INDUCED SPAWNING AND REAR LARVAE OF SPADEFISH *CHAETODIPTERUS FABER* IN MARGARITA ISLAND, VENEZUELA.

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ABSTRACT

This paper describes standard procedures developed to induced spawning of the spadefish *Chaetodipterus faber* (Broussonet) (Pisces: Ephippidae) and rear their larvae under controlled conditions. The spadefish are induced to spawn using human chorionic gonadotropin and luteinizing-releasing hormone analog. Larval rearing is done in the same tank in which the eggs hatched. Larvae were fed with mixed live food and normally after 31 days attained a total length between 24 and 33 mm. In twenty four trials realizated the whirling disease and vibriosis were common. During 1991-1992 a total of 26,731 juveniles were harvested.

Key Words: aquaculture, *Chaetodipterus faber*, finfish, larviculture, Venezuela.

INTRODUCTION

Much attention has been directed towards the artificially induced spawning of fishes and the intensive rearing of the larvae to increase the available supply of aquatic protein resources. The atlantic spadefish Chaetodipterus faber has a wide distribution (USA to BRASIL) in a variety of habitats. Said to reach a length of 3 feet and a weight of 20 pounds, their flesh is good to eat (Randall, 1966). The spadefish readily take a baited hook and have a fine flavor (Bohlke and Chaplin,1968).

In Venezuela it has some commercial importance (Cervigon and Fischer, 1979). The embryonic development of the eggs and larvae stages were described (Gomez,1984), and carried out experimental cage culture (Gomez and Larez,1984) and mature in captivity. The spadefish may have ornamental importance, the young are melanistic, the small juveniles solid black and the may resemble dark-colored bits of plant debris and molluscs (Breder and Rasquin,1955). This fish is a candidate for aquaculture in the Caribbean region (Tucker and Jory, 1991).

This paper describes standard procedures developed to induce spawning of the spadefish and rear their larvae under controlled conditions and operational procedures for successful mass propagation at the Instituto de Investigaciones

Cientificas (Universidad de Oriente) in Margarita Island, Venezuela.

MATERIAL AND METHODS

Mature broodstock available in the Instituto and some loaned by FundaCiencia marine laboratory (Mochima Bay) were used for the trials carried out. Males and females were staged for maturity by applying slight pressure to the abdomen. The spadefish are induced to spawn in captivity using human chorionic gonadotropin (HCG) and luteinizing-releasing hormone analog (LHRH) (des-Gly10[D-Ala6]) both from Sigma Co. Protocols, weight of female fish used and hormonal dosis are summarized in Table 1. Selected fishes were anaesthetized in 200-300 ppm tricaine methasulfonate weighted and marked, intramuscular injections were applied in the epaxial musculature adjacent to the anterior part of the dorsal fin, normally the males do not require hormones. Sometimes the females were catheterized with a polyethylene cannula inserted into the oviduct and oocyte samples obtained by mouth aspiration. A sex ratio of two females to three males was used and they were maintained in 1500 l tanks supplied with aeration and containing filtered and irradiated seawater (salinity 38-40 °/oo and temperature 25-30°C). The criterion for a successful spawn was the release of eggs into the water. The number of eggs was estimated by determining the number in 10 l aliquot and extrapolating for the tank volumen. Fertilized eggs were found floating in the holding tank and skimmed from the surface water. The eggs were transferred to tanks (90 cm diameter and 80 cm depth) where the water was gently aerated. After hatching, the larvae were reared for 31 days and fed with live food. Cultured Tetraselmis chuii (50,000 cel/ml), rotifers and nauplii of Artemia were introduced into the larval rearing tanks in the morning. Live mysids collected in a near coastal lagoon were administered in the last week of each rearing period.

