Notes

Nephrocalcinosis in Mediterranean Cultured White Bream (Diplodus sargus L.)

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Abstract

During an experiment to examine susceptibility of white bream Diplodus sargus L to systemic granuloma, calcic precipitates were found in both experimental and control fish. Further experiments are required to determine the cause and significance of this nephrocalcinosis.

Nephrocalcinosis is a chronic disease reported especially in rainbow trout in intensive aquaculture (Schlotfeldt, 1980; Mulcahy et al., 1984; Ferguson, 1989), which has been found not only in its natural environment, but also under experimental conditions (Harrison and Richards, 1979). It has also been observed in other Salmonidae (Landolt, 1975), Atlantic halibut larvae (Diamant et al., 1996) and cultured gilt head sea bream (Diamant et al., 1991). The main pathomorphological characteristic consists of mineral deposits in the kidney, although other organs can also be affected. The etiology of the disease is not defined and it is believed that it is related to dietary factors and/or modifications of physical and chemical parameters of the water (Ferguson, 1989).

The observations described in this paper are derived from an experiment to study the possible susceptibility of Diplodus sargus to systemic granuloma. Two groups of tank raised D. sargus were tested. Each group consisted on 20 individuals (average size 17 cm, average weight 100 g), kept in two 2000 l fibre-glass tanks at an average water temperature of 26.3°C. The experiment was conducted over six weeks. Fish of both groups were fed with commercial pellets of composition and size suitable to their age. The food for the experimental group had been previously stored in unsuitable conditions of humidity and high temperature. Control group food was kept according to manufacturer recommendations.

Three individuals of each group were killed at one week intervals. After the macroscopic survey, individual samples of digestive system, kidney, spleen, liver, heart, gonads, gills and skeletal muscle were fixed in 10% formalin solution, processed and paraffin wax embedded. Sections were stained by haematoxylin-eosin (H&E) and Von Kossa methods.

During the experiment no fish died and no symptoms were observed. Tested animals did not show any macroscopic lesions. Histological observations were made on control and experimental fish. The microscopic survey of H&E stained sections revealed the presence of basophilic deposits in kidney in 80 % of
tested fish. The Von Kossa stain confirmed the calcic nature of precipitates. Microscopically, calcification foci appeared within the renal excretory tissue and renal interstitium. Renal tubules and collecting ducts appeared enlarged and showed epithelial atrophy and necrosis. The most intensive lesions were found in the group killed after 5 weeks, in which there were many mineral precipitates associated with cellular casts within collecting ducts (Fig. 1).

In this study histopathological changes were limited to the kidney. Interstitial renal calcification was observed associated with the presence of tubular lesions, as reported by Harrison and Richards (1979). Renal microscopic lesions in D. sargus were similar to those previously reported in other susceptible species and related to early phase of nephrocalcinosis (Landolt, 1975; Harrison and Richards, 1979; Jelmert et al., 1995). The pattern of calcium deposits in the kidney has been described in freshwater and saltwater farmed rainbow trout (Mulcahy, 1984). Stomach and skeletal muscle calcification were not observed. Muscular lesions were only found in the presence of severe renal damage (Harrison and Richards, 1979).

Lesions related to systemic granuloma, the original aim of the experiment, were not found in D. sargus. Kidney changes described in this experiment do not appear to be related to systemic granuloma, a chronic inflammatory, diet related disease, which is occasionally found in intensive fish culture (Tixerant et al., 1984; Paperna, 1987).

The finding of calcic precipitates in both experimental and control groups were unexpected. This fact suggests that such precipitates already existed when the test was started. Therefore, new experiments must be carried out to investigate the appearance of nephrocalcinotic syndrome in this species. Description of a nephrocalcinosis process in D. sargus indicates that this species may also suffer the disease when it is growth under intensive conditions.

Figure 1. a) Kidney of D. sargus showing enlargement and calcium deposits within renal tubules (H & E, x 220). b) Dilation, epithelial degeneration and cast material in collecting ducts (H&E x 220).
The author wishes to thank Dr. A. Ortega for his collaboration and Mr. Sanchez for technical assistance.

References.


