KEY OUTPUT

EFFECT OF REDUCTION OF DIETARY CRUDE PROTEIN LEVEL IN SALMON FEEDS ON GROWTH OF ATLANTIC SALMON (*SALMO SALAR*) POST-SMOLTS

SUMMARY: The development of more sustainable and cost-effective aquafeeds requires the optimisation of dietary amino acid (AA) profile. This study evaluates the feasibility of reducing protein level in salmon post-smolts diets.

AT A GLANCE

FULL TITLE: Dietary protein level can be reduced without affecting amino acid utilisation efficiency for growth of Atlantic salmon post-smolts

KNOWLEDGE TYPE: Paper in proceedings of a conference. Abstract presented at Aquaculture Europe 2014 Conference, San Sebastian, Spain

WHERE TO FIND IT: Available as part of Aquaculture Europe 2014 book of abstracts www.was.org/easOnline/AbstractDetail.aspx?i=3481

WHO TO CONTACT FOR MORE INFORMATION: Bjarne Hatlen, Nofima AS, Norway, **E:** Bjarne.Hatlen@Nofima.no; Cláudia Figueiredo-Silva, Evonik Industries AG, Health & Nutrition, Hanau-Wolfgang, Germany, **E:** claudia.silva@evonik.com

PATENTS OR OTHER IPR EXPLOITATIONS: No

This research was carried out under the AQUAEXCEL Transnational Access programme at NOFIMA Averøy, Norway.

INTRODUCTION

Crude protein (CP) is an estimate of the approximate amount of protein in feedstuff as it measures the nitrogen (N) content of a food, including both true protein and non-protein N. Therefore, CP is rarely a true reflection of the AA composition of the diet and merely represents a mixture of different N containing compounds in different proportions. Fish, like other animals, require a specific quantity and balance of the dietary essential amino acids (EAA) rather than CP per se.

Due to the increasing cost of protein-rich feedstuffs and environmental issues and regulations associated with animal production, considerable efforts have recently been focused on the possibility of reducing CP levels in diets for livestock and more recently in diets for fish and shrimp. Although aquaculture seems more eco-efficient than other kinds of animal production in providing nutrients for human consumption, the move towards a lower N output is a major sustainability drive in fish farming, both for environmental and economic reasons. In short, the greater the amount of CP in the diet the greater the release of N.

KEY INFORMATION

The development of more sustainable and cost-effective aquafeeds requires the optimisation of dietary AA profile whilst limiting the amount of N released into the environment. The challenge therefore is to reduce the amount of CP in the diet while still ensuring the efficiency with which AA are used for synthesis of protein. This study evaluates the feasibility of reducing protein level in salmon post-smolts diets. In order to do this, two diets providing equal energy amounts and similar in EAA/lysine ratios but differing in CP content were used during a seven week feeding trial. The efficiencies of AA utilisation for gain above maintenance were determined by feeding low (44%) or high (50%) CP diets with increasing ration levels (24, 40, 50, 75, 100%).

CONCLUSIONS:

- Final body weight, specific growth rate or nutrient gain, including protein and EAA gain, were not affected by reducing CP from 50% to 44% in salmon feeds. This confirms that, similarly to other animals, salmon have a requirement for EAA and not for dietary protein level.
- In diets with similar EAA/lysine ratios, reduction of dietary protein concentration had no negative effect on the utilisation efficiencies of protein, lysine, methionine+cysteine or any other EAA by salmon.
- The next step will be to evaluate the possibility of reducing CP in practical diets for salmon by using only commercially available, free AA to balance the dietary AA profile.

END-USER & APPLICATION

- **END-USER 1:** Scientific & Research community.
  APPLICATIONS: By generating relevant knowledge in the field of AA nutrition in fish and pointing out directions for future research of more practical application.

- **END-USER 2:** Feed additive industry.
  APPLICATIONS: The research results could facilitate feed additive producers to optimise their feed formulations and ultimately reduce feed cost.

- **END-USER 3:** Aquafeed industry & producers.
  APPLICATIONS: The research results could help nutritionists formulating and developing more cost-effective feeds.

- **END-USER 4:** Commercial aquaculture.
  APPLICATIONS: Optimisation of dietary AA profile would allow for reduction of feed cost (reduced reliance on marine and other highly costly protein sources) whilst maintaining animal performance (by covering requirements for AA). This benefits fish farmers through cost efficiency.

IMPACT

The knowledge generated in this project is of most importance to corroborate concepts in the field of animal AA nutrition, including aquatic species. The next step will be to evaluate the possibility of reducing CP in practical diets for salmon by using only commercially available, free AA to balance the dietary AA profile.

More generally, the results of this study have broad application across the aquaculture sector, including aquafeed producers, the feed additive industry and fish producers. The research demonstrates a means to optimise salmon feed formulas, in particular AA profile of the diets; with an overall anticipated impact of decreased feed costs leading to higher profits for farmers and lower N waste/output leading to more sustainable fish farming.