Inline registration of heart rate and body temperature of free swimming eel

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Introduction

Production of farmed fish is world wide undergoing a strong growth. Together with this, rearing systems are becoming more intensive and questions concerning animal welfare are raised. Animal welfare aspects of fish are in generally scored based on production parameters (growth, feed consumption) and blood parameters related to neuro-endocrine stress responses. To come to valid statements on fish welfare it is essential to combine production parameters with physiological and behavioural parameters. However, measuring physiological parameters in free swimming fish is at the moment a new field of research and needs development. Intention of this project was to develop a method to measure heartbeat and body temperature in free swimming eels and to correlate these physiological data with activity.

Methods

To monitor on-line heart rate, activity and body temperature continuously for a period of months we implanted a Telemetric device (Telemetronics PhysiolinQ®) in eels. The implant was placed in the abdomen of the eels under full anaesthesia.

Eels of approximattly 40 cm in length and 5 cm in diameter were individually housed in a 100x70 cm tube. To provide surgery eels were placed in water with 0.9% 2-fenoxyethanol to induce full anaesthesia. Anaesthesia was remained during surgery by placing the head of the eel under water with 2-fenoxyethanol. The transmitter (L 2.5 cm x ∅ 1 cm) was placed in the abdome trough a 3 cm inciscion approximatly 3 cm caudale of the liver, wich is approximatly 7 cm caudale of the pectoral fins.

Two leads to measure heart rate where subcutaneous brought to the base of the left and right pectoral fins and secured with a double non-resolvable suture. The abdomen was closed by single monofilament sutures and a thin layer of skin bond. After surgery the eels were placed back into their home tub.

The signal receiver, which also charges the implant, was located under the bottom of the tub.

Recordings

Over a period of 2 months stress was induced by frequently placing other eels in the same tub and by chasing the eels with a net. During these, potentially stressful, interventions heart rate increased together with the activity of the eels. Also body temperature increased for short periods during increased activity.

Measuring and registration of changes in heart rate, body temperature and activity without human intervention is well possible in free swimming eels. Eels showed low activity when they were not stressed and therefore, a bio-rhythm could not be observed.

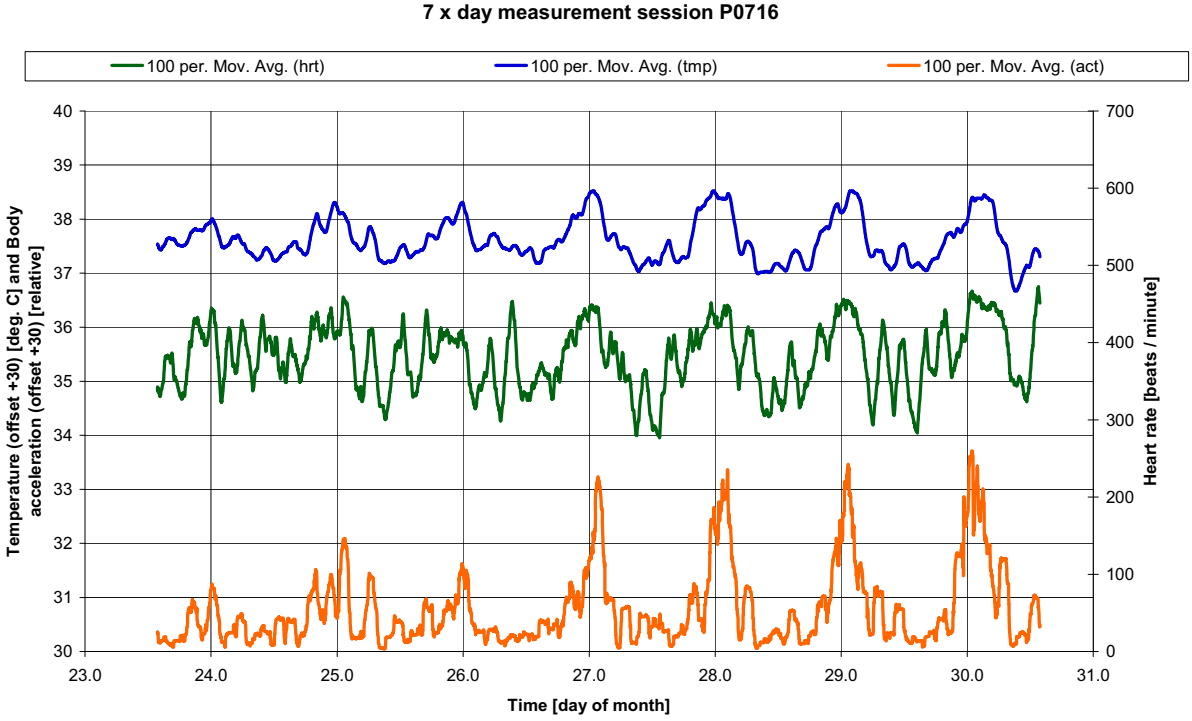

Figure1. *Example off measured body temperature (offset +20), heartbeat and activity (offset+30).*