

# AQUACULTURE III

