



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

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# Development of a High-Density Salmon SNP chip

UK TSB funded project

GWAS using Affymetrix Axiom array < 132k SNPs

33K Medium density Axiom array



Technology Strategy Board  
Driving Innovation

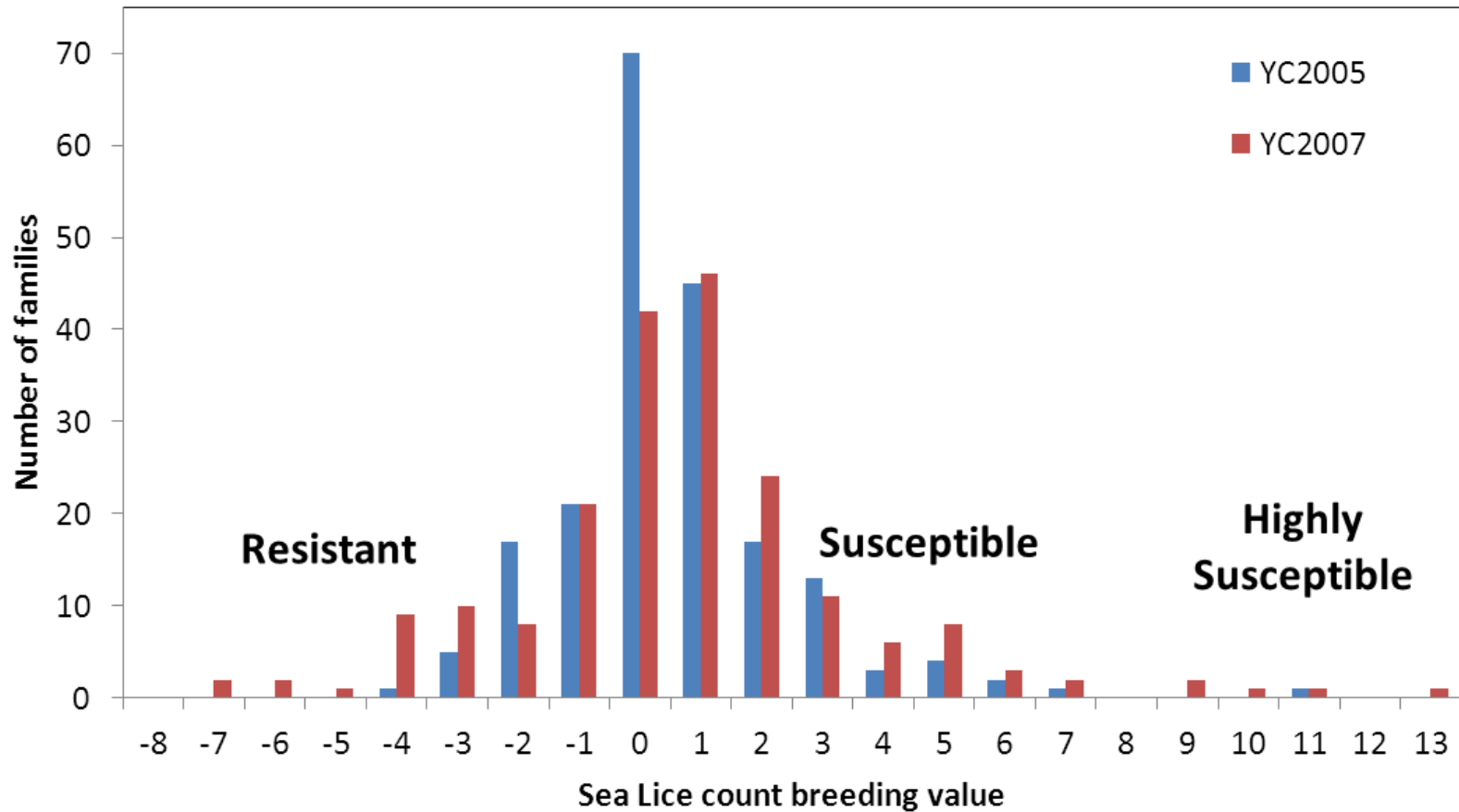
Landcatch  
A Hendrix Genetics Company





# Sea Lice Resistance

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



# **2014 candidate broodstock selections**

## **3 discovery populations**

**2000 sibs sea lice challenged at 100g  
H<sup>2</sup> 0.31**

