EDTA supplementation to decrease allergic reactions caused by gilthead seabream (Sparus aurata)

Introduction

- Main elicitor of fish-allergic reactions (fish allergies show sensitization prevalences, by skin and serum, of up to 2.9% in the general population)[1]
- Ion-binding muscle protein (higher affinity for calcium and magnesium)
- EF-hand family member
- Highly stable to food processing
- Highly IgE-cross reactive [2,3]
- Structural rearrangement upon calcium depletion, inducing an apo-parvalbumin (a less allergenic form of protein)
- Calcium chelator

Objective

- β-parvalbumin (PV)

Results

Fig. 1. Plasma cortisol levels in blood samples of gilthead seabream submitted to control and EDTA3 supplemented feeds (n=10) show no significant differences (p=0.778), suggesting that the EDTA level included in the diet had no impact over the plasma cortisol concentration.

Fig. 2. A total of 20 cod-allergic patients’ sera were used, from which 17 showed a band in a narrow molecular weight range (ca. 10–12 kDa), testing positive for IgE-reactivity to gilthead seabream PV in CTRL samples (Fig.2A). Regarding EDTA3 samples, only 8 had detectable IgE-binding signals for PV (indicated by a black star, Fig.2B). A positive control using a mix of anti-PV antibodies (C) confirmed the presence and identity of the allergen.

Methodology

98 days trial with EDTA supplemented diets

Objective

- Growth performance
- Stress analysis
- Muscle proteomics profile and quality analysis
- IgE-reactivity using fish allergic patient serum

Conclusions

Low concentrations of EDTA in fish diets do not seem to impair stress nor affect muscle quality of gilthead seabream

IgE-tests with fish-allergic patients sera showed that EDTA3-fish have a tendency in decreasing the biological IgE-reactivity, without affecting fish welfare and organoleptic properties

Parvalbumin modulation was shown by adding 3% of EDTA in fish diet

Nutritional strategies including supplementation of fish diets with specific molecules are a promising avenue to tailor fish in Human needs

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References