

Comparison of Spawning Response of Silver carp (*Hypophthalmichthys molitrix*) and Grass carp (*Ctenopharyngodon idella*)

Sana Urooj¹⁻², Aroosa Qayyum³, Muhammad Arfan Hadyait^{3*}, Shaista Razzaq², Dr. Zubair Anjum²

¹Punjab Fish and Seed Hatchery Rawal Town Islamabad

²Department of Zoology, Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi

³Fish Quality Control Labs, Fisheries Research & Training Institute Manawan Lahore, Pakistan.

*Corresponding Author: marfan39@gmail.com

Abstract

*In the present study, intramuscular injection of ovaprim-C was studied on the number of eggs/kg, fertilization rate and hatching percentage during April to August 2015 at Punjab Fish and Seed Hatchery Rawal Town Islamabad on Silver carp (*Hypophthalmichthys molitrix*) and Grass carp (*Ctenopharyngodon idella*). Fishes were spawned successfully following a single dose of injection of ovaprim-C (luteinizing hormone releasing hormone analogue) with 0.5 ml/kg for female and 0.1 ml/kg for male. Experiment was conducted in circular spawning tank. The results showed successful spawning of both fish species silver carp (*Hypophthalmichthys molitrix*) and Grass carp (*Ctenopharyngodon idella*) with the constant dose of ovaprim in captivity which was found to be fruitful for commercial scale fish production and we conclude that ovaprim proved the advantages over other commercial pituitary and not it reduces the brood handling problems but also reduces the post spawning mortality of fish as for as it increases spawning response too.*

Key Words: Ovaprim; Silver carp; Grass carp

1. Introduction

In Pakistan the trend of carp culture in aquaculture industry is expanding day by day and almost all carp culture able species is being practiced in all over the Pakistan. As the Pakistan have a good aquaculture operational potential sources of 1100 km coastline but still it only cultivated nine species among warm water and cold water species commercially. This is due to lack of good developmental and management system of this sector (Akhtar 2005).

The downside of aquaculture industry is deficiency of good quality seeds production which get diseased and pest during the stocking (Mylonas *et al.* 2001). Besides of all that there are certain environment conditions which restrict the fish productivity due to natural distinction because some species do not breed at captivity solution. To overcome this problem induced breeding method is being used in which the pituitary extracts are injected into the body to bring ovulation and results good collection of eggs in number of culture able fishes (Naeem *et al.* 2011)

The Chinese carps included silver carp (*Hypophthalmichthys molitrix*) and Grass carp (*Ctenopharyngodon idella*) are native to China and introduced first time in Pakistan since 1959 to check their compatibilities to the Indian major carps, extend the culture as

well as to overcome the biological aquatic weed. (Khan et al. 2004).

There are many synthetic GnRH and dopamine antagonist containing spawning agent's i.e ovaprim-C, aquaspawn etc. are commercially available used to induce spawning in different types of fish (Brzuska 2006; Marimuthu *et al.* 2009).

Ovaprim is one of them commercially available pituitary extract product and being injected in liquid form which is successfully useful to induce spermiation and ovulation in fishes (Akhter *et al.* 2014). Ovaprim constitute of synthetic GnRH (gonadotropin-releasing hormone) and Domperidone. GnRH has a resemblance to the natural GnRHs.as it activates the pituitary gland to initiate the reproduction while the domperidone has the preventive action of blockage the GnRHs activity in stress conditions. (Pandey *et al.* 2017). The aim of present study to check the effect of ovaprim on the spawning response of hatchery reared brood stock of Chinese carps.

2. Material and Methods

The experiment has been conducted in Punjab Fish and Seed Hatchery Rawal Town Islamabad during the month of April to August 2015.

Seventy five samples of healthy and sexually mature brooders of two species having the weight more than 1.5kg were captured. The experiment was designed in five groups of fish and conducted in five trials. Each group consisted of fifteen fishes with the ratio 1:2 for female and male and single trial was of one month so the present study was done in five months. The fish was kept in spawning circulating tank for acclimatization before the commencement of experiment. The ovaprim dosage was calculated by following the formula used by (Nandeeshha et al. 1991)

Quantity to be injected (ml) = weight of brood fish (kg) x dosage of ovaprim-C (ml)

The selected dose of ovaprim 0.1 ml/kg and 0.5 ml/kg were injected intra muscularly to the male and female respectively. To examine the breeding response fish were released in controlled circular tank having temperature of 25°C to 27°C.after 8 to 9 hours of dosage fishes were selected for stripping followed by dry method of fertilization used by (Chaudhary et al. 1984).The sexual products were released in plastic tub and mixed by using bird feather for 2.5 minute to minimized the distance between the sperm and micropyle of egg to carried out fertilization. The total number of eggs/kg were counted by the following formula.

