Malformations in Nile tilapia (*Oreochromis niloticus*) reared in a recirculation water

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INTRODUCTION

In the recent years, the means of global fish farming have evolved significantly to become an economic importance within the agricultural sectors. Tilapia is the second most farmed fish world-wide after carps. This fish specie present a faster growth and high disease resistance. The intensification of aquaculture conditions and the use of artificial feeds induce fish diseases, deformities particularly. These malformations cause economic losses, reduced growth and increased cost of production. Thus, this publication aims to describe gross deformities observed in a recirculation system farm of Nile Tilapia in Tunisia.

MATERIALS & METHODS

1- **Description of the breeding unit**

- Ponds of different shapes, colors and capacities, comprising breeding tanks for broodstock, larval rearing and pre-growing tanks and grow-out tanks. It produces fry which are intended for stocking in dams and hill lakes.
- The breeding system operates in a recirculation system. Thus, the water recovered from the basins passes through various treatment compartments: a mechanical filter, a biological filter, an ultra-violet (UV) sterilizer and a heat pump.

2- Fish feed

Fish were fed an artificial diet made from soybean meal, fishmeal, corn, vegetable oil, minerals and vitamins.

3- Fish samples

- Subjects with malformations were removed and examined.
- Radiographic examinations were also performed.

RESULTS

1. Jaw malformations

- Compression of the ethmoid region and upper jaw (Fig. 1).
- Reduction of the lower jaw (fish with upper prognathism) (Fig. 2).

2. Opercular deformity

Pughead : Anomalies were observed at the level of the opercula, with prominence of the gill rays localized at the level of the inter-opercular space (Fig. 3).

3. Fins malformations

- Several types of fin anomalies: deformities, ray deviations, partial or complete absence of the pelvic fin (Fig. 4).
- Anomalies were also observed in the dorsal fin, with the absence of a few rays. The fish thus presents two dorsal fins, an anterior and a posterior; whereas tilapia normally has a single dorsal fin (Fig. 5).

4. Eye agenesis

One specimen presented with agenesis of the eyeball (Fig. 6). The individual suffers from distension of the abdominal cavity. At autopsy, we found the presence of a non-inflammatory fluid, linked to passive edema. The origin of this dropsy could be the consequence of a malformation of the kidney (Fig. 7).
8).

5. Gas bladder malformation

Gas bladder malformation were revealed by radiographic examinations. For individuals with gas bladder malformation, this organ is poorly conformed or else completely absent. In addition, a deformation of the spine was also observed (Fig. 8)

Figure 1. Pugheadness in a Nile tilapia fry

Figure 2. Fry showing reduction of the lower jaw

Figure 3. Malformations of the operculum and prominence of the branchiosteg rays

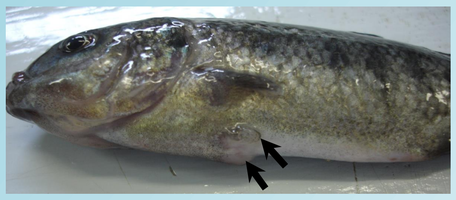

Figure 4. Partial absence of pelvic fins

Figure 5. Dorsal fin malformation (top specimen)

Figure 6. Absence of the left eyeball and dropsy

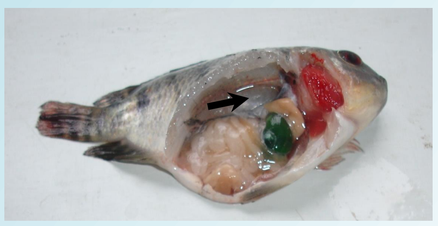

Figure 7. Kidney malformations

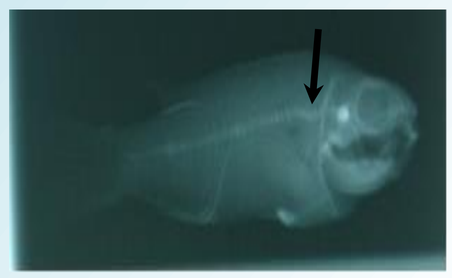

Figure 8. Absence of gas bladder and deformity of the spine (arrow)

DISCUSSION

- The health monitoring of a recirculation system farm of Nile tilapia has shown the frequency of malformations in the jaws, gills, gill rakers, fins and spine. These skeletal anomalies are currently the major problem in fish farming, especially in seabass (*Dicentrarchus labrax*) and sea bream (*Sparus aurata*) farms (Koumoundouros G, 2010).
- Fish vertebral malformations are mainly induced by nutritional disorders or by the toxicity of certain ingested elements.
- Gas bladder malformations have also been observed. they are also induce malformations of the vertebral skeleton (Darias et al, 2009).
- The possible etiologies are mainly related to nutritional deficiencies, especially in vitamins (vitamins A, C and D). An analysis of the diet and its vitamin content would shed to confirm this hypothesis. Elimination of malformed animals is recommended in order to improve the quality of the fry intended to be released in the natural environment.

References

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