

# Fish pituitary gland collection and supply as a vocation in West Bengal, India

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*Healthy L. rohita spawn supplied to farmers.*

In India, West Bengal is a pioneer state and leads in hatchery-oriented induced bred seed production of major carps. Healthy carp fry production, the stockable size in rearing ponds for raising fingerlings, amounted to 22,691 million in West Bengal in 2018-2019 and carp spawn production increased to 15,002 million in 2012-2013 from 2,000 million in 1982. Good quality seed (spawn and thereafter fry) of pure varieties of carp dictates the success of grow-out culture and table fish production. It is the most important input in freshwater fish aquaculture and culture-based fisheries in India, facilitating growth and expansion. From every 5 million major carp spawn stocked in well-managed earthen nursery ponds, 1.5-2.5 million fry are produced in 15-18 days.

Widespread adoption of the hypophysation technique for carp breeding started in the mid-1970s in West Bengal and other states and established steadily. Most major carp breeders and hatchery owners in West Bengal today prefer fish pituitary gland (ie., hypophysis) as inducing agent (hormonal injection) over commercially available synthetic hormones. Hormones stored and secreted in the fish pituitary gland cause spermeation and ovulation in mature carps and release of gametes effectively in hatchery conditions. The pituitary glands of mature fish are gathered by professional collectors in retail fish markets for carp breeding, and sold to hatchery owners.



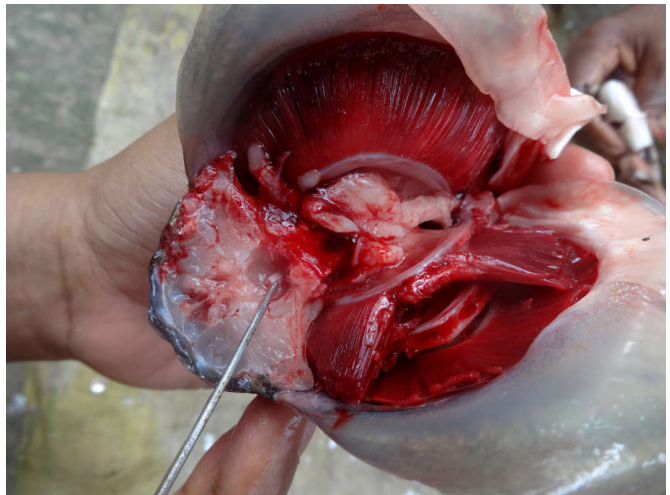
*Tools of a pituitary gland collector.*

In West Bengal, a greater concentration of fish hatcheries is found around Naihati Village in Barrackpore-I Block, North 24 Parganas District, which in the 1970's had three hatcheries, but has now become a major concentration of fish seed production in India. Ramsagar Village in Onda Block, Bankura District, is also a well-known site for commercial carp hatcheries. In early 2015, 596 functional fish hatcheries existed in the private sector in West Bengal. In August 2016, the West Bengal Fisheries Directorate published a directory with contact information for 454 private sector major carp seed hatcheries, another five under the Fisheries Directorate and 33 carp seed farms (for fry and fingerling production)<sup>1</sup>.

## Pituitary gland collection

In retail fish markets in Kolkata city proper, suburbs and neighbouring districts, pituitary glands are collected by trained and professional persons from the foramen magnum region (large posterior aperture of fish skull) of the heads of major carps  $\geq 1$  kg in size. Prior to sale, fish sellers remove major carp heads with a strong native knife ('bonti') at a fixed distance from the body. As the posterior part of cranium is cut, sufficient space is left to remove the brain and collect the pituitary gland. After drilling the bony portion carefully with a short sharp knife, collectors remove a small lump of grey matter and fatty tissue from the region and set it aside. A 15 cm long needle is inserted through this opening and the pituitary gland located and removed with the blunt (bent) end of the needle. Then small opening is then smoothed over and the head returned to the seller for sale.

