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COMMUNICATION I

A Preliminary Study on Induced Spawning of the Catfish *Clarias batrachus* (Linnaeus) in Malaysia

ABSTRAK

Sepuluh ekor induk betina Clarias batrachus *yang matang telah disuntik dengan satu dos homogenat pituitari ikan lee koh. Telur didapati berwarna kuning muda sebelum suntikan hormon dan garispusatnya menjulat antara 0.94 mm hingga 1.08 mm. Ovulasi berlaku lebih kurang 12 jam selepas suntikan kelenjar tersebut. Pada masa ovulasi, warna telur bertukar menjadi coklat dan garispusatnya menjulat antara 0.99 mm hingga 1.27 mm. Kadar persenyawaan menjulat antara 10-81%. Telur ikan menetas selepas pengeraman 30-36 jam pada suhu air 26°C hingga 28°C. Kadar penetasan menjulat antara 13-67%.*

ABSTRACT

Ten gravid Clarias batrachus *females were administered with a single dose of common carp pituitary homogenate (CPH). Before injection, the eggs were light yellow and the diameter ranged from 0.94 mm to 1.08 mm. Ovulation occurred approximately 12 hours after the adminstration of CPH. The colour of the eggs turned brown and the diameter ranged from 0.99 mm to 1.27 mm. The fertilization rates ranged from 10-81%. The eggs hatched after about 30-36 hours of incubation at 26°C to 28°C. The hatching rates ranged from 13-67%.*

INTRODUCTION

The freshwater catfish *Clarias batrachus* is an important species for culture in Malaysia. Though this fish possesses suitable culture qualities such as resistance to low oxygen conditions and high growth rate, its culture in Malaysia is hampered by fry availability. Induced spawning of *C. batrachus* in India using pituitary glands have been reported by Devaraj *et al.* (1972) and Thakur (1978). In Thailand induced spawning of *C. macrocephalus* was attempted by injecting the fish with pituitary glands (Tongsanga *et al.* 1963). Though induced spawning of *C. macrocephalus* using human chorionic gonadotropin, homoplastic pituitary extract and heteroplastic pituitary extract has been successful in Malaysia (Mollah and Tan 1983; Thalathiah 1986), literature on induced spawning of *C. batrachus* using common carp pituitary homogenate is not available and as such this study was conducted. This report presents the findings of an initial attempt at induced spawning of *C. batrachus* at the hatchery of the Faculty of Fisheries and Marine Science, University Pertanian Malaysia.

MATERIALS AND METHODS

C. batrachus broodstock were purchased from a farmer in Sabak Bernam, Selangor, Malaysia. The fish were brought back to the hatchery of the Faculty of Fisheries and Marine Science, sexed and separately stocked in two 25 ton concrete tanks. The fish were fed a fish pelleted feed containing approximately 25% crude protein, twice a day *ad libitum* and chicken liver twice a week.

At the start of the study, the broodstock tanks were drained. Ten female fish that possessed a pinkish genital papilla as well as a reddish ring around the tip were selected. Ten male fish that possessed an enlarged pinkish papilla were also selected. Samples of fish eggs were taken from all the female fish by the use of a catheter and the egg diameters of at least twenty eggs were determined with an eye-piece micrometer.

Twelve common carp weighing about 200 g each were killed and their pituitary glands were collected. The glands were then homogenized with distilled water in a tissue homogenizer. After the weights of the females and males were determined, they were administered with one dose and half

a dose of carp pituitary homogenate respectively. When the pituitary gland that was collected from a 200 g common carp was injected into a 200 g catfish, the catfish is considered to have received one dose of carp pituitary homogenate.

A pair of fish, was then put together in a 5 1 all-glass aquarium containing 2 1 of water. Approximately 12 hours after the administration of carp pituitary homogenate, the females were checked for their ovulatory response by applying a gentle pressure on the abdomen. In ovulated fish, this would result in the release of eggs from the abdominal cavity. Unovulated fish were checked periodically at hourly intervals.

When the female fish had ovulated, they were removed from the aquarium and the abdomen was dried with a towel. Then a gentle pressure was applied on the abdomen from the base of the pectoral fin towards the genital papilla. The eggs were collected on a pre-weighed bowl to determine the weight of eggs released. A sample of at least fifty eggs were weighed to determine the weight-number relationship to calculate the working fecundity. The egg size of at least 20 eggs was also determined with the eye-piece micrometer.

The male fish were then removed from the aquarium and the ventral part of the abdomen was slit with a scalpel. The testis were then pulled out with pair of forceps and subsequently meshed up on a 0.4 mm sieve that was put on top of the bowl containing the eggs. Distilled water was then used to rinse the portion of the sieve that was retaining the testicular tissue so that the washings would drop directly into the bowl. A clean chicken feather was then used to mix the egg and testicular tissue mixture to enable egg fertilization. The mixture was then left aside for a few minutes following which it was poured into an egg incubation tray. The tray was partially submerged in a 100 1 fibre glass tank that was connected to a biological filter.

Approximately 12 h after incubation, the gastrula stage was detected in viable eggs. Such egg samples were taken from the incubation tray for the determination of the fertilization rate by counting the number of viable and inviable eggs. The inviable eggs were white in colour and opaque whereas the viable eggs were translucent.