Number of eggs /kg=Total number of eggs/total weight of fish.

Hatching of larvae was started after 18 to 24 hours of fertilization under the temperature (25 to 29°C).For the calculation of hatchling the larvae were kept in circulating tank for three days as the yolk sac disappeared the percentage of hatchling was conducted by the following formula:

Percentage of hatchlings = (Total No. of hatchlings/total No. of fertilized eggs) x 100

3. Results and Discussion

The study was conducted into five trials (each trial of one months) in which each species was divided into five groups and the sex ratio was used in accordance with the (Naeem *et al.* 2005a). The experiment was carried out in circular tanks and the dose of ovaprim injected in female and male were kept 0.5 ml/kg and 0.1 ml/kg in both species

respectively that was similar the dose used by (Naeem *et al.* 2005c). The ovaprim dose kept constant to observe the variation in spawning

response of both species throughout the breeding season.

Table 1: Spawning response of Silver Carp to Ovaprim.

Months	Temp (°C)	Females	Pre wt. (kg)	Post wt. (kg)	Ovaprim ml/kg	Spawning Time (hrs)	Degree Hours	Total No. of eggs (lac)	No. of fertilized eggs (lac)	Total No. of Hatchlings
April	24	5	3.45	3.18	0.5	10.6	255.8	3.1	2.42	1.74
May	26.3	5	3.06	2.78	0.5	10.26	269.8	2.54	2	1.56
June	27	5	3.01	2.71	0.5	9.68	261.3	2.36	1.8	1.3
July	27.5	5	3	2.66	0.5	9.2	247.5	2.4	1.9	1.4
August	28.5	5	2.36	1.9	0.5	9.04	257.5	2.18	1.62	0.82

Table 2: Spawning response of Grass Carp to Ovaprim

Months	Temp (°C)	Females	Pre wt. (kg)	Post wt. (kg)	Ovaprim ml/kg	Spawning Time (hrs)	Degree Hours	Total No. of egg (lac)	No. of fertilized eggs (lac)	Total No. of Hatchlings
April	24	5	3.34	2.9	0.5	9.14	219.4	2.7	1.82	1.28
May	26.3	5	2.7	2.4	0.5	8.58	225.6	2.38	1.96	1.76
June	27	5	2.5	2.1	0.5	8.3	224.1	2	1.6	0.94
July	27.5	5	2.3	2.1	0.5	8.14	223.9	1.64	1.56	0.84
August	28.5	5	3	2.6	0.5	8.16	232.5	2.26	1.94	1.48

Table 3: Comparison of spawning response of Grass and Silver to Ovaprim.

S.No.	Parameter	Ovaprim treatment	
		Grass	Silver
1	No of females treated	25	25
2	Total weight of females	69	74.3
3	Total no of eggs	5490000	6410000
4	Total no of fertilized eggs	4440000	4930000
5	Total no of hatchling	3150000	34510000
6	Overall fertilization percentage	80.80%	76.90%
7	Overall hatching percentage	70.90%	70%
8	Average no of eggs/kg	79565.4	96271.8
9	Spawning time	8.45	9.45

In the present study the successful spawning of both fish species silver carp (*Hypophthalmichthys molitrix*) and Grass carp (*Ctenopharyngodon idella*) was observed with the constant dose of ovaprim in captivity which was found to be fruitful for commercial scale fish production. The outcomes of the study was similar to the results of (Naeem *et al.* 2011; 2005a)

In both species (silver carp and grass carp) the Overall fertilization percentage and Overall hatching percentage was observed 76.90%, 80.80% and 70%, 76.45% respectively. The similar results were found in (Naeem *et al.* 2005a; 2011). The total no of eggs with respect to the total fish weight in silver and grass carp were observed 6410000, 5490000 and the total fish weight was 74.3kg, 69kg as the total no of eggs are directly proportional to the total body weight of fish as it increases the fecundity also increased but in such case it reduces as the body weight increased. The outcomes of the study shows little resemblance with the findings of (Naeem *et al.* 2005b; 2011).

