

INTRODUCING NEW BREEDING AND GENETIC TOOLS TO OPTIMIZE THE COMPETITIVENESS OF LOW-TROPHIC SPECIES

Ana Granados Chapatte, General Secretary FABRE TP
Anna K. Sonesson, PhD, senior researcher, board member FABRE

Farm Animal Breeding & Reproduction Technology Platform

Stimulating European Research Activities in Animal Breeding and Reproduction



Research Members



Generalitat de Catalunya
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EFFAB Members



- Developing industry-focused **strategic research and innovation agendas**
- Encouraging **industry participation in EU programs Horizon 2020 and next Horizon Europe**

Meeting point for professionals in genetics, genomics, breeding, reproduction

- Identifying **opportunities for international cooperation**
- Channel of external **advice** for H2020 and **Horizon EU** now

EFFAB (FABRE TP) has been/is involved in many EU projects



FABRE TP Board 2018-2020

Private sector

Johan van Arendonk (EFFAB – Hendrix Genetics) – Chairman
Craig Lewis (EFFAB – Genus PIC) replaced by Laurent Schibler
(ALLICE)

Olivier Demeure (EFFAB – Groupe Grimaud)
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Research Institutes

Anna Sonesson (KI's – NOFIMA)

Johann Sölkner (KI's – BOKU)

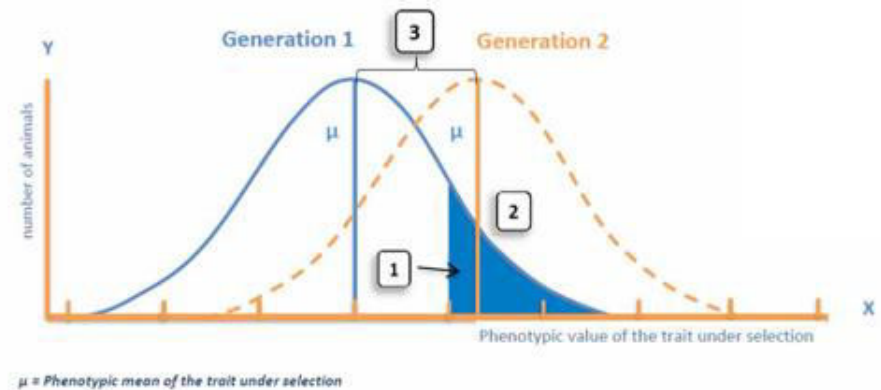
Ian Dunn (KI's – Roslin)



Breeding results in genetic improvement

- 5-10% genetic gain per generation typical in aquaculture species

- EU breeding in oyster, carp??



- Traits
 - Growth : Requires high-quality and enough feed
 - Disease resistance
 - Production quality
 - Morphometric traits
 - Environmental impact
- Non-GMO alternative

Phenotypes



- Recording
 - Directly on breeding goal trait
 - Indicator trait with genetic correlation to the breeding goal trait
 - Large numbers of individuals
- Most important information sources to calculate breeding values
 - Selection candidates
 - Sibs of candidates
 - Family mean

Select parents

- **Information**

- Own performance only, e.g. growth
- Estimated breeding values for selection index based on pedigree information
- Genomic-based estimated breeding values for selection index

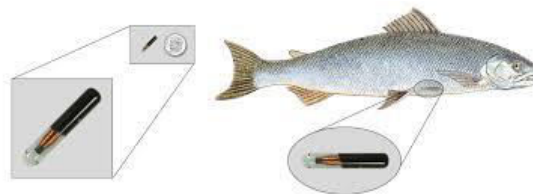
- **Identification of individuals and families to set up a pedigree**

- Individual

- PIT-TAG
- Bee-tags

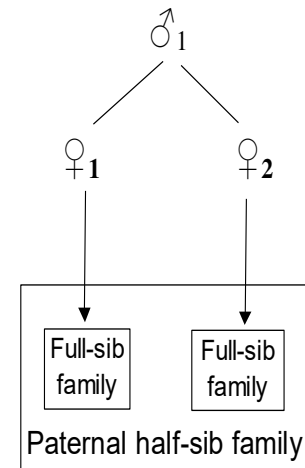
- Family

- Rope (mussel)
- Line (seaweed)
- Flasks (microalgae)



Mating requires control of reproduction

- Controlled paired mating needed to disentangle environmental and genetic effects
 - 1 sire x 2 dams, or 2 sires x 2 dams or n sires x n dams
 - Genetically stable products and no contamination between families!



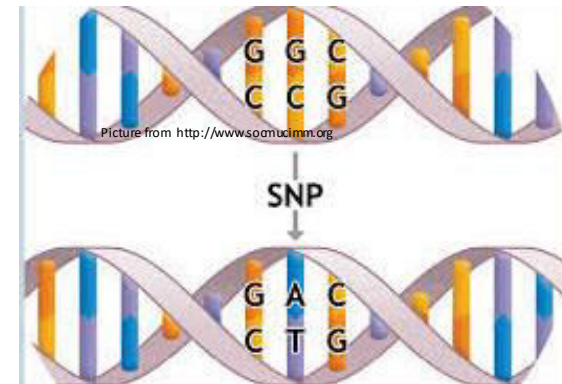
Inbreeding



- Results in reduced genetic variation in the population to select from
- Cannot be avoided in a closed population
- Warning for high rates of inbreeding in outbred aquaculture populations!
- Selection parent with control of inbreeding

Why genomics in breeding?

- Genomic information gives information on the genetic make-up of individuals
- Single Nucleotide Polymorphism (SNP) main information in breeding
 - SNP chip or Genotyping-By-Sequencing
- Uses
 - Gene mapping
 - Genomic breeding value estimation
 - Within-family information for sib-traits
 - + 20-30 gain compared to conventional selection



In conclusion, for breeding programmes of new species

- CLOSED REPRODUCTION CYCLE
- LARGE-SCALE PHENOTYPIC RECORDING
- IDENTIFICATION OF INDIVIDUALS/FAMILIES
- GENOMIC INFORMATION

Development of industries for these species should represent the whole value chain- breeding, reproduction, production management, feeding, health, processing, market, economy etc

Thank you!



General Secretary, FABRE TP
Ana Granados Chapatte



ana.granados@effab.info



<http://www.fabretp.eu/>



@FABRETP



Board member FABRE
Senior Researcher, NOFIMA
Anna K. Sonesson



anna.sonesson@nofima.no



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