About 48 hours after incubation, the hatching rate was determined. The air stone was gradually moved over the larvae to distribute them evenly on the incubation tray. A 10 cm x 10 cm square wire larvae sampler was randomly dropped into the tray and the number of larvae that was found within the sampler was counted.

This was repeated twice. The number of larvae in the tray was then estimated by extrapolating the number of larvae that was found within the wire sampler to the total area of the tray.

RESULTS AND DISCUSSION

The results of the preliminary attempt at induced spawning of *C. batrachus* is presented in Table 1. As the data on two fish were incomplete, the data on eight fish are reported. The body weights of female fish used in this study ranged from 65 g to 190 g thus indicating that *C. batrachus* could mature when the body weight was only 65 g. Most of the eggs that were taken from the fish prior to injection were light yellow in colour. The pre-injection egg diameters ranged from 0.94 ± 0.04 mm to 1.08 ± 0.13 mm in size. After the administration of common carp pituitary homogenate, all the ten fish spawned and released brown eggs. Mollah and Tan (1983) reported that 88% of *C. macrocephalus* that were injected with 35 mg/kg of homoplastic pituitary extract ovulated in their study. Thalathiah (1986) reported that administration of 1.5-2 doses of homoplastic pituitary extract was effective to induce ovulation in *C. macrocephalus*.

By the time of ovulation, the egg diameters had increased and ranged from 0.99 ± 0.11 mm to 1.27 ± 0.18 mm. The eggs were much smaller compared to the *C. batrachus* eggs in India which had a diameter of 1.5 mm (Thakur 1980). With the exception of fish number 3 where natural oviposition had occurred and only 0.91 g of eggs were collected, the fish released between 2.75 to 6.31 g of eggs. The relationship between the number of eggs collected and body weight is presented in *Figure 1*. As the regression coefficient was 0.30, there was poor correlation between the number of eggs and body weight.

The fertilized eggs were demersal, adhesive and spherical in form. The yolk was pale or greenish yellow and contained no oil globule. In impregnated eggs, the blastodisc was reddish in colour. The findings were consistent with the findings of Thakur (1980). While the fertilization rates ranged from 10% to 81%, the hatching rates

TABLE 1
Summary of data on induced spawning of *Clarias batrachus* with fresh common carp pituitary homogenate

Parameter	1	2	3	4	5	6	7	8
Body weight (g)	65	100	120	120	150	160	160	190
Papilla colour	Light Pink	Light Pink	Light Pink	Light Pink	Pink	Light Pink	Pink	Light Pink
Genital pore colour	Pink	Pink	Pink	Pink	Pink	Pink	Light Pink	Pink
Egg colour	Yellow	Yellow	Yellow	Yellow	Yellow	NA	Yellow	Yellow
Egg diameter I (mm)[1]	0.94	1.00	0.97	1.08	1.03	NA	0.98	1.02
Std. dev.	± 0.04	± 0.17	± 0.10	± 0.13	± 0.13	NA	± 0.12	± 0.02
Egg diameter II (mm)[2]	1.11	1.12	1.17	0.99	1.16	1.10	1.26	1.27
Std. dev.	± 0.18	± 0.09	± 0.10	± 0.11	± 0.11	± 0.15	± 0.17	± 0.18
Total egg weight (g)	2.86	4.03	0.91	6.31	2.75	4.45	5.69	3.29
Working Fecundity	3374	4755	1152	7445	3483	5251	8648	4715
Fertilization rate (%)	20	43	42	35	26	81	10	40
Total number of fertilized eggs	675	2044	484	2605	905	4253	864	1886
Total number of larvae	443	813	258	1256	609	591	247	296
Hatching rate (%)	66	40	53	48	67	14	29	13

Note: 1 - Preinjection size; 2 - Ovulation size, NA - Date not available.

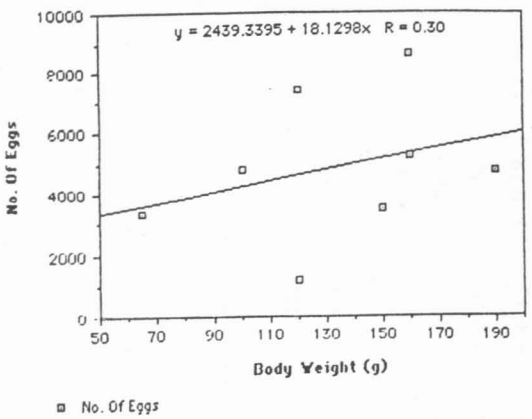

Fig. 1: Relationship between number of eggs and body weight of Clarias batrachus.

ranged from 13% to 67% indicating that there is a need for further research to standardize the methodology in induced spawning of this fish. Further research should include better management of broodstock, determination of the optimum level of common carp pituitary to be administered as well as refinements in the techniques employed for fertilization and egg incubation.

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CHEAH, S.H.
S.S. SIRAJ
K.J. ANG

Department of Aquaculture
Faculty of Fisheries and Marine Science
University Pertanian Malaysia
43400 UPM Serdang, Selangor, Malaysia.

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