Hatchery owners obtain pituitary glands preserved in acetone from markets in Kolkata, Kalna and Naihati. Glands are supplied to hatcheries at Naihati, Kalyani, Ramsagar, Balagarh, Pandua, Kalna, Kaliagarh (in Bankura, Hooghly, North 24 Pgs and Purba Bardhaman districts in West Bengal)<sup>2</sup>. A survey covering 149 major markets in 20 districts of West Bengal estimated that a total of 8-9 million pituitary glands are collected by local youths at the onset of monsoon until its peak, sold at INR 5-8/piece<sup>3</sup>.



*Position of foramen magnum in C. catla head (300 g).*



*Alcohol preserved fish pituitary glands.*

### Activity of pituitary gland collector Bachchu Dey

Sri Bachchu Dey, residing near Sealdah Koley market and aged 56, has been collecting fish pituitary glands professionally since 1982 as his main means of livelihood. He does mass-scale pituitary gland collection himself in the semi-crowded and quite noisy Lokarmat-Sishumangal fish retail market in south-east Kolkata every day from 7.30am-11am; his trained assistants also collect glands for him from the Manicktala and Ananda Palit Chorgarod fish markets in north-central Kolkata. Sri Dey's workplace is 7-8 km from home. He collects 160-200 pituitary glands daily from different fishes, viz., *Labeo rohita*, *Catla catla*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Pangasianodon hypophthalmus*, *Sperata seenghala*, *Rita rita*, *Lates calcarifer* (4-6 kg), *Nibeia soldado* (bhola bhetki) from 10-12 fish sellers, neither disturbing them nor buyers. Major carps as donors of quality pituitary gland weigh between 900 g – 3 kg and *C. catla* sometimes weigh even 6-8 kg. Demand for pituitary glands is highest during the monsoon months until the end of August, the carp spawn/fry production season.

Until 1988, every fortnight for six months a year, he travelled 80-100 km from home and supplied pituitary glands to a hatchery at Kulgoria Choti, Sibdurga hatchery, and Nabodar hatchery in Galsi-II Block, Purba Bardhaman District. Pituitary gland collection and supply has become his year-round activity since 1990. Presently middlemen/agents collect pituitary glands from his doorstep which are supplied to established hatcheries at North 24 Parganas and Bankura districts. From September, on demand, he collects pituitary glands from *Cyprinus carpio* as it breeds during winter. Until 1987, he paid INR 0.50 to fish sellers for each fish head he collected from, which was sold for INR 2.50-3.50. In his words, the pituitary glands of 2.5 – 3 kg carps appear as lentil grains, bigger than smaller sized fishes. Presently he pays INR 2.00 for every fish head; and sells pituitary glands @ INR 8.00/piece. He gets INR 5.00, 6.00-7.00 and 10.00 for each pituitary gland if segregated by size before selling. Collecting in 30 ml amber-coloured glass vials containing 100% alcohol, he returns home, exchanges the alcohol, remove impurities from the glands, counts and stores them at 4°C. Alcohol is exchanged once in 12-15 hours until the glands are collected from him, in lots of 1,000-2,000 each time.

Combining the three markets, Sri Dey's daily collection is 550. For every 200 pituitary glands, he pays INR 400 and earns INR 1,500 daily. Bearing expenses for tiffin, fuel for motorcycles, etc., he makes a profit of INR 500 and above daily from the sale of 200 pituitary glands, i.e., ≥ INR 15,000/month. He can minutely distinguish alcohol-preserved pituitary glands of major carps from those of large catfishes; collected both from donor ice-preserved fresh imported fishes and fresh local ones of proper size. He collects 4-5 pituitary glands/minute holding fish heads upside down on his left palm. Pituitary glands are placed on his lower left arm just after collection, 5-10 collectively dipped inside vials before they start drying and enzymatic decomposition of gonadotropin begins. Screwcaps are tightened to avoid contamination with water.