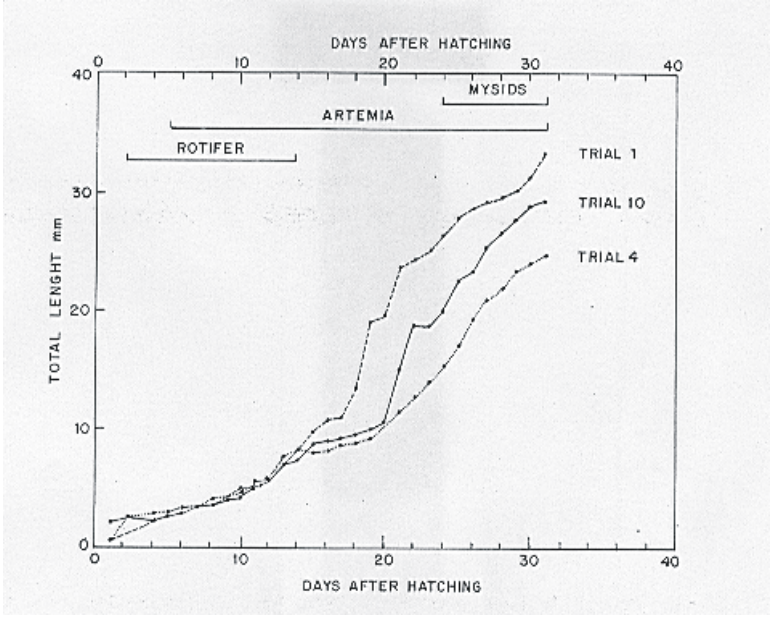

Figure 1 illustrates the schedule of feeding and larval growth of paguara.

RESULTS AND DISCUSSION

Table 1 shows the performance of paguaras broodstock (females) subjected to induced spawning during various periods of the year. During two years (November 1990 to November 1992) were injected 68 females and 29 responded successfully to HCG and LHRH (range doses 60 to 2200 UI/k and 12 to 42 ug/k respectively) (Table 2). Generally fishes injected in July through November spawned 36-45 h after the injection, in the other months the paguara responded poorly to injections. Successful spawns occurred when therapy was iniciated on females with oocyte diameter of more than 400 um and the released eggs have between 0.9 and 1.0 mm (Gomez,1984) and total fecundity ranged between 16,500 and 502,000 eggs (Table 3). The range of dosages used in this study had no effect on fertilization rates or spawned egg diameters.

Table 1. *Chaetodipterus faber* females treated with hormones during two years of experiments in Margarita Island, Venezuela

DATE	WEIGTH(G	HORMMONE	DOSE	SPAWN	HOURS
26-11-90	304	GCH	500	Y	36
	360	GCH	500	N	
	402	GCH	1000	N	
	298	GCH	1000	N	
	450	GCH	1500	N	
	415	GCH	1500		
	405	GCH	1000	Y	38
	375	GCH	1000	Y	38
04/12/90	332	GCH	250	Y	40
	418	GCH	250	Y	40
21/03/91	655	LHRH	15	N	
	523	LHRH	10	N	
	404	LHRH	10	N	
	360	LHRH	13	N	
18/04/91	525	LHRH	13	N	
	618	LHRH	11	N	
04/05/91	460	GCH	217	Y	36
	375	GCH	266	Y	36
10/05/91	305	GCH	245	N	
	483	GCH	155	N	
	394	LHRH	35	N	
	411	LHRH	35	N	

	441	LHRH	35	N	
01/06/91	560	GCH	450	N	
	390	GCH	640	N	
	550	GCH	330	N	
	465	GCH	400	N	
08/06/91	383	GCH	156	N	
	374	GCH	160	N	
12/06/91	383	GCH	456	N	
	443	GCH	451	N	
19/06/91	457	GCH	800	N	
	354	GCH	500	N	
01/07/91	575	GCH	2100	Y	
	465	GCH	2200	Y	
06/07/91	787	GCH	600	N	
	710	GCH	700	N	
	615	LHRH	20	Y	40
18/09/91	338	GCH	600	Y	36
	352	GCH	620	Y	36
	437	GCH	350	Y	36
	406	GCH	350	Y	36
	425	LHRH	12	Y	36
	428	LHRH	12	Y	36
16/10/91	441	GCH	450	Y	36

	471	GCH	480	Y	36
14/02/92	395	LHRH	25	N	
	443	LHRH	22	N	
	512	LHRH	25	N	
26/03/92	575	LHRH	17	N	
	590	LHRH	42	N	
04/04/92	555	LHRH	22	N	
	570	LHRH	24	N	
21/04/92	452	LHRH	20	N	
	420	LHRH	27	N	
07/05/92	1010	LHRH	20	N	
	746	LHRH	27	N	
10/06/92	359	GCH	500	Y	40
05/07/92	460	GCH	435	Y	40
	635	GCH	275	Y	40
	910	GCH	357	Y	40
02/10/92	502	GCH	99	Y	45
	640	GCH	78	Y	45
	837	GCH	60	Y	45
06/11/92	663	GCH	75	Y	38
	643	GCH	77	Y	38
	767	GCH	66	Y	38
	831	GCH	120	0	38

