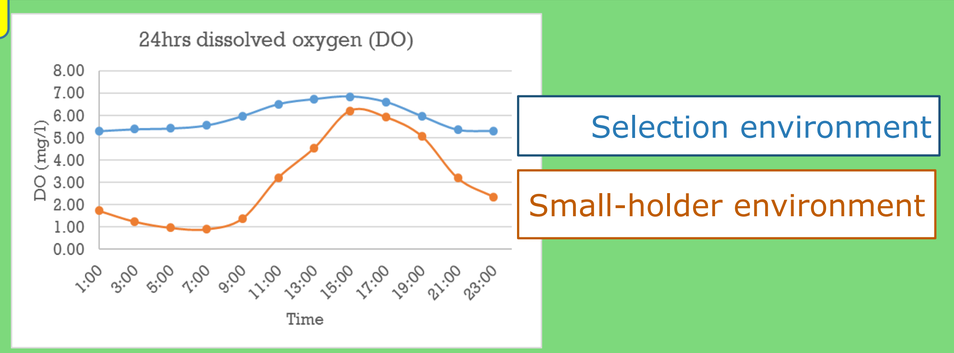
Non-aerated ponds reduces variances and heritabilities compared to aerated ponds in Nile tilapia

Samuel B. Mengistu*, Han A. Mulder , John A. H. Benzie, Hooi Ling Khaw, Hans Komen

Background

- Nile tilapia selection environments
  - Always aerated
  - Optimal dissolved oxygen maintained
- Small-holder production environments
  - Dissolved oxygen is suboptimal for most of the day
  - Large diurnal dissolved oxygen fluctuations



Objectives

To estimate

- Heritabilities for harvest weight in an aerated and non-aerated ponds
- Genotype by environment interaction between aerated and non-aerated ponds for body weight in Nile tilapia.

Conclusions

- No aeration leads to:
  - Lower additive genetic variance and
  - Lower heritability
- Some genotype by environment interaction was found
- Use of half sib information from production environment could reduce the loss in selection response

Materials and methods

- Fingerlings were mass-produced and mass-reared
- Grow-out
  - Two earthed ponds (500m^2), with aerator/without aerator
  - 3 fish/m2, 218 days
- Body weight measurements
  - At stocking,
  - At 163 days after stocking and
  - At harvest (218 days)
- Genotyping
  - 2064 fish were genotyped using genotyping by sequencing (GBS)
  - Genomic relationships were built based on 11,929 SNPs
- Model: $\mathbf{y = Xb + Za + e}$

  y body weight
  b vector of fixed effects (stocking weight, sex)
  a vector of random additive effects
  X and Z are design matrices

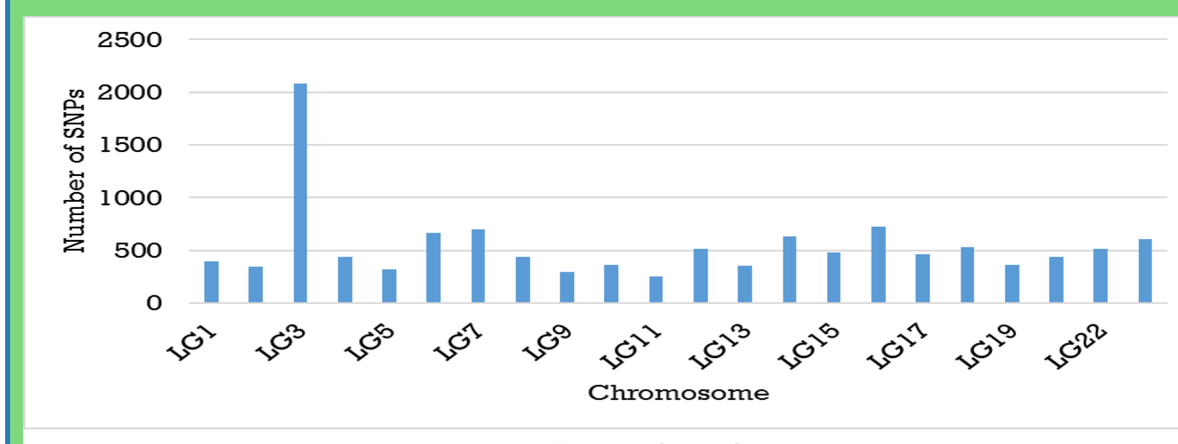


Figure 1. SNPs distribution

Results

Table 1. Genetic parameter estimates for harvest weight in the aerated and the and genetic correlation (r_g) for harvest weight between ponds. non-aerated ponds

Pond	σ_a^2	h^2	r_g	σ_a^2 non-aerated pond/σ_a^2 aerated pond
Aerated Pond	9019.4	0.24±0.06	0.81±0.30	0.30
Non-aerated pond	2685.1	0.17±0.06		

Table 2: Direct response to selection (R) of harvest weight based on performance in an aerated pond and correlated response (CR) in a non-aerated pond.

Trait	R	CR	CR/R
Harvest weight	44.05	20.28	0.46

GIFT strain

Acknowledgements

This project was funded by Koepon Foundation

Wageningen University & Research
P.O. Box 123, 6700 AB Wageningen
Contact: Samuel.mengistu@wur.nl
T + 31 (0)317 12 34 56, M +31 (0)6 16 31 36 09
www.wur.nl