**Subset of 1152 selected for MD 33k array genotyping**

**Alternative year class challenged at 100g  
H<sup>2</sup> 0.24**

**Subset of broodstock scored during  
natural Amoebic Gill Disease challenge  
H<sup>2</sup> 0.17**

# Gross AGD Score (from Taylor *et al.*, 2009)



0



1



2



3



4



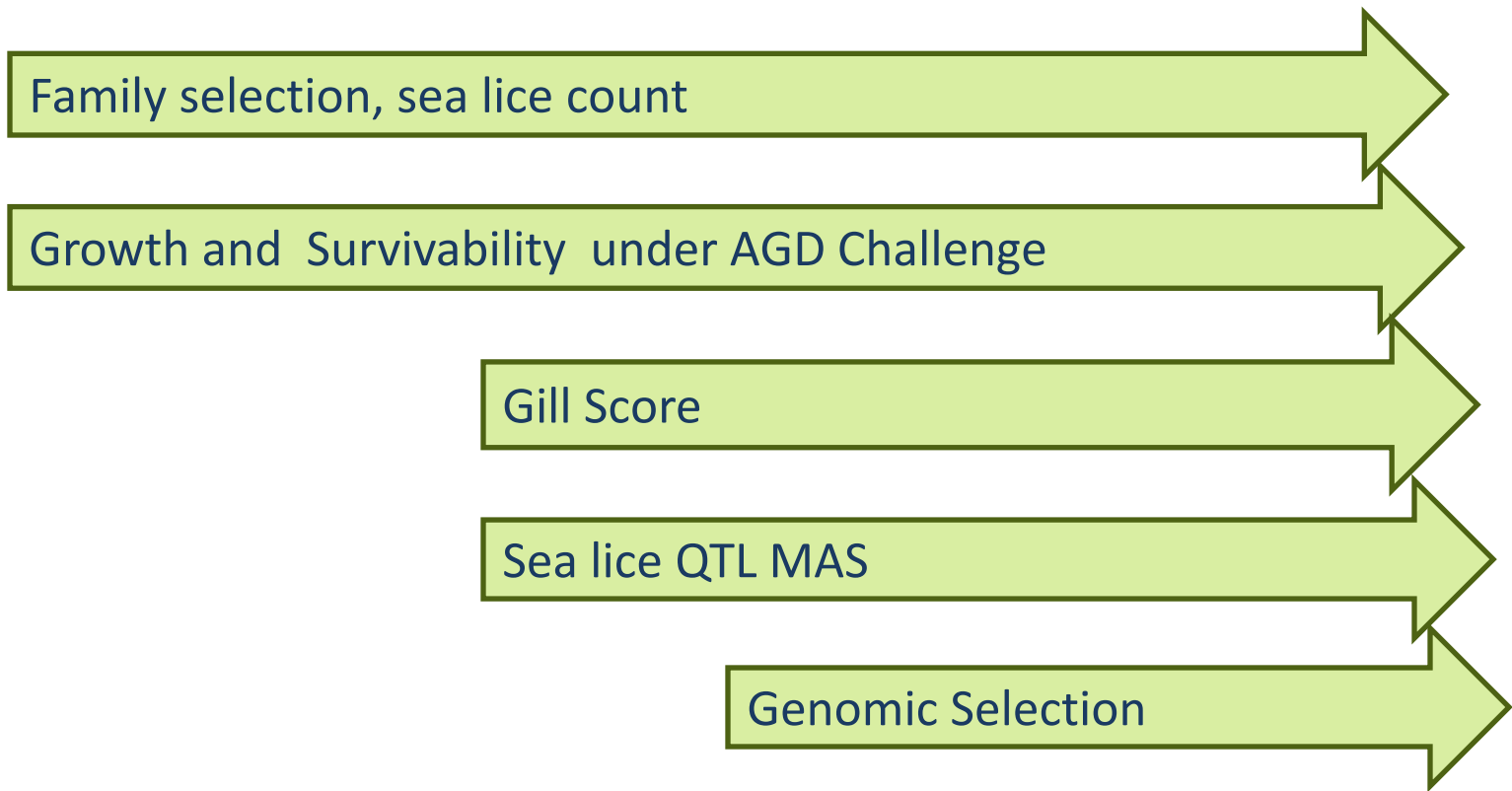
5

Photos: Hamish Rodger  
Vet-Aqua International February 2013

# Timescale

Eggs	2011/12	2012/13	2013/4	2014/15	2015/16	2016/17
Year Class	2007	2008	2009	2010	2012	2013

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