# EFFECT OF ELEVATED IONIZED AMMONIUM ($NH_4^+$) CONCENTRATIONS ON GROWTH PERFORMANCE AND MORTALITY OF BURBOT (*LOTA LOTA* L.)

**Thomas ABEEL[1]*, David VUYLSTEKE[2], Wouter MEEUS[1], Heidi ARNOUTS[1], Daan DELBARE[2] and Stef AERTS[1]**

[1]*Aqua-ERF, Department of Agro and Biotechnology, Odisee University College, Sint-Niklaas, Belgium.*
[2]*Fisheries and Aquatic Production, ILVO, Oostende, Belgium.*
*Corresponding author, e-mail: thomas.abeel@odisee.be

**Introduction:** Recently, burbot has been introduced as a new aquaculture species in Belgium for both flow-through and recirculating aquaculture systems (RAS). While this fish species can be successfully cultured in RAS, the impact of long-term exposure to high concentrations of $NH_4^+$ on burbot performance is unknown. The effects of toxic un-ionized ammonia ($NH_3$) are well-studied for several aquaculture species, but there appears to be no literature on the chronic effects of elevated ionized $NH_4^+$ concentrations. For commercial farms, it is crucial to identify the maximum tolerable $NH_4^+$ concentration, in order to adequately dimension the biofilter capacity.
**Aims:** In order to design an optimal RAS for intensive burbot aquaculture, this species' tolerance towards $NH_4^+$ has to be determined. Therefore, the effect of elevated $NH_4^+$ concentrations on burbot growth performance and mortality was evaluated.
**Materials and Methods:** Burbots with an average body weight of 47.11 ± 7.97 g were stocked in six 50 liter aquaria at a density of 30 fish per aquarium. The fish were exposed to two $NH_4^+$ concentrations: 0.09 ± 0.22 $mg.l^{-1}$ and 1.94 ± 0.48 $mg.l^{-1}$. They were raised in these conditions for 48 days and weighed and measured every three weeks.
**Results:** Burbots reared at high and low $NH_4^+$ concentrations showed specific growth rates (SGR) of 0.80 ± 0.13 $\%.day^{-1}$ and 0.77 ± 0.16 $\%.day^{-1}$ respectively. Survival was 96.67 ± 5.77% in the high $NH_4^+$ treatment and 94.44 ± 5.09% in the low $NH_4^+$ treatment. We observed no significant effects of the elevated $NH_4^+$ concentration on growth performance or mortality.
**Conclusion:** In this study, an $NH_4^+$ concentration up to 1.94 $mg.l^{-1}$ did not affect burbot growth performance or mortality. Based on these observations, we assume this level of $NH_4^+$ is safe for burbot grow-out in RAS, providing the formation of toxic $NH_3$ is prevented by suitable water quality management. In order to determine the maximum $NH_4^+$ tolerance for burbot, the effects of exposure to higher concentrations should be tested.

**Keywords:** ammonium, aquaculture, burbot, RAS