



# Competence building by combining scientific projects and education

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Norwegian University of Life Sciences



## Outline

- Some example of projects/programs
  - with more or less success in competence building
- Important factors for unsuccess
- Important factors for success
- And finally, an appeal from the heart

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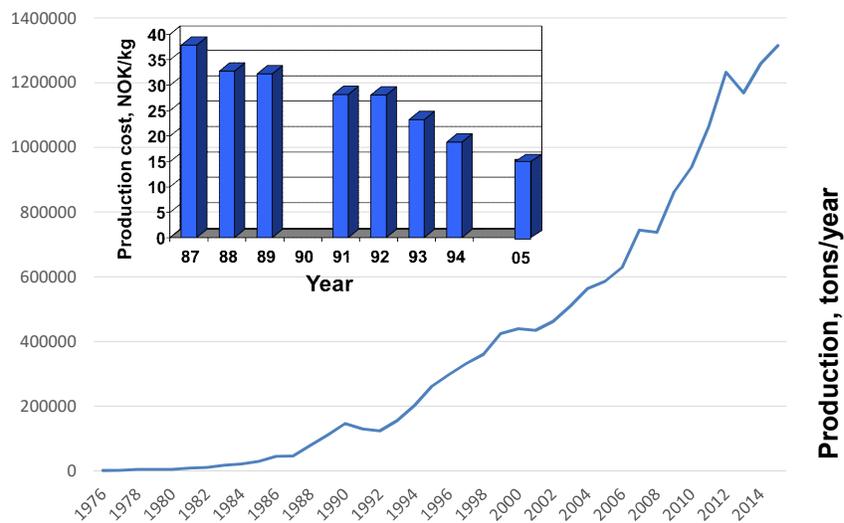
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## But first, the inspiration

- why did things go exceptionally well in Norway

## Norwegian production of salmon



In Norway, much of the R&D were conducted on the breeding station, i.e. also nutrition and management



The breeding station at Sunndalsøra, Norway in 1976.  
Photo: Ola Sveen / Nofima

The Norwegian University of Life Sciences  
- example of academia contributing



- Start-up of breeding program in Salmon - 1971
- First aquaculture course – 1971
- Aquaculture Master programme –1989 >
- The last decade, more than 90% of students are from developing countries



Professor Harald Skjervold. Foto: Vidar Vassvik



**Research in tilapia – a Norwegian tradition**

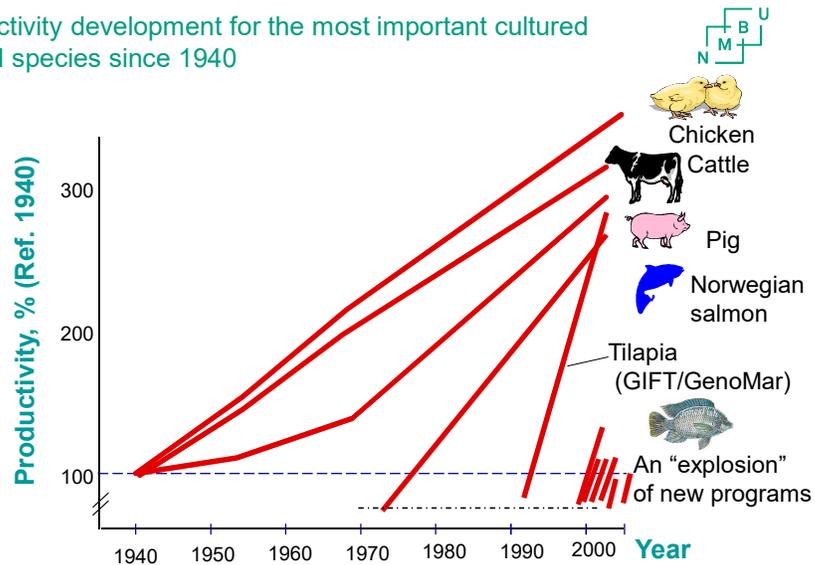
**1988 – 1998:**  
 the GIFT Project –  
 UNDP/ADB.  
 Akvaforsk had the  
 main responsibility  
 for the breeding  
 program for 9  
 generations



**1998 – ...:**  
 GIFT Foundation/GenoMar  
 agreement: GenoMar is given  
 commercial rights and scientific  
 responsibility for the continued  
 development of the GIFT-strain,  
 now called GST → 27 generations  
 Prof. Gjøen at NMBU has been  
 scientifically responsible for the  
 program until 2017



