

# DISSERTATION ABSTRACT

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## BACKGROUND AND AIM

Growth hormone (GH) is the principal stimulator of growth and has major effects on metabolism in vertebrates. Therefore, GH should increase the metabolic demands and the appetite in animals, and may thereby lead to an altered behaviour. In addition, GH may induce behavioural changes by a direct action at the central nervous system. The aim of this study was to clarify the effects of GH on behaviour, and if GH can act centrally to alter behaviour. Furthermore, as both changes in growth and behaviour may alter the survival of an organism, the question was addressed how natural selection may act on the endocrine regulation of growth in juvenile salmonids.

## MATERIAL AND METHODS

Two species of salmonid fish were used in this thesis; rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*). For peripheral GH treatment, GH was administered intraperitoneally by injections, cholesterol implants (ovine GH), or a slow-release implant (bovine GH, Posilac®). Salmon GH was used for central injections into the third ventricle. The behaviour of the fish was recorded by direct observations. To gain insight into the association between GH, physiology and behaviour of the fish, GH levels, growth parameters, lipid content, and brain monoamines were measured.

## RESULTS AND CONCLUSIONS

GH reduces the anti-predator behaviour in both in rainbow and brown trout juveniles. Furthermore, in rainbow trout, GH increases swimming activity as well as aggression. However, social status *per se* does not seem to be increased by GH, but rather, competitive ability for food. GH appears to increase swimming activity, but not appetite, by acting directly at the CNS. Furthermore, central injections of GH decreased the dopamine metabolite homovanillic acid (HVA) in the hypothalamus. Whether this is a mechanism whereby GH alters swimming activity remains to be elucidated. In a long-term field experiment, GH increased growth at the expense of lipid reserves, and this may be one of the factors selecting against high growth/GH in nature, as this may reduce survival during starvation. However, the mortality of brown trout was not significantly affected by GH, indicating that the costs and benefits of fast growth and/or high GH levels may balance each other.

**Keywords:** Growth hormone, somatotropin, behaviour, growth, metabolism, trade-off, rainbow trout, brown trout, fish, CNS

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