# Some facts on cannibalism in *Wallago attu* and its management during captive seed production

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*Wild caught Wallago attu.*

*Wallago attu* is a bony fish in the Siluridae family and is considered to be a large catfish due to its large size availability in the wild, with fish reaching 45 kg. It is found in tanks, rivers, reservoirs and connected water bodies of the Indian subcontinent, Thailand, Vietnam, Cambodia and Indonesia. It is an excellent food fish due to high nutritional quality and softness of flesh, and lack of intramuscular spines. The shining silver colour of its body also attracts consumers.

This catfish is listed as an endangered species, and presently it is only available in the market occasionally, due to the decline of wild populations. Researchers from our institute have attempted captive production but encountered high losses due to cannibalism during its early life, which does not encourage its adoption for aquaculture. Cannibalism due to genetic and behavioural factors may persist throughout or disappear after certain life stage in many fishes, and may be species specific, but *W. attu* is known to be a highly predatory fish. It is necessary to understand the causative factors governing cannibalism in this catfish. However, cannibalism can be initiated by rapid transfer from live to commercial feed, size differences during stocking, seasonal changes, feeding at long intervals, high density rearing, feed distribution, feeding method and size of feed etc. Many of these factors apply to this catfish as causes of cannibalism. Studies revealed that the management of some of these causes can reduce cannibalism during the seed rearing period for this species.

## Predatory nature of the catfish

*W. attu* is a mid-feeder in the water column. It may also swim on the surface or bottom of the water while feeding to seek an advantageous position for predation. Adults prefer to eat live fish or aquatic organisms. The fry are also predacious, showing cannibalistic tendencies. Certain morphological and anatomical adaptations favour its voracious predatory feeding

habit. The large, grasping mouth has a cleft that extends beyond the eye and bears a spacious buccal cavity. The lip region of the mouth bears sharp, backwardly directed teeth, which helps in holding the prey firmly without any chance of escape. The teeth-like gill rakers also serve as an additional grip on the prey. The folded internal wall of its bag shaped stomach provides a large space for bigger prey.

## Captive production

The male and female fish mature at the age of two and three years, respectively. *W. attu* is a monsoon breeder. Brood-stock were regularly fed with boiled chicken viscera as feed along with low value live fish, which may serve as food at leisure. The bulging abdomen with round red papilla for female and pointed papilla as well as free oozing of milt in males were criteria for selecting broodstock of both sexes. Sometimes the optimum maturity of female fish was also judged by observing the uniform size of eggs through cathetering. Both male and female broodstock of 1.0-2.5 kg weight range were selected for induced breeding during June-July. The males and females were injected with Ovaprim (SGnRH + Domperidon) @ 0.3 ml. and 0.5 ml/kg body weight, respectively and kept separately. The fish were hand stripped after 8-10 hours post-injection and the eggs were mixed thoroughly with the stripped milt for 2-3 minutes before the addition of a little water and were released into circular hatching tank (1.5 m diameter, 1 m depth) with a provision of 3-5 litres water exchange per minute. The hatching of larvae started after 18-20 hours of incubation and was completed within 2-3 hours from the onset of hatching. The larvae were transparent and free swimming in nature. The initial weight and length of larvae were 2.0-3.0 mg and 5.6-6.5 mm, respectively. The larvae were transferred to rearing tanks for further rearing by feeding live feed or animal origin feed or in combination during the hatchery phase. Our experience on the cannibalism of larvae and its management during the hatchery rearing phase is described below.

*W. attu mouth showing teeth in upper and lower jaw along with gill rakers.*

## Causative factors of cannibalism and their management

### Rearing density

It is not wise to rear in high density during the larval or fry stages. Yield will be better using low-density rearing. Rampant cannibalism is obvious during high density rearing as the larvae have a more frequent chance of interaction. Predatory fry swim coolly with their siblings and bite them whenever they get a chance. Prey capture is always head or tail first, engulfing them gradually, and the movement of the predator becomes slow after swallowing the prey completely. Predatory larvae are ready to consume another within hours. Hence rearing in low density improves survival by reducing interactions between fry.