**Productivity development for the most important cultured animal species since 1940**



*(Modified after Eknath et al., 1997)*



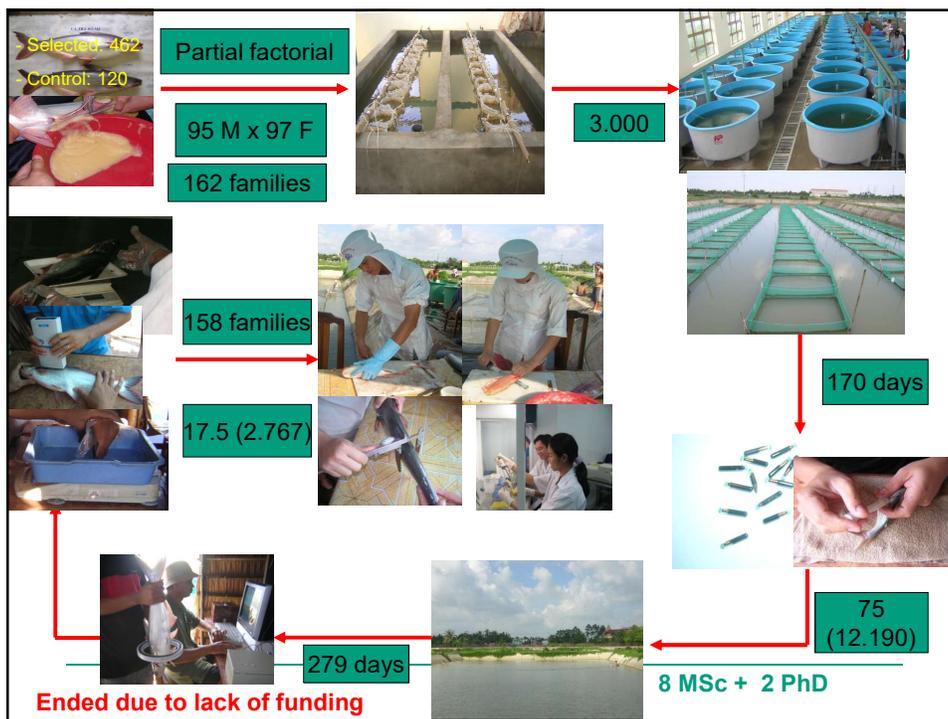
## Examples of programs



## Selective breeding for river catfish (*Pangasianodon hypophthalmus*) in Vietnam



- *Started and operated by Nguyen Van Sang, Research Institute for Aquaculture No.2 (RIA2)*
- *Funded by Norad (Quota stipend), first through MSc and later PhD*





## Establishment of base population for long term genetic improvement of Nile tilapia in Ethiopia



**Kassaye Balkew Workagegn**      Supervisors: Prof. Hans Magnus GjØen (NMBU)  
 Prof. Gunnar Klemetsdal (NMBU)  
 Dr. Elias Dadebo (HwU)

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Establishment of base population for long term genetic improvement
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**Cont...**

- Ca 200 fry per family collected
- After a month, the number of fingerlings reduced to 100 per family and transferred to nursery until tagging
- Ca 20-30 fingerlings per full-sib family PIT-tagged
- Common rearing: fish randomly divided into two production systems, Lo-P and Hi-P, in duplicate
- Body measurements at harvest, recorded and analyzed

→ Dissemination of fingerlings (based on experience from Madagascar)

→ Collaboration to develop a MSc program in Hawassa, Ethiopia



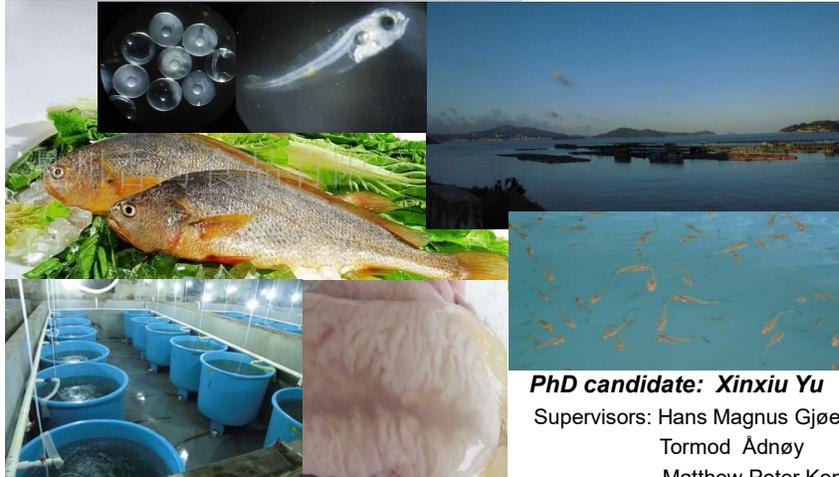
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## Breeding programs for tilapia in Mozambique and Madagascar






## Start-up of a breeding program for large yellow croaker in China



**PhD candidate:** Xinxu Yu

Supervisors: Hans Magnus GjØen

Tormod Ådnøy

Matthew Peter Kent

Large yellow croaker (*Larimichthys crocea*)

- Continuation hindered by further financing; may be reinitiated by China this year

## The development of sustainable selective breeding program for salmonid strains of the neretva river, Bosnia



### Objectives

Aim of study: To assess brown trout family differences in fitness and growth, both in wild and in cultivated conditions.



### Outcome:

After three years, the funding ended.

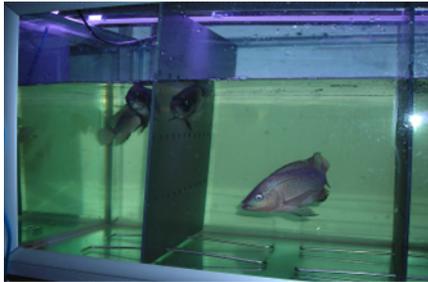
Only the initial milestones had been reached

The two PhD students enrolled was not able to complete their projects



## Link between education and research

### - Testing of aggressive / submissive behaviour in tilapia



Large and small fish together → stress



Time and amount of feed  
- after stressor

(Pham , 2007)

## GENETIC IMPROVEMENTS - COST/BENEFIT



Species	Cost-Benefit	Reference
Sheep, beef cattle, pigs	1/50 - 1/5	Barlow, 1992 Mitchell et al., 1982
Atlantic salmon	1/22	Gjedrem, 1996



## Important factors for unsuccess



## Asking for trouble:

- Too short projects
- Bureaucracy
- Incapable or poorly motivated key staff



## Important factors for success



## What is needed

- Good relationships among the parties
- Political stability and willingness to be in it for the long-haul
- Activity centered education
- Local ownership and decision making
- A holistic approach



And finally, an appeal from the heart



To the decision makers:

*Establishing good relationships  
take time and effort,  
value them!*

