8 Summary

Alternative non chemical possibilities to control fish infections caused by *Bucephalus polymorphus* Baer, 1827 (Trematoda: Bucephalidae)

In the wake of Council Regulation (ECC) 2377/90, German agriculture has been severely affected by stringent restrictions concerning the use of medications in animals reared for human consumption. In commercial fish production, legal administration has been limited to a few desinfectants and antibiotic drugs. Currently, no permitted antiparasitic drug is available to treat fish stock threatened by endogenous parasites. After demonstrating the detrimental effects of fish-pathogenic parasites on commercial fish production by examining an exemplary fish-rearing facility, this paper continues to investigate alternative, non chemical ways to effectively disrupt parasitic life cycles in an economic fashion.

Using different diagnostic procedures, numerous parasite species are identified in a fish-rearing facility in Saxony. The trematode *Bucephalus polymorphus* is quickly found to be causing reoccurring fish-mortality in the aforementioned facility because of its high intensities in examined fish and invertebrate hosts. It can be shown that *B. polymorphus* is able to survive several years in its 1st intermediate host, zebra mussel *Dreissena polymorpha*. Exposing different species of fish to cercariae of *B. polymorphus* demonstrates varying susceptibility rates among investigated species. Rainbow trout (*Oncorhynchus mykiss*) and several cyprinid species show high susceptibilities.

The role of pike perch (*Sander lucioperca*) and perch (*Perca fluviatilis)* as final hosts of the infection is investigated. After feeding on infected fish, adult trematodes are detected in the digestive tract of all examined pike perch, whereas none of the perch receiving a similar diet can be diagnosed with a *B.- polymorphus*- infection.
To develop a practical anti parasitic treatment of the facilities´ production water which is taken from a nearby reservoir, three non chemical water treatments are examined for their effectiveness against *B.- polymorphus*- cercariae in the laboratory.

An impact resulting from pouring suspended cercariae from a height of 36 to 200 cm leads to injury and death of a proportion of exposed individuals. Exposure to ultrasonic waves with specific energy inputs of 0,0005 to 0,001 kWh/ l results in cercarial mortalities ranging from 60 to 100 %. After being submitted to ultraviolet light at a dose of 1800 to 2850 J/ m^2, examined cercariae show slightly reduced activity.
Field trials with carp (*Cyprinus carpio*) and rainbow trout (*O. mykiss*) demonstrate that ultrasonic treatment with a specific energy input of 0,000652 kWh/ l as well as an exposure of production water to ultraviolet light at a dose of 58 J/ m^2 can potentially be used to reduce infections with *B. polymorphus*.
The aforementioned findings are compared to additional potential treatment possibilities (ozonation, filtration, use of electric current and biological manipulation). All procedures are then discussed concerning their sustainability, economic efficiency and ecological tolerability. Summarizing the individual treatments it is concluded that none can be unrestrictedly recommended to treat all of the production water in a cost-efficient and effective manner.

Consequentially, periodic cleaning and disinfection are shown to still be the primary means to limit parasitic infections of commercial fish populations by reducing the number of host organisms in the fish's vicinity. Additionally, a time-limited water treatment of single production-subunits holding the most susceptible fish species using UV- doses of $\geq$400 J/ m^2 is recommended to treat waterborne parasitic stages at the time of their highest occurrence. UV-lamps are mobile, their use affects numerous parasitic stages and is comparatively cost-effective. The treatment facilities can be maintained by staff members. In case of a malfunction, only single subunits which can easily be sanitised are affected. Furthermore, the use of ultraviolet light involves low hazard risks and has no negative impact on water parameters.