Use of Medium Density Affymetrix Axiom array for introduction of genomic selection in an Atlantic salmon breeding programme

ISGA Santiago da Compostella 22June 2015

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Landcatch Natural Selection Ltd
Development of a High-Density Salmon SNP chip

UK TSB funded project
GWAS using Affymetrix Axiom array < 132k SNPs

33K Medium density Axiom array
Sea Lice Resistance

Genetic Variation in Sea Lice count EBV
- by family in YC2005 and 2007

- YC2005
- YC2007

Number of families

Sea Lice count breeding value

Resistant
Susceptible
Highly Susceptible
2014 candidate broodstock selections

3 discovery populations

2000 sibs sea lice challenged at 100g
$H^2 0.31$

Subset of 1152 selected for MD 33k array genotyping

Alternative year class challenged at 100g
$H^2 0.24$

Subset of broodstock scored during natural Amoebic Gill Disease challenge
$H^2 0.17$
Gross AGD Score (from Taylor et al., 2009)

Photos: Hamish Rodger
Vet-Aqua International February 2013
## Timescale

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<td>Year Class</td>
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<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2012</td>
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### Selection

- **Family selection, sea lice count**
- **Growth and Survivability under AGD Challenge**
- **Gill Score**
- **Sea lice QTL MAS**
- **Genomic Selection**
Sea Lice

GEBV’s calculated via GBLUP using SVS within Golden Helix software package.

Input trait was sea lice count per unit skin surface area

Within population accuracy 0.55 - 0.76

Between populations 0.18 - 0.47

Predicted phenotypic improvement using GS 22%
AGD

Accuracy of input trait as polygenic EBV’s
0.67

Predicted phenotypic improvement using GS
11%
Advantages

Robust:
99% of samples exceeded call rate of 98%
Very forgiving of DNA quality and concentration

Accurate
Consistency of SNP calls between repeats and positive controls
Prediction accuracies surpassed expectations
Disadvantages

Inflexibility of marker density: inflexibility of cost

>2 week processing time

6 week manufacture lead time

Multiple equivalent chips worldwide, datasets less comparable