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Evaluation of Breeding Performance of Asian Catfish *Clarias batrachus* at Different dose of HCG and Latency Period Combinations

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Abstract

An experiment was conducted to evaluate the breeding performance in *Clarias batrachus* (130±1.32 g) at different HCG dose and latency period combinations. The breeding performance was judged through weight of stripped egg (g) and stripping response {weight of stripped egg/(weight of stripped egg+weight of stripped ovary)}. The females injected with 1000-3000 IU HCG per kg body weight could not be stripped at 11 h latency. The weight of stripped eggs increased gradually with the increase of latency period in both 1000 and 2000 IU dose level. Smooth stripping and free flow of eggs were observed when stripped at 3000 and 4000 IU dose levels in combination with 14-23 h latency periods but a significant decrease ($P<0.05$) in egg was observed at 5000 IU and 17-23 h latency combination. The stripping response was the highest at 3000 and 4000 IU in combination with 14-23 h latency period. The injection of 3000-4000 IU HCG dose per kg female weight in combination with 14-23 h latency was suitable to get good stripping response for the highest weight of stripped egg in *C. batrachus* during induced breeding operation.

Key words: *Clarias batrachus*, breeding performance, stripped egg, stripping response, hcg.

Introduction

Asian catfish *Clarias batrachus* is considered as a potential aquaculture species in Indian sub-continent. The production potentiality of this species in aquaculture has been reported (Thakur and Das, 1986; Areerat, 1987). The easy availability of stocking material is always considered important for successful culture of any fish species. Though the collection of natural seed for the purpose may be an alternative, but it is not sustainable for an intensive culture. The scarcity of marketable fish as well as seed from the natural ground has been felt in this catfish. So the seed production in hatchery will be the only alternative for obtaining optimum quantity of seed for the purpose through induced breeding operation. The injection of different inducing agent in fish breeding is adopted for successful ovulation and collection of eggs in different cultivable fish species. Human chorionic gonadotropin (HCG) is one among them and is reported successful in catfish during induced ovulation (Legendre *et al*., 2000; Adebayo and Fagbenro, 2004). The breeding performance is an important parameter to evaluate the breeding success in captive condition, which depends on the type of hormone used and its potency, dose of hormone and maturity status of the fish. The success of induced breeding also depends on latency period, which has been discussed for several species (Hogendoorn and Vismanas, 1980; Legendre and Oteme, 1995). Appropriate combinations of the proper dose of inducing agent and stripping time always yield maximum egg output during induced breeding. Improper coordination between these two will lead to breeding failure. There is no information available regarding these combinations in this valuable catfish. So the present study communicates the pattern of egg yield and stripping response in *C. batrachus* at variable dose and latency period combinations during breeding operation.

Materials and Methods

C. batrachus brood were raised in 0.01 ha earthen pond of Central Institute of Freshwater Aquaculture, India. The fish were regularly fed at 2% of their body weight with laboratory make pelleted feed containing 30% crude protein and 3.5 Mcal gross energy per kg feed. *C. batrachus* females of homogenous size (130±1.32 g) were selected for induced breeding during monsoon months (July - August). The females were considered on the basis of soft distend belly and uniform shining intra-ovarian oocytes. The HCG (Serono, 1170 Aubonne/ Switzerland) was purchased and reconstituted in 1 ml of solvent provided with the pack. That was further diluted with normal saline solution (0.89% NaCl) to get required concentrations of injectable HCG. Five doses of HCG (1000, 2000, 3000, 4000 and 5000 IU per kg female weight) and five latency periods (11, 14, 17, 20 and 23 h) were used in twenty (5x5) different combinations. Five females were considered for each combination. The body weight of each female was recorded before injecting HCG. The females were injected with selected doses of HCG and kept separately to record the breeding

performance (weight of stripped egg and stripping response). The tubs (100 L) were provided with flow-through water system till the desired latency period. The females of each combination were hand stripped and eggs were collected individually in pre-weighed plastic petriplate. The weights of stripped egg (g) of all five females were pooled. The mean was considered as the average weight of stripped egg for a particular dose and latency period treatment. The stripped females were dissected; ovaries were collected and weighed. The stripping response was calculated by weight of stripped egg/(weight of stripped egg+weight of stripped ovary). The values obtained for five fish were pooled and considered as stripping response at particular dose and latency combination. The statistical analysis of data was performed using two-way ANOVA (Snedecor and Cochran, 1967), which included effects due to HCG doses and latency periods. Treatment effect was considered significant at $P<0.05$.