### Activity of Md. Ali and the price of fish heads

Md. Zulfikar Ali, aged 34 at Talsa village under Dighra-Manikberia GP, Habra-II Block, North 24 Parganas has been doing pituitary gland collection since 1998, which he supplies to fish breeders on demand during June-July. Working for six hours



Pituitary gland from a mature *C. catla* of 1.3 kg.



Two different sizes of pituitary glands in separate vials.



Selection of pituitary glands in fish hatchery for injection.



*Pituitary gland suspension after homogenisation.*

in forenoon daily in local fish markets, he earns INR 8,000-9,000/month. He gives a certain amount to sellers from whom he collects fish heads. Sri Dey, Md. Ali and others involved in pituitary gland collection, preservation and marketing also collect glands from large Indian major carps bought at homes in at times of occasions like marriage ceremonies. According to Md. Ali, the potency of alcohol-preserved pituitary glands remains for 2-3 years at 4°C in airtight phials, with routine change of alcohol. Fish pituitary glands from West Bengal are also transported to hatcheries in Andhra Pradesh and Tamil Nadu.

Pituitary glands weigh 5-6 mg (wet weight) and 9-10 mg collected from 1-2 kg and 2-3 kg *L. rohita* respectively. An experienced worker easily manages to collect 50-60 pituitary glands per hour<sup>4</sup>. With practical experience, this work seems easy. A beginner (entrepreneur) in carp spawn production will require 100 mg of pituitary gland for every 10 kg female brooder in a single operation in a hatchery in four months (breeding season)<sup>5</sup>. The same females are induced to breed 3-4 times in a season. For every male and female *L. rohita*/*C. catla* of 2 kg size, around 24-36 mg of pituitary gland are required per breeding operation. The author observed that in Kolkata retail markets, a 750 g head of a large *C. catla* or that of *L. rohita*, or 650 g head off a 3.6 kg fish normally sold @ INR 80/kg to general buyers/consumers. The same weighing 300 g off a fresh 1.3 kg *C. catla* in district markets will cost

INR 28-30. Heads of *L. rohita* 800-1,000 g are sold @ INR 15-20/piece at times of bulk availability. For 800 g *L. rohita* or *C. catla*, the head weighs around 200 g and is normally sold @ INR 50-60/kg. For 3.0-3.5 kg fish, with a head weighing 800 g the price can reach INR 100/piece. A 400 g head off a 1.5 kg *C. catla* sold at INR 30-32.

#### **Fish pituitary gland supplier Tapan Ghosh**

Sri Tapan Ghosh, aged 59 at Goalafatak, near a hub of carp hatcheries at Naihati, has long experience in supplying pituitary glands to hatcheries. In addition to local supply, he visits Maharajganj and other villages in Gorakhpur and Charbagh districts, Uttar Pradesh, once in three weeks, distributing 20,000-25,000 of alcohol-preserved pituitary glands to the owners of 60-70 hatcheries. The faint brick colour of pituitary gland is retained if they are properly washed and preserved, otherwise they will turn whitish, Sri Ghosh mentioned in a conversation recently. He segregates pituitary glands of 2.0-2.5 mg (from 1.5 kg *L. rohita*/*C. catla*) and 4-5 mg (from 3.5-4.0 kg fish) separately, with 500 and 1,000 of larger and smaller size respectively in each of 10 ml vials. Large vials contain 7,000. Supply season ends in September, but he collects every month. In the early 1980s, he sold 80,000-85,000 pituitary gland in every season; INR 0.50 had to be paid for each fish head to sellers. Then pituitary gland collectors working under Sri Ghosh were paid



Sri Ghosh with some of his pituitary gland stock.



Author with Sri Debnath.

INR 1.20/pituitary gland and sold by him for INR 1.50-1.80 each to 15-18 fish hatcheries established around Naihati in villages namely Madarpur, Awalsiddhi, Ramchandrapur, Hamidpur, Shibdaspur. In 2020, he paid INR 10-12 for each collected pituitary gland and same sold at INR 15-16. pituitary glands were sold at a higher price in the COVID-19 induced lockdown period due to lower supply of larger major carps in market and high demand for pituitary gland. During 2012-2016, his cost and selling prices were INR 4.50 and INR 5.50-6.00/pituitary gland respectively.

