

A Review and Assessment of Environmental Risk of Chemicals Used for the Treatment of Sea Lice Infestations of Cultured Salmon

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Abstract Chemicals (sea lice therapeutants) currently authorized in North America and Europe for the treatment of sea lice infestations in cultured salmon may be classified into two major groups. The classification is based on their routes of administration, and includes bath techniques (organophosphates, pyrethroids and hydrogen peroxide) and additives in feed (ivermectins, chitin synthesis inhibitors). The ecological risk posed by the use of the chemicals is reviewed and assessed in this chapter. While the biological effects of sea lice therapeutants on aquatic animals that may live near salmon culture sites have been studied under laboratory conditions, field studies on the efficacy, fate and distribution, and biological effects are limited. In general, the in-feed treatments are more convenient to administer and posed less ecological risk than the bath treatments. As an example, the approach adopted by the UK was used to assess the environmental safety of the sea lice therapeutants. It was concluded that there are considerable differences between the environmental characteristics of fish farm sites and their ability to accept discharges of sea lice treatments without giving rise to unacceptable environmental impacts. Such site-specific risks can be managed through the application of appropriate environmental quality standards for the chemicals concerned, and site-specific assessment of the maximum acceptable rate of use of the treatments.

Keywords Aquaculture therapeutants · Antiparasidics · Ecotoxicology · Efficacy · Risk assessment

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Introduction

Fin-fish marine aquaculture is a relatively new but important food industry with a worldwide production of 3.79 M metric tonnes in 2002 of which 47.5% was salmonid species valued at \$4.9 B (US) [1]. Cultured Atlantic salmon, *Salmo salar*, comprised 60% of the salmonid species production, and of which 91% was produced in Canada, Chile, Norway and the United Kingdom. The demand for cultured fisheries products is increasing with the continued decline in catchable wild fisheries and an increase in demand by consumers [2]. The challenges for the aquaculture industry are to expand, remain environmentally sustainable and be socially acceptable [3].

Cultured salmon in the crowded and stressful conditions of aquaculture are susceptible to epidemics of infectious bacterial, viral and parasitic diseases. Sea lice are ectoparasites of many species of fish and are a serious problem for salmon aquaculture industries [4, 5]. The species that infest cul-