Results and Discussion

The weight of stripped egg at different dose and latency period combinations is presented in Table 1. The females injected with 1000-3000 IU HCG per kg body weight did not respond to stripping but other two higher doses responded partially at the lowest latency period. This might be due to insufficient time for ovulation of eggs. The weight of stripped eggs increased gradually with the increase of latency period in both 1000 and 2000 IU dose level. The longer latency period might have helped for ovulation in these dose levels. While comparing the results between two the lowest doses, it was observed that the weight of stripped egg was significantly the highest ($P<0.05$) in 2000 IU dose at each latency period. This lower performance in getting less egg in 1000 IU at each latency period might be due to insufficient gonadotropin in the injected dose. The ovulation failure due to insufficient gonadotropin release has also been reported in other species (Tan-Fermin *et al.*, 1997). It was also felt hard while stripping the fish in these dose and latency period combinations, which was also a practical indication of insufficient dose during induced breeding. Smooth stripping and free flow of eggs were observed when stripped at 3000 and 4000 IU dose levels in combination of 14-23 h latency periods with a yield of 9-11 g of eggs per 100 g female brood. This could be due to the ovulation success in these dose levels. So it is suggested that these dose and latency period combinations are ideal for getting more strippable eggs in *C. batrachus*. Zonneveld *et al.* (1988) were also in opinion that optimum quantity of egg is obtained in right combination of pituitary dose and latency period in this catfish. But there is a significant decrease ($P<0.05$) in egg was observed at 5000 IU and 17-23 h latency combination compared to 3000 and 4000 IU dose level at these latencies. Similar observation was encountered in our previous experiment while using high dose of synthetic hormone (SGnRHa + Domperidone) during breeding operation (Sahoo *et al.*, 2006). This decreased output of egg was due to plugging of egg at these combinations, indicating an overdose during breeding operation. The variation of stripping response at different doses and latency periods is depicted in Table 2. A significantly reduced ($P<0.05$) stripping response was observed at 1000-2000 IU dose with 14-23 h latency as well as at the highest doses in combination with 17-23 h latency. This reduced response could be due to less strippable eggs obtained in these combinations. On the other hand, higher stripping responses were observed at 3000 and 4000 IU in combination with 14-23 h latency. The higher weight of strippable eggs due to more complete ovulation was responsible for higher response at these combinations.

Conclusion

The study indicated that best breeding performance in *C. batrachus* was obtained at 14-23 h latency in combination with 3000-4000 IU HCG dose. Good stripping response is always desired to get optimum quantity of egg in hatchery condition. So this information is of value for a commercial hatchery to achieve good production during induced spawning of this catfish. However, the results of the study must be verified by measuring the quality of ovulated eggs through fertilization and hatching.

Table 1. Influence of different dose of HCG and latency period combinations on the weight of stripped egg (g) in *C. batrachus* during induced breeding in hatchery condition

Latency period	Dose of HCG (IU) per kg body weight				
(h)	1000	2000	3000	4000	5000
11	0_x^b	0_w^b	0_w^b	$2.26\pm0.94_w^a$	$2.16\pm0.89_x^a$
14	$2.28\pm0.94_w^c$	$5.60\pm1.42_v^b$	$9.29\pm0.38_v^a$	$10.37\pm0.53_v^a$	$10.82\pm0.44_y^a$
17	$3.14\pm1.29_w^d$	$5.59\pm1.41_y^c$	$9.88\pm0.42_v^a$	$10.96\pm0.33_v^a$	$7.74\pm0.30_w^b$
20	$5.55\pm1.46_v^c$	$7.02\pm0.13_v^b$	$9.48\pm0.22_v^a$	$10.77\pm0.36_v^a$	$6.13\pm0.37_w^b$
23	$5.71\pm1.43_y^c$	$6.97\pm0.29_v^b$	$9.55\pm0.33_v^a$	$10.77\pm0.38_v^a$	$6.17\pm0.42_w^b$

Mean values bearing different superscripts in a row differ significantly ($P<0.05$)
Mean values bearing different subscripts in a column differ significantly ($P<0.05$)

Table 2. Influence of different dose of HCG and latency period combinations on the stripping response of *C. batrachus* during induced breeding in hatchery condition

Latency period	Dose of HCG (IU) per kg Body Weight				
(h)	1000	2000	3000	4000	5000
11	0_x^b	0_w^b	0_w^b	$0.15\pm0.06_w^a$	$0.13\pm0.05_x^a$
14	$0.15\pm0.06_w^d$	$0.33\pm0.08_v^c$	$0.53\pm0.01_v^b$	$0.62\pm0.01_v^{ab}$	$0.64\pm0.01_v^a$
17	$0.20\pm0.08_w^d$	$0.33\pm0.08_v^c$	$0.55\pm0.01_v^{ab}$	$0.64\pm0.01_v^a$	$0.45\pm0.01_w^b$
20	$0.32\pm0.08_v^b$	$0.42\pm0.01_v^b$	$0.57\pm0.01_v^a$	$0.64\pm0.01_v^a$	$0.39\pm0.02_w^b$
23	$0.33\pm0.08_v^b$	$0.42\pm0.03_v^b$	$0.56\pm0.01_v^a$	$0.63\pm0.01_v^a$	$0.36\pm0.01_w^b$

Mean values bearing different superscripts in a row differ significantly ($P<0.05$)
Mean values bearing different subscripts in a column differ significantly ($P<0.05$)

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