Newly hatched larvae vary in length from 1.9 to 2.1 mm and have a yolk sac which is depleted after two or three days (Gomez,1984). Larval rearing is usually done in the same tank in which the eggs hatched. Feeding start 48 - 72 hours after hatching and was a common practice to add Tetraselmys to naturalize the tank water and to provide natural food. The larvae were reared for 31 days and fed with mixed live food. Cultured rotifer Brachionus was given on day 3 at density of 5-12 pieces/ml and increased until 20/ml. Newly hatched Artemia were administered beginning on day 5 at density of 2/ml and increased until 10/ml (day 25). On the last week of the rearing period were supplied with live mysids. Figure 1 illustrates the schedule of feeding and larval growth of paguara. After 31 day larvae normally attained a total length between 24.1 and 33.1 mm (Table 4) but larval growth is dependent on larval density and diseases problems which cause slow growth (13 to 16 mm in 31 days) (Table 4). Larvae are vulnerable to problems resulting from ingestion of the empty cyst or shells of Artemia. Poor tanks management can also result in high mortality rate, an important task is the cleaning of the tank bottom where debris, fecal heces, dead fish and unconsumed food are deposited. Some diseases were observed in trials, during 1991 a heavy mortality (whirling disease) was caused by a myxosporidian which invaded the brain of larvae and during 1992 vibriosis diseases were common.

Table 2. Summary of induced spawning trials of *Chaetodipterus faber* in Margarita Island, Venezuela.

Females injected; 68	Spawned: 29	
eggs/spawn: 16,000 to 502,000		
Range females weights (g)	Hormone	Doses range
298 to 910	GCH	60 to 2,200 UI/K
360 to 1010	LHRH	12 to 42 Ug/k

Table 3. Data from the experiments on the rearing of *Chaetodipterus faber* in Margarita Island, Venezuela. (TL = total length)

DATE	TRIAL	TEMPERATURE	TL AFTER 31 DAYS

07/5-6/91	1	26.0-29.5	33.1
	2	25.6-29.3	29.2
9/7-8/8/91	3	26.1-28.9	28.0
20/9-21/10/91	4	26.5-28.7	24.4
	5	26.5-28.6	26.1
	6	26.5-28.7	29.3
	7	27.0-28.5	29.3
	8	26.5-28.6	27.7
	9	27.1-29.0	29.1
20/10-19/11/91	10	26.0-28.8	28.2
	11	26.2-28.7	29.5
	12	26.2-28.9	30.8
	13	26.4-29.1	30.9
07/07-08/08/92	14	26.4-29.1	16.5
	15	25.4-27.1	13.2
	16	25.3-27.4	15.4
	17	25.4-27.2	15.3
	18	26.0-27.6	16.9
	19	26.4-27.3	13.9
04/10-05/11/92	20	26.3-29.1	26.3
	21	26.4-28.5	26.5
	22	26.5-28.2	27.7

	23	26.5-28.3	27.0
	24	26.5-28.4	28.5

Table 4. Production data on the rearing of *Chaetodipterus faber* in Margarita Island, Venezuela.

TRIAL	EGGS	% FERTILIZATION	# JUVENILES
1	39,000	84.61	1,497
2-3	190,250	72.40	989
4-5	303,000	82.17	5,161
6-7	219,000	69.86	4,039
8-9	409,500	71.79	2,542
10-11	81,000	37.04	2,385
12-13	16,500	1.00	--
14-19	502,000	19.17	6,600
20-24	348,000	58.60	3,518

JUVENILES OF SPADEFISH REARED/1991 : 16,613
/1992 : 10,118
TOTAL :26,731

In the 1991 trials the harvested fish totaled 16,613 and 10,118 during 1992 (Table 4). The fishes that are grown to a size of 30 mm or so are used as seedlings for further cultivation in captivity and others restocked to the sea.

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