

Cataract formation in Atlantic salmon, *Salmo salar* L., smolt relative to dietary pro- and antioxidants and lipid level.

- [Waagbo R,](#)
- [Hamre K,](#)
- [Bjerkas E,](#)
- [Berge R,](#)
- [Wathne E,](#)
- [Lie O,](#)
- [Torstensen B.](#)

National Institute of Nutrition and Seafood Research, Bergen, Norway.
rune.waagbo@nutr.fiskeridir.no

The development of cataracts in Atlantic salmon, *Salmo salar* L., was studied in 16 groups of smolts fed diets differing in prooxidant (iron, copper, manganese) and antioxidant (vitamin E, vitamin C, astaxanthin) composition and lipid level for 23 weeks in sea water, using a 2(7-3) reduced factorial design. The seven dietary variables were systematically varied at low (requirement level and 150 g lipid kg(-1)) and high levels (below known toxic levels and 320 g lipid kg(-1)). A mean endpoint cataract incidence of approximately 36% was observed. High dietary levels of vitamin C and astaxanthin reduced cataract frequency, whereas high dietary lipid level, iron and manganese were associated with increased cataract frequencies. Considering the nutritional status of selected organs of the fish, only the status of ascorbic acid correlated negatively to cataract development ($P < 0.05$). The lens glutathione (GSH) status was not correlated to cataract frequency, nor statistically explained by the dietary variables. However, the study shows that balancing the diet with respect to pro- and antioxidant nutrients may significantly protect Atlantic salmon against development of cataracts. An incidence of reversible osmotic cataract observed at week 14 was positively correlated to plasma glucose concentration.