportation was 80-90 %. The spawners were acclimatized in a 3 x 3 x 3 m floating net cages at a density of 50 squids (females and males in equal numbers). Males were identified by the presence of a hectocotylyzed left arm IV.

Feed

Trash fish (anchovies and sardines) is the main diet for squid spawners. Artificial feed (moist pellets) can to some extent be used to substitute trash fish. The most effective feeding time is early morning or late afternoon. The squid grab the feed using its tentacles and chew it rapidly.

Egg production

Mating is commonly observed early in the morning and the female attached the fertilized eggs to egg collectors made from net set in a corner of the cage. It takes 2-3 hours for the squid to attach all of the egg capsules on the collector. Based on 2 years of observation, the spawners weighed 150-300 g. The egg capsule of bigfin squid contains 1-7 embryos. The number of capsules attached to the collector varies depending on the size of the spawners. The 110-200 g spawners

Table 1. Total landing and export of Indonesian squid (Ditjen Perikanan 1991, 1993, 1994, 1995, 1996 a, b)

| Years | Volume (Tonnes) | |
|-------|-----------------|--------|
| | Production | Export |
| 1990 | 17612.0 | 155.9 |
| 1991 | 17365.0 | 615.7 |
| 1992 | 23392.0 | 1908.0 |
| 1993 | 26187.0 | 3392.7 |
| 1994 | 31505.0 | 3616.1 |

attached an average of 203 capsules per spawning while the 300 g spawner attached 600 capsules predominated by capsules containing 4 embryos (Ahmad *et al.* 1996). Danakusumah *et al.* (1995) reported that the spawning season of bigfin squid is from June to July. However, in the net cage squid seems to spawn all year around with a peak in June. Spawners usually died 1-2 weeks after spawning.

Egg incubation

The incubation of bigfin squid eggs can be carried out either in fibre glass tank or in floating net cage with 2.5 mm mesh size. It is more practical to incubate eggs in a floating net cage because no aeration is needed and the newly hatched juveniles can be kept for 1 month in the same cage. However, the hatching rate of eggs in a floating net cage is lower (70-80 %) than in fibre glass tanks provided with aeration (81-92 %). Filtered water used for incubation of eggs in fibre glass tank and sufficient water exchange (75-80 % per day) are considered main factors influencing the hatching rate of eggs. Incubation takes 19-23 days at a temperature of 28 °C, resulting in a 4 days age difference between the juveniles. However, there is no significant difference in size of the last and the first hatched juveniles. The mantle length of bigfin squid juveniles range from 4-7 mm. To obtain good result, the incubation should be conducted in 25-35 ‰

salinity, 28-30 °C, pH 7-8.5, and dissolved oxygen > 5.0 ppt.

Juvenile rearing

Bigfin squid juvenile can be raised in a 1.5 x 1.5 x 1.5 m floating net cage at a density of 300-400 juvenile. The best feed for the juvenile is still unknown. But until 30 days, the juvenile feed on larval crustaceans (*Mesopodopsis* sp.) and other zooplankton. Live *Mesopodopsis* sp. seem to be a suitable food for juvenile because it supports the highest survival rate (7 %). The survival rate of the juvenile fed on minced fish is lower (5 %). The weight of 30-day juveniles is 2.9-4 g if they feed on *Mesopodopsis* sp. and 4.0-5.0 g if they feed on minced fish. Live silvery tiny fish, and crustaceans, or fish larvae seem to be the best feed for bigfin squid juvenile. Adult *Mesopodopsis* sp. is nutritionally not good for squid juvenile which require high levels of EPA and DHA.

Grow-out

The grow-out experiment of bigfin squid juvenile was carried out for 6 weeks at a density of 9 juveniles per 1 x 1 x 1 m cage. The feed given was minced *Clupea* spp. at different rations. The survival rate at the end of the experiment was 78.0-95.5 % with the weight gain of 9.9-11.5 g per juvenile. There was no significant difference in weight gain among food rations, so a feed ration of 25 % of the total biomass seems to be optimal (Ahmad & Marthinus 1996). Further studies on this aspect are required since Nabhitabhata (1995) reported that the optimal feed ration for squid is 8 % of the total biomass.

