

### Estimation of the lysine requirement for Atlantic salmon (*Salmo salar* L.)

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Fish meal replacement in the diets of Atlantic salmon (*Salmo salar* L.) can only be achieved through a fundamental understanding of the dietary requirement for the first limiting amino acid, lysine. Currently there is considerable variation in the lysine requirement when expressed as a dietary concentration or a ratio to dietary energy (1,2). Experiments at the University of Tasmania have shown lysine deposition to be solely dependent on absolute lysine intake ( $\text{mg}\cdot\text{d}^{-1}$ ) irrespective of dietary lysine concentration and energy intake. Confirmation of the linear relationship between lysine intake and deposition established from the current experiments was tested against lysine requirement estimates for Atlantic salmon parr (1) and post-smolt (2). Whole-body protein composition was assumed to be 15.0% and lysine to be 9.41% of protein. Lysine intakes were selected from the literature below the plateau in lysine deposition.

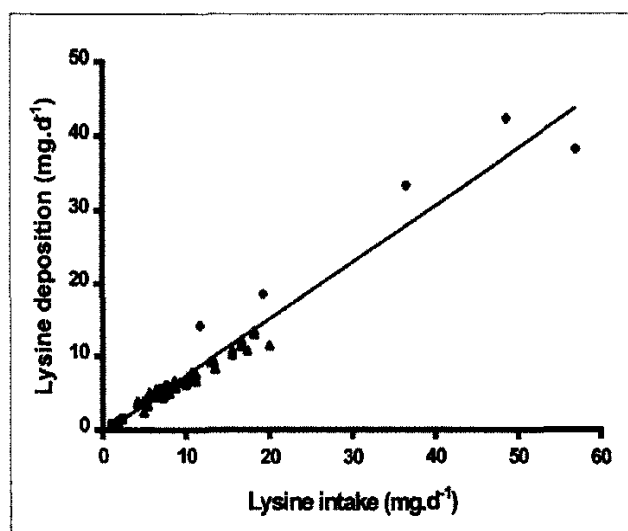


Figure. Linear relationship between lysine intake and lysine deposition for Atlantic salmon for parr (1 - n), parr in current experiments (s) and post-smolt (2 - u). Lysine deposition is dependant on lysine intake (LI,  $\text{mg}\cdot\text{d}^{-1}$ ) as described by the equation: lysine deposition ( $\text{mg}\cdot\text{d}^{-1}$ ) =  $0.775\cdot\text{LI} - 0.375$  ( $n = 56$ ,  $r^2 = 0.95$ ,  $P < 0.001$ ).

The results confirm that prior to reaching the plateau in lysine deposition, lysine was deposited at similar efficiencies irrespective of energy intake and the dietary formulations used in these experiments (Figure). Consequently, the estimation of the lysine requirement as a dietary concentration or a ratio to the dietary energy appears to be of limited value. Alternatively, these results suggest a more accurate approach is a factorial estimation of the lysine requirement, which has not been previously considered in fish studies. The requirement is calculated by dividing lysine deposition observed by the fish by the lysine deposition efficiency and taking into account the lysine requirement at maintenance. Further development of factorial parameters will allow a more convenient estimation of the lysine requirement and facilitate fish meal replacement in Atlantic salmon diets.

1. Anderson JS, Lall SP, Anderson DM, McNiven MA. Quantitative dietary lysine requirement of Atlantic salmon (*Salmo salar*) fingerlings. *Can J Fish Aquat Sci* 1993; 50:316-322.
2. Berge GE, Sveier H, Lied E. Nutrition of Atlantic salmon (*Salmo salar*); the requirement and metabolic effect of lysine. *Comp Biochem Physiol* 1998; 120A:477-485.