GASTROINTESTINAL PH AND PROTEASE ACTIVITIES IN SENEGAL SOLE ADULTS

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Introduction
The improvement of diets and the utilization of their nutrients by growing fish is a major challenge in fish farming. In vitro experiments with customized bioreactors simulating the digestion conditions are considered as an easy-working and quick methodology for advancing in feeds formulation. Nevertheless, it is first necessary to obtain enzyme extract of the selected species for the experimentation as well as to define realistic digestion conditions according to the target species. In this context, this study aimed to determine the luminal ionic conditions and the proteolitic activity in the adult Senegal sole (Solea senegalensis) specimens used for obtaining an operational amount of digestive enzyme extract.

Materials and methods
Senegal sole specimens (212 to 575 g) were maintained in 2000-L tanks with flow-through water system with a temperature of 19.5 ± 1.0 °C and a natural light/dark photoperiod. Fish were fed daily on commercial diet ad libitum (at 09:00 a.m local time). Fish were sampled at 2, 5 and 7 hours after morning meal, intending to catch the moments of higher digestion activity. Animals were anaesthetized, killed with anaesthesia overdoses. Gastrointestinal pH was obtained with a needle tip micro-pH electrode (Fisher), following the procedure explained in Yúfera and Darias (2007). Activity of acid and alkaline proteases was measured according to the methodology of Anson (1938) and Kunitz (1947) modified by Walter (1984), respectively.

Results
The lumen of the stomach maintained a slight acidic environment between 6.2 and 6.6 during the whole examined period. The values in the intestine were neutral or slightly alkaline, excepting in the anterior intestine just after the pylorus where some acidification was still detected (see Fig. 1). Regarding the enzymatic activity, the trypsin activity ranged between 1.99 and 4.71 U of protease/g fish fresh weight while the pepsin activity ranged between 0.33 and 1.00 U of protease/g fish fresh weight.

Discussion and conclusions
The results confirm the poor acidification capacity of this species observed in some few adult fish by Yúfera and Darias (2007). Pepsin activity was determined buffering the reaction at pH 3.5. Nevertheless as the gastric pH never declined below 6.2 the pepsinogen cannot become activated. This means that gastric digestion and peptic activity in this species is negligible in practice and that practically all the digestion occurs in its long intestine.

References

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Fig. 1. Values of luminan pH in the stomach and intestine of adult Senegal sole at different times after food supply.