The most efficient size of net cage for growing-out of bigfin squid juveniles is 3 x 3 x 3 m. The mesh size of net should be 5.0 mm for 1-3 months old and 20 mm for 3-4 months old juveniles (Ahmad & Gunarto 1996). The recommended density is not more than 250 squid per cage. A shade and lamp should be set above the net cage to prevent stress due to extensive light during the day and to prevent cannibalism in the dark at night.

REFERENCES

- Ahmad, T. & Gunarto. 1996. Membesarkan sotong buluh dalam kejapung. *Trubus* 320.TH.XXXVII: 44-46.
- Ahmad, T., Pongsapan & Usman. 1996. Pengaruh padat tebar induk sotong buluh, *Sepioteuthis lessoniana* terhadap pertumbuhan, kelangsungan hidup dan jumlah inti telur dalam keramba jaring apung. Laporan Hasil Penelitian, Balai Penelitian Perikanan Pantai, Maros, 10 hal.
- Ahmad, T. & S. Marthinus. 1996. Pengaruh ransum pakan yang berbeda terhadap kelangsungan hidup dan pertumbuhan sotong buluh (*Sepioteuthis lessoniana* Lesson). Laporan Hasil Penelitian, Balai Penelitian Perikanan Pantai, Maros, 8 hal.
- Danakusumah, E., A. Mansyur & S. Marthinus. 1995. Pembenuhan cumi-cumi *Sepioteuthis lessoniana*. Laporan Hasil Penelitian, Balai Penelitian Perikanan Pantai, Maros. 20 hal. Ditjen
- Ditjen Perikanan. 1991. Statistik Ekspor dan Impor Hasil Perikanan Indonesia Tahun 1990. Direktorat Jenderal Perikanan, Jakarta. 316 pp.
- Ditjen Perikanan. 1993. Statistik Ekspor dan Impor Hasil Perikanan Indonesia Tahun 1991. Direktorat Jenderal Perikanan, Jakarta. 515 pp.
- Ditjen Perikanan. 1994. Statistik Ekspor dan Impor Hasil Perikanan Indonesia Tahun 1992. Direktorat Jenderal Perikanan, Jakarta.
- Ditjen Perikanan. 1995. Statistik Ekspor dan Impor Hasil Perikanan Indonesia Tahun 1993. Direktorat Jenderal Perikanan, Jakarta. 318 pp.
- Ditjen Perikanan. 1996a. Statistik Perikanan Indonesia Tahun 1994. Direktorat Jenderal Perikanan, Jakarta.
- Ditjen Perikanan. 1996b. Statistik Ekspor dan Impor Hasil Perikanan Indonesia Tahun 1994. Direktorat Jenderal Perikanan, Jakarta.
- Iskandar, B., B. Sumiono & K. Basuki. 1992. Dugaan potensi, analisis usaha dan prospek pengembangan sumberdaya cumi-cumi (*Loligo* spp.) di Selat Sape, Nusa Tenggara. *Jurnal Perikanan Laut*. Jakarta (66): 17-28.
- Mangawe, A.G., M. Amin & T. Ahmad. 1996. Pengaruh jenis pakan terhadap berat badan dan gonad induk sotong buluh, *Sepioteuthis lessoniana* Lesson. Laporan Hasil Penelitian, Balai Penelitian Perikanan Pantai, Maros. 5 hal.
- Nabhitabhata, J. 1995. The culture of cephalopods in Thailand. - *Infofish International* 6(95): 28-33.
- Nabhitabhata, J. 1996. Life cycle of cultured big fin squid, *Sepioteuthis lessoniana* Lesson. - *Phuket Marine Biological Center Special Publication* 16: 83-95.