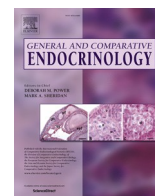




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## Cloning of gonadotropin Gph-alpha, FSH-beta and LH-beta subunits and seasonal profiles of steroid hormones in wild-caught Nile perch, *Lates niloticus*

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## ABSTRACT

The Nile perch (np; *Lates niloticus*) is a freshwater teleost species with a potential for aquaculture in freshwater surroundings. However, wild-caught breeders have persistently failed to spawn spontaneously in captivity. Cloning of the gonadotropin subunits and analysing seasonal variation in reproductive hormone levels for a 1-year period were done to gain knowledge on the physiological basis underlying the reproductive biology of np. The  $\beta$ -follicle-stimulating hormone (FSH- $\beta$ ) and  $\beta$ -luteinizing hormone (LH- $\beta$ ) subunits and their common  $\alpha$ -glycoprotein (Gph- $\alpha$ ) subunit were cloned using 3' and 5' RACE-PCR. The nucleotide sequences of the npgph- $\alpha$ , npfsh- $\beta$ , and nplh- $\beta$  subunits were 664, 580 and 675 nucleotides in length, encoding peptides of 124, 120 and 148 amino acids, respectively. The deduced amino acid sequence of each mature subunit showed high similarity with its counterparts in other teleost. Sequence analysis showed that npFSH- $\beta$  is more similar to higher vertebrate FSH- $\beta$ s than to higher vertebrate LH- $\beta$ s. Heterologous immunoassay was calibrated to analyse pituitary LH levels. While the LH immunoassay showed parallelism of npLH with that of tilapia (ta), no parallelism for FSH was found. Levels of pituitary LH were higher in females at gonadal stages of vitellogenic oocytes, mature secondary oocytes and mature tertiary oocytes with migrating nucleus than in pre-vitellogenic oocytes and early and late perinucleolus oocytes. Using competitive steroid ELISA, variations in the levels of the steroid hormones 11-ketotestosterone (11-KT) in males and E2 in females were characterized in relation to month and reproductive index of Nile perch. Our findings show that in females, gonadosomatic index and plasma E2 were highly correlated ( $R^2 = 0.699$ ,  $n = 172$ ) and peaked from September to November while in males, the gonadosomatic index and plasma 11-KT peaked from October to November. In female fish, both steroid hormones were detected in the plasma but greatly varied in concentrations. E2 in particular, increased with the developmental stage of the gonads. The levels of steroid hormones, E2 and 11-KT in females and males respectively increased with fish size (total lengths) and suggest that females mature at a body length of 40–59 cm than their counter part males that mature at a total length of 60–70 cm. Taken together, we describe seasonal endocrine differences in wild-caught adult Nile perch which could potentially be exploited to manipulate the reproductive axis in cultured breeders.

## 1. Introduction

Fish gonadotropins are structurally and functionally related to their

mammalian counterparts (Fontaine et al., 2020; Levavi-Sivan et al., 2010). The gonadotropins follicle-stimulating hormone (FSH) and luteinizing hormone (LH) play regulatory roles in gonadal secretion of

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