### Rearing environment

Many of the Indian catfish species (*Clarias batrachus*, *Heteropneustes fossilis*, *Horabagrus brachysoma*, *Rita chrysea*, *Mystus cavasius* etc.) prefer dark environments or show hiding behaviour during some phase of their life in nature or during captive rearing. However, the rearing of larvae or fry in complete darkness does not help in reducing cannibalism. Vision might not play major role in predation during darkness, but probably the barbel and cutaneous sensory mechanisms are more important in detecting prey. However, rearing under red light improves the survival rate.

### Complexity of environment

Many predatory fishes at their early stage are reared in complex rearing environments with an aim to reduce interaction between the larvae or fry. The survival of *W. attu* larvae did not improve when shelters were provided in the rearing containers such as nets or thickly distributed plant twigs (*Hydrilla verticeillata*). The predatory behaviour of the fish is responsible for its high cannibalism. The larvae or fry are never seen chasing prey. Rather, predatory larvae swim along with others and bite them whenever the opportunity arises. *W. attu* is a free swimmer and never seen hiding or seeking shelter.

### Provision of live feed

Provision of live feed as starter feed for these larvae was found to be suitable. The yolk sac is absorbed after around two days of life, after which they need immediate feeding with live feed such as mixed zooplankton, *Artemia* or chopped *Tubifex*. These feeds are suitable at their initial stage of life as their digestive system does not contain enzymes responsible for digestion of any complicated feed at an early age. Feeding the fish these live feeds in combination or one after another on regular basis serves to reduce cannibalism to some extent. *Artemia* or *Tubifex* are consumed instantly, and when fed a few hours apart from mixed zooplankton remain live in the water medium for longer period, which makes them suitable as a booster that larvae can consume at liberty between feedings.


*Male brood fish (left) have a pointed genital papilla, whereas in females (right) it is rounded.*

### Provision of animal origin feed

Fullness of stomach always reduces the desire for predation or cannibalism. It also depends on the suitable feed available during captive rearing. It was observed that the early life stages of the highly cannibalistic *W. attu* do not solely depend on the live feed as mentioned above. Trials of providing minced molluscan meat, fish muscle and liver revealed a high acceptability of liver meal by the larvae and fry, which lead to reduced predation to a large extent. Provision of this animal origin feed along with live feed also reduces aggression.

### Long intervals between feedings

Long intervals between feedings is not advisable while rearing a predatory fish. Hence over sufficient feed is supplied with an aim to allow larvae to feed at liberty. But a preferable feed like minced liver is not acceptable if it remains in water for a long time. Hence it is better to give the feed until they are satiated. The extra animal origin feed will decay and cause water quality problems if it remains in the water too long. Hence, frequent feeding at short intervals is necessary to reduce predation.

### Combination of feed

It is always advisable to provide suitable feed in combination to give fish enough scope to feed. The fullness of stomach may distract them from cannibalism. Live feed along with supplementary animal origin feed remains beneficial during rearing these larvae.

### Regular segregation

The larvae of this catfish begin their cannibalistic habit just after yolk sac absorption. Opportunistic larvae, after successful preying on their own kind, get an increased somatic growth rate. Hence, they achieve higher robustness and vigour after each predation, which in turn favours more frequent predation on weaker larvae. It is better to segregate them as quickly as possible to restrict their interaction with other slow growing larvae. Size variation is always considered to be a cause of dominance by larger individuals in a fish population.

## Conclusion

This catfish is cannibalistic. Keeping the larvae or fry full through frequent feeding is essential to reduce predation. Hence the feeding of suitable feed alone or in combination at regular intervals to the larvae, while rearing them under low population densities to reduce interactions, may reduce losses from cannibalism during their rearing phase.

**Further reading**

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