Technical note

The use of holding cages for the spawning of *Clarias gariepinus*

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Abstract

Use is made of plastic covered wire mesh cages to minimise the stress and physical damage caused by the inherent aggression of *Clarias gariepinus* during the spawning phase. The cages enable a single person to perform the entire hormonal injecting programme with a minimum of stress in a relatively short period of time.

It has been noted that the African sharptooth catfish, *Clarias gariepinus*, shows a high state of aggression during the spawning period (Bruton, 1979). Although Bruton noted aggression amongst males only, personal observations in the laboratory show this phenomenon also between females. In extreme cases of aggression, biting may result. The attack occurs when the attacking fish approaches the victim from the side or rear. The opened mouth is pressed against the body of the victim scraping off a rough rectangle of skin by biting with the mandibular and premaxillary tooth bands, which consist of many small, re-curved teeth (Mills, 1966; Bruton, 1979). Owing to the nature of these teeth, any bite will result in serious cutaneous, and in some instances, subcutaneous damage (Fig. 1).

During the artificial culture of *C. gariepinus*, broodstock are normally brought into the hatchery from large broodstock ponds where they are free-roaming and at relatively low stocking densities. Economics of the hatchery normally necessitates the keeping of broodstock together at high densities.

Spawning of the catfish is artificially stimulated by an increase in water temperature and hormonal treatment. This results in more restless and aggressive behaviour, necessitating the covering of holding tanks with nets to prevent fish from jumping out. Under these conditions, the more dominant fish may attack and injure the less dominant, but the placing of individual fish into small cages has alleviated these problems (Fig. 2). Apart from an increase in stress, deaths of the weaker (smaller) broodstock have been monitored.

The cages are made of plastic covered wire mesh, sized at 0,7 x 0,5 x 0,3 m in which fish of 600 to 2 000 g mass (the normal size of *C. gariepinus* broodstock) could be easily accommodated.

The fish are more placid within these cages, the use of this type of holding cage enables a single person to perform the entire hormonal injecting programme whilst retaining the fish in the cage. This eliminates the use of a scoop-net and reduces stress on the fish, while the use of cages also enables a higher number of broodstock to be kept together. An added advantage of this procedure is the keeping of males and females in the same container allowing male pheromones to be available for ovary ripening in the females (Resink et al., 1987).

Care must be taken that cages are not totally submerged in the water because *C. gariepinus* requires atmospheric air for respiration. If the cages are totally submerged, the catfish will drown within hours.

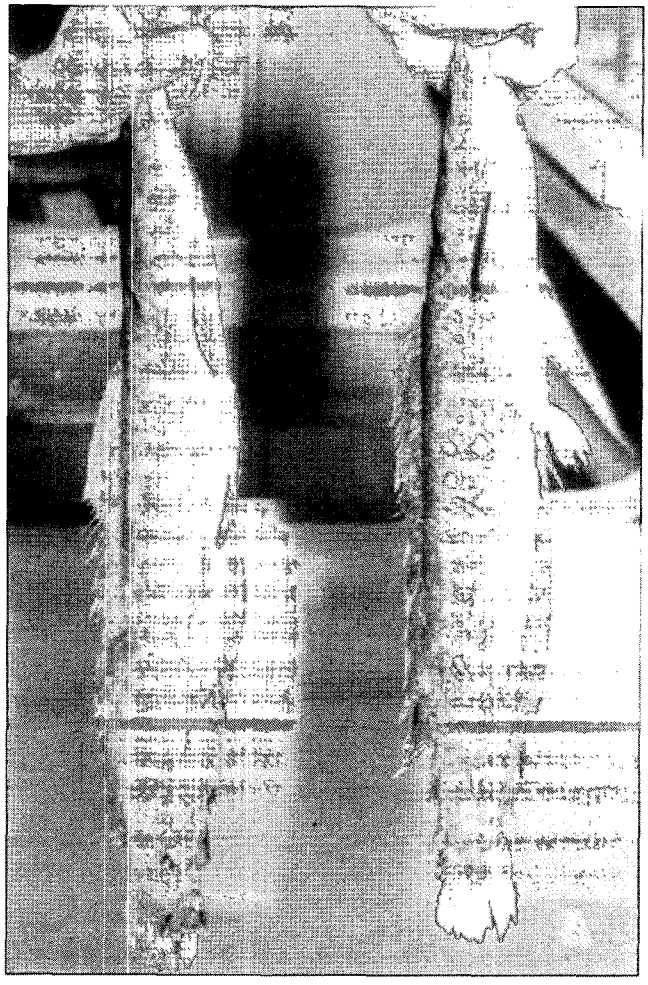

Figure 1
Severe cutaneous and subcutaneous lesions on C. gariepinus *females kept together overnight in a holding tank*

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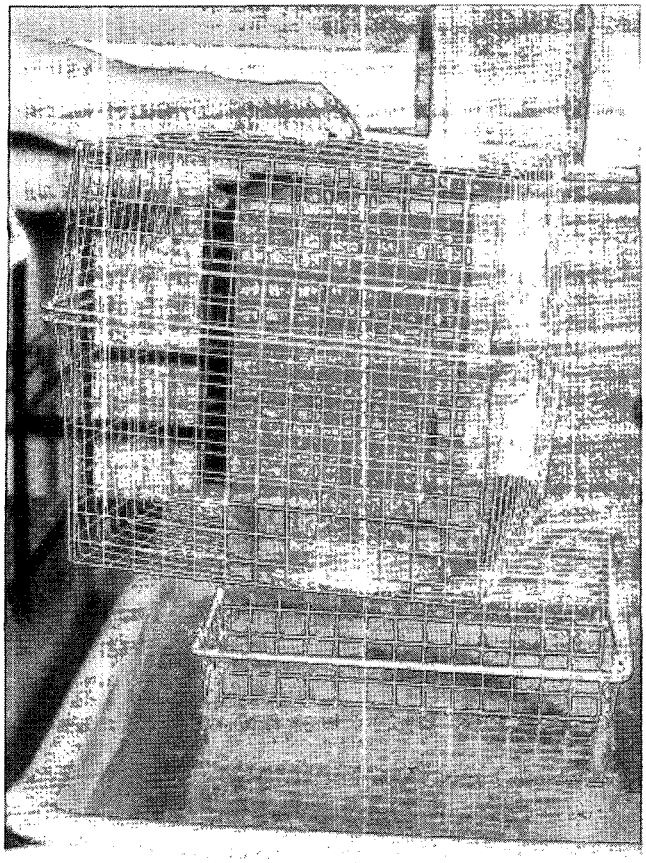

Figure 2
Holding cages for separating C. gariepinus *broodstock in holding tanks. Note incomplete submersion of cage.*

References

BRUTON, MN (1979) The breeding biology and early development of *Clarias gariepinus* (Pisces: Clariidae) in Lake Sibaya, South Africa, with a review of breeding in species of the subgenus *Clarias (Clarias). Trans. Zool. Soc. Lond.* **35** 1-45.

MILLS, HD (1966) The African mudfish *Clarias lazera*: An introduction to the anatomy and dissection of an African teleost. Ibadan University Press.

RESINK, JW, VAN DEN HURK, R, GROENINX VAN ZOELEN, RFO and HUISMAN, EA (1987) The seminal vesicle as source of sex attracting substances in the African catfish, *Clarias gariepinus. Aquaculture* **63** 115-127.

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