SALMOTRIP

FEASIBILITY STUDY OF TRIPLOID ATLANTIC SALMON PRODUCTION (2008-2010)

LEAD CO-ORDINATOR: University of Stirling, Institute of Aquaculture, Drs Herve Migaud & John Taylor, hm7@stir.ac.uk

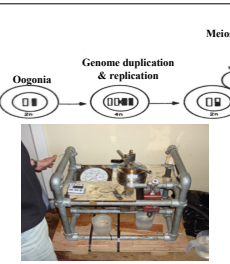
RTD Partner Institute of Marine Research, Tom Hansen, Norway
Wageningen University and Research Institute, Dr Adriaan Kole, Netherlands

SME Partner Landcatch Natural Selection, Derrick Guy, UK
SARL Salmo, Gavin Moss, France
AquaGen, Arne Storset, Norway
Centre of Aquaculture Competence, Olav Brek, Norway

Large Enterprise Marine Harvest, Dougie Hunter, UK

1- Introduction & Background

The negative environmental impact of escapees from fish farms is a general concern among the salmon industry and authorities. Using sterile (Triploid) fish in culture has been proposed to reduce this problem considerably. Triploidy also offers several other advantages: no maturation (at least in females, males still developing gonads) = improved flesh quality at harvest, wider harvest windows, lowered disease risk, reduced running cost as lights may not be required anymore and a means for breeding companies to protect IPR on selected strains. Sterility can be induced at the egg fertilisation stage by hydrostatically shocking eggs (see picture on the right) to produce offspring with an extra chromosome set (Triploid) and no gonadal development. Triploidy was tried in the early 90's but encountered numerous problems (poor growth and survival, and increased deformity rate) and the concept was abandoned. Nonetheless, triploid salmon has the potential to make an important contribution towards a more sustainable and environmentally friendly salmon industry. However, prior to implementing such a radical change within the industry, a sounder understanding of triploid requirements and performances is needed at a commercial scale. As a result a trans-national collaborative project supported by 5 key players of the salmon industry and 3 research centres was started in June 2008 as part of the *EU 7th Framework Programme*. The project focuses on 5 key areas regarding the evaluation and optimisation of triploid salmon production. Only when this knowledge is available and consumer perception addressed can the potential for triploidy be realised as a viable farming option for the industry.

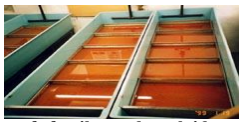


Hydrostatic Pressure Vessel

RBCs 1.5x larger in triploids due to extra chromosome set

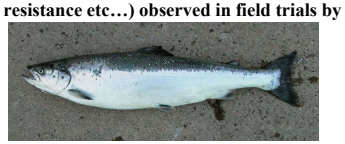
1-Family Performance

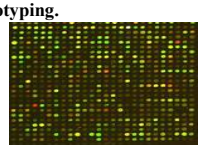
Correct broodstock selection is essential for achieving optimal culture performance in offspring.



The aim is to determine the interaction of family and ploidy on salmon performances.

Evaluation of best families on traits of interest (growth, flesh quality, disease resistance etc…) observed in field trials by genotyping.



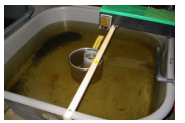


2-Culture Sensitivity

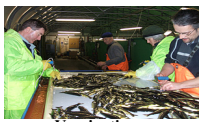
Triploids may be less tolerant to suboptimal conditions due to cellular physiology & occurrence of deformity.

O_2/Temp vs. Respiration

Deformity



Dietary Needs

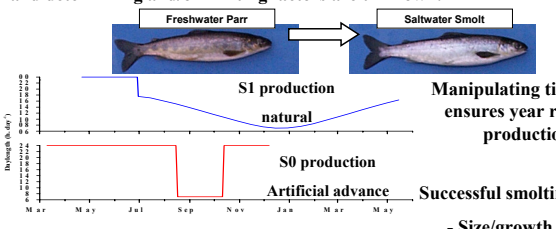


Vaccination

Aim to determine which environmental conditions and husbandry procedures and/or combinations thereof are detrimental to triploid welfare.

3-Out-of-season Smolts (S0)

Effect of triploidy on out-of-season smoltification has not been investigated to date and determining and/or limiting factors are unknown.



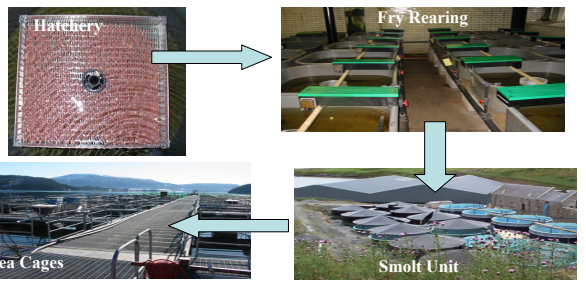
Manipulating time of smolting ensures year round salmon production at sea

Successful smolting determined by:

- Size/growth
- Photoperiod
- Temperature
- Nutrition

4-Commercial Field Trials

Full scale field trials to evaluate triploid and family performance under commercial conditions (egg to market size).



5-Market Perception

The aim is to assess consumer perception, product acceptance/quality and develop marketing strategies for triploid salmon.

Project Deliverables

- Transfer of triploid induction technology to SMEs
- Strengthen knowledge on triploid biological and culture requirements
- Advance knowledge of the smolt process and monitoring
- Provision of triploid specific smoltification regimes
- Develop a welfare scheme for triploid fish
- Define parentage contribution to performance based on ploidy
- Identify perceived risk-benefit of triploidy and define marketing strategy

Overall, results will deliver new knowledge on triploid salmon culture that will aid salmon SMEs and EU legislators to make decisions on their potential implementation within the salmon farming industry as a means to minimize environmental genetic impacts while improving fish welfare and food standards by maintaining a year round high quality product that is acceptable to the consumer.