Both species showed the 100% ovulation with the single dose of ovaprim but there little difference was observed in average spawning time of both species Silver and Grass Carp 8hr and 9hr respectively. As the spawning directly depend upon the temperature but in such experiment it increased as the temperature increased and was kept the same in case of both species.

4. Conclusion

The findings of the present study showed the best response of both species on single dose of ovaprim and prove the ovaprim advantages over other commercial pituitary. Not it reduces the brood handling problems but also reduces the post spawning mortality

of fish as for as it increases spawning response too.

References

- [1]. Akhtar, N. (2005). Government of Pakistan, Overview: Medium Term Development Framework, 2005-2010.
- [2]. Akhter, R., Gupta, R. and Zube, S.M.(2014).Effect of Various Doses of Ovaprim on the Reproductive behavior of Rainbow Trout *Salmo Gairdneri Gairdneri* Inhabiting Trout Hatchery Farm at Kokernag Anantnag Kashmir. International Journal of Fisheries and Aquaculture Sciences.
- [3]. Brzuska, E. (2006). Artificial propagation of female Hungarian strains 7 carp (*Cyprinus carpio*) after treatment with carp pituitary homogenate, Ovopel or Dagin. Czech J. Ani. Sci. 51: 132-141.
- [4]. Chaudhary, H., Singh, S.B., Sukumaran, K.K. (1984).Induced breeding of carp. ICAR. New Delhi, India.pp82
- [5]. Das SK (2004). Evaluation of a new spawning agent, Ovopel in induced breeding of Indian carps. Asian Fish. Sci. 17: 313-322.
- [6]. Khan, M.S., Khan, S.A., Chaudhary, Z.I., Khan, M.N., Aslam, A., Ashraf. K., Ayyub, R.M., Rai, M.F. (2004). Mercury intoxication in grass carp (*Ctenopharyngodon idella*). Pak. Vet. J. 24(1): 33-38
- [7]. Marimuthu, K., Haniffa, M.A., Rehman, M.A. (2009). Spawning performance of native threatened spotted snaked fish, *Channa punctatus* (*Actinopterygii: Channidae; Perciformes*), induced with ovatide. Acta Ichthyol. Piscat. 39(1): 1-5.
- [8]. Mylonas, C. C.Y., Zohar. (2001). Use of GnRH-delivery systems for the control of

reproduction in fish. Rev. Fish Biol. Fish. (10): 463-491.

[9]. Nandeesh SG, Ramacharya V. TJ (1991). Further observation on breeding of carps with Ovaprim, Special Publication No. 6. Asian Fish. Soci. Indian Branch, Mangalore. pp. 41.

[10]. Naeem, M., and Salam, A. (2005a). Induced spawning of bighead carp *Aristichthys Nobilis* by using Ovaprim-Cat fish hatchery Islamabad, Pakistan. Sindh. Univ. Res. J. (Sci.Ser). 37 (1): 9-16.

[11]. Naeem, M., Salam, A., Diba, F. and Saghir, A. (2005b) Fecundity and Induced Spawning of Silver carp, *Hypophthalmichthys molitrix* by using a Single Intramuscular Injection of Ovaprim – C at Fish Hatchery Islamabad, Pakistan Pakistan. J. Bio. Sci. 8(8): 1126-1130.

[12]. Naeem, M., Salam, A and Jafar, A. (2005c).induced spawning of major carp

catla catla by single intra muscular injection of ovaprim-C and Fecundity at fish hatchery Faisalabad Pakistan. J. Bio. Sci., 5(6):777-780.

[13]. Naeem, M., Zuberi, A., Salam, A., Ashraf, M., Elahi, N., Ali, M., Ishtiaq, A., Malik, T., Khan, M. J., Ayaz, M.M., Iqbal M.J. and Ahmad, B.(2011). Induced Spawning, Fecundity, fertilization rate and hatchling rate of Grass Carp (*Ctenopharyngodon idella*) by using single intra muscular injection of ovaprim-C at fish hatchery Faisalabad Pakistan. Afr. J. biotech. 10(53):11048-11053.

[14]. Pandey, N.N., Gupta, M., Singh, R., Ali, S., Haldar, R.S., Kumar, P. and Singh, A.K. (2017). Breeding performance of indigenous carp, *Labeo dero* in captivity under cold water condition of Uttarakh and, India. Journal of Environmental Biology. 38:771-775