Since early 2018, he sold 300,000-320,000 pituitary gland/season and normal sales are 35,000-45,000/month, with customers even at Raipur, Chattisgarh. He gains INR 1.50/pituitary gland, excluding expenses incurred. In the off-season of early November 2020, he bought glands @ INR 7.00-8.50 for stock. The pituitary gland of *Cyprinus carpio* has high potency and the fish remains gravid all year round, he stated and travels by himself to collect glands already gathered by 15 people working in retail fish markets in Bardhaman and Midnapore districts, also in Odisha. He first supplied pituitary glands to hatchery owners outside West Bengal in Darbhanga District, Bihar in 1996; he explained that pituitary glands harden once dipped in alcohol, but extracted brains do not and preserved pituitary glands do not disintegrate nor become soft when pierced by a needle. Emphasising that there are no alternatives to pituitary gland, Sri Ghosh opined that spent brooder carps attain a 'ready-to-be-bred' stage once again in the same season if pituitary gland is used as inducing agent instead of synthetic hormones and if the fish are maintained properly. Such females spawn twice (*C. catla*) or thrice (*C. idella*, *L. rohita*, *H. molitrix*). Many hatchery owners prefer to buy pituitary glands even if the price is high. With encouragement of renowned fish breeder the Late Nilratan Ghosh earlier on collection and supply of pituitary glands to fish hatcheries, Sri Ghosh became proficient in this business-oriented activity, working faithfully with determination even after death of his only son in 1994.

### Large-scale business of Ratan Debnath

Sri Ratan Debnath at Vill. Purbo Methermathpara, Block Haringhata, Dist. Nadia is one among very few dominating large-scale business people and wholesale suppliers of fish pituitary gland in West Bengal, operating since the year 2000. He collected 200-300 pituitary glands/day initially on

his own; presently 18-20 persons work directly under him as paid gland collectors, supplying him with 2,000/day from an equal number of retail fish markets in Asansol, Katwa, Nabadwip, Chakdah, Krishnanagar, Gobardanga, Ranaghat, Habra, Bongaon and other towns and Taratala, Behala, Patipukur, Kestopur markets in Kolkata. In addition to this, 5-6 independent collectors supply part of their take to him. Sri Debnath pays INR 1.50-2.00 for each fish head to major carp sellers and INR 5.00-6.00 to his workers for every pituitary gland collected. Retail fish pituitary gland sellers buy it from him in bulk ( $\geq 5,000$  /person) once in every 6-12 days, smaller ones for INR 7.50-8.00 and larger for INR 10.00-12.00 individually, which are supplied to 80-100 hatcheries in Chattisgarh, Bihar, Assam in addition to reputed fish hatchery owners in districts of West Bengal. He makes a profit of INR 0.50-2.00/pituitary gland and his monthly collection is 60,000-70,000 (sometimes reach 0.15 million combining all assured sources) and same is sold. Demand peaks from March to August every year and he maintains sufficient pituitary gland stock (0.10-0.15 million) at home at 4°C during other months, with fortnightly change of alcohol. In addition to small glass vials, he maintains stock in 120 ml vials containing 6,000-10,000 in each, depending on individual size. Only 3,000 pituitary glands of Rita rita, larger than major carps, make up every such vial.

Sellers bought pituitary gland from Sri Debnath at a high price (INR 22-25/pituitary gland) during the recent COVID-19 induced lockdown period, compared to INR 5.00-6.00/pituitary gland during 2005-2015. He developed a drying technique of fish pituitary glands; material is supplied to hatcheries in Bangladesh and elsewhere @ INR 10,000/g and same is the price of dusted form of pituitary glands, which he prepares and sell as 1 g vials. He pays advance money to fish sellers for one year in all markets in different locations of West Bengal from whom his collectors get the material; all deliver their collection (made during 7.00-11.00am) to him every day. His 24-year-old son, an arts graduate and trained in pituitary gland collection on-field, is one of them.

