



WorldFish
C E N T E R

Selection for live weight in the GIFT strain

Raul W. Ponzoni, A. Hamzah and N. Kamaruzzaman

Department of Fisheries
Malaysia

WorldFish Center

Genetically Improved Farmed Tilapia **GIFT**



- **A selection line developed during the 1990s in the Philippines**
- **AKVAFORSK, Philippines' research agencies (BFAR, FAC-CLSU, UPMSI) and WorldFish Center were involved**
- **Based on a complete 8x8 diallel, with four domesticated and four wild strains from African countries**



WorldFish
C E N T E R

OUR POPULATION

- In 2000 and 2001 a total of 63 families (6th generation) were transferred from GIFT Foundation, Philippines, to Jitra Research Station, Kedah, Malaysia
- In 2002 and 2003, a 7th and 8th generation were produced, respectively

PROJECT AIMS



- **Conduct a genetic improvement program based on GIFT**
- **Compare GIFT with other strains in a range of environments and production systems**

THIS REPORT

Generations 2002 and 2003



- **Results on performance in two environments**
- **Phenotypic and genetic parameters**
- **Response to selection**

Generations 2002 and 2003

Fish and environment



- Progeny of 106 sires and 138 dams (5394 progeny with records at harvest)
- Spawning January and February, pair mating, one male to two females
- In nursing hapas for 21 days
- In rearing hapas about 2 mo, tagged
- Grow out in cages and pond for ~ 4 mo

Numbers by spawning season and line



Spawning

<u>season</u>	<u>Line</u>	<u>Sires</u>	<u>Dams</u>	<u>Progeny</u>
2002	Base	52	54	1684
2003	Selection	35	65	2560
	Control	19	19	1150
Total		106	138	5394

Joint analysis of Generations 2002 and 2003



- Preliminary examination with SAS, then estimated variance components with ASReml
- Final model included spawning season, sex and environment (cage or pond) sub-classes, age within that sub-class as a covariate, and animal and dam as random effects
- Another analysis was conducted treating weight in cage and pond as different traits
- Square root transformation was used to eliminate variance heterogeneity among groups



Least squares means (harvest weight)

Variable	Sex	Ls means (g)
Cage weight	Females	191 a
	Males	223 b
Pond weight	Females	228 b
	Males	272 c

Variance components, h^2 and c^2 for live weight^{0.5}

Parameter	REML estimate
σ^2_A	2.68
σ^2_{M-E}	1.20
σ^2_P	7.96
h^2	0.34 (0.069)
c^2	0.15 (0.031)

Response to selection in live weight^{0.5}

Method	Response (%)
Difference between the least squares means in the Selection and Control lines in 2003	8.4
Difference between the estimated breeding values in the progeny of the 2002 spawning season and the estimated breeding values in the 2003 spawning season	8.7
Difference between the estimated breeding values in the progeny of the Selection and Control lines in the progeny of the 2003 spawning season	11.4

Genetic parameters treating weight in cages and pond as different traits

Parameter	Environment	
	Cage	Pond
h^2	0.38 (0.083)	0.45 (0.103)
c^2	0.17 (0.038)	0.22 (0.047)
r_g	0.58 (0.135)	

Response to selection treating weight in cages and pond as different traits



- Responses separately calculated in the two environments were in agreement with those estimated treating weight as a single trait



CONCLUSIONS

- Despite eight generations of selection GIFT shows evidence of additive genetic variance and response to selection
- Genotype by environment interactions are better dealt with in terms of the genetic correlation between traits expression in the different environments
- We plan to continue with the selection program, refining the breeding objective to include traits other than growth



WorldFish
C E N T E R

Thank you