### End note

During the early part of May 1958, scientists at the Pond Culture Division of the ICAR-Central Inland Fisheries Research Institute, Barrackpore collected over 100 pituitary

glands of maturing major carps from the Kolkata fish markets. The same was done by scientists at the Allahabad Research Centre, Jhansi with 4-6 times more in number during June-July 1958 (Source: ICAR-CIFRI Annual Report, 1961). Since the mid-1970s, trade in pituitary gland collection from mature carps has flourished in the Howrah fish market. The heads of fish in breeding season were offered to pituitary gland collectors for INR 2.00-3.00 and same returned to fish sellers after collection. This market served as donor fish for pituitary gland collectors in West Bengal and neighbouring states<sup>6</sup>. At the then Cuttack Research Station of CIFRI in the late 1950s and 1960s, pituitary glands collected from the Kolkata fish markets from well-preserved iced donor fishes found fully potent for induced breeding work, though fresh fish were preferred<sup>9</sup>.

In fish hatcheries in Bangladesh, pituitary gland hormone has tripled in price since the COVID-19 crisis started (Source: Field Notes on Impacts on aquaculture and fisheries in Bangladesh in times of COVID-19; fish.cgiar.org).

In 964 Government accredited and registered carp hatcheries in Bangladesh produced 610 tonnes of carp spawn annually via hormonal injection of pituitary gland extract. About 40-50 kg of pituitary gland was required to produce this volume of spawn. Material inputs from Kolkata, i.e., dried pituitary glands from food fish markets, were supplied to major fish seed production centres at Jessore District, Bangladesh<sup>7</sup>. Pituitary glands of mature major carps are items of higher biological research and of practical demonstration at undergraduate / postgraduate level, and are indispensable to commercial fish hatcheries, providing a means of livelihood generation and an important contribution to fish culture.

In the chapter 'Fish breeding and reproduction' of a Bengali book on fish culture authored by Prof. Bana Bihari Jana, it was mentioned (when translated into English): 'These days cut heads of large-sized major carps are found to be sold in fish markets in West Bengal and some middle-aged persons with little effort to collect pituitary glands from these heads'. The author read it in 1998-1999 during undergraduate studies but did not appreciate then the importance of this activity as profession. Young people assisting fish sellers/traders in retail markets may gain additional income if they collect pituitary glands from major carps for hypophysation. With a reasonable charge, people involved in fish dressing may begin pituitary gland collection as a promising entrepreneurial activity. One person/retail fish market in Kolkata and other places, can be involved in other income-generating activities after 11.30 am. Pituitary glands can be collected, preserved, and stored quite in advance of fish breeding season. The total number of registered fish retailers in Kolkata is 2,407 and there are 98 registered fresh fish retail markets in the same number of municipal wards. The majority of these serve as a major source of pituitary gland supply during fish breeding season. There were separate pituitary gland collectors, who paid INR 0.50 /pituitary gland to retailers<sup>8</sup>. This activity does not reduce market value of fish heads.

According to a survey made by West Bengal Government officials during 2016-2017, the total number of renowned and established fish retail markets in Kolkata is 145, with at least another 1,200 non-registered retail markets in Kolkata and outskirts with 8-10 fish sellers in each. Pituitary gland collection is not possible in wholesale fish markets. After some experience is gained, a worker can easily collect

pituitary glands from fish heads without either causing any injury to the pituitary gland or damaging the fish head<sup>9</sup>. Some onlooking buyers/consumers in local marketplaces in West Bengal consider pituitary gland collection from major carps as an improper activity and disfavour it, but, according to afore-mentioned persons with whom author conversed during October-December 2020, there is nothing suspicious about it; large-sized carp heads without pituitary glands may be unhesitatingly bought and cooked as a special Bengali dish at home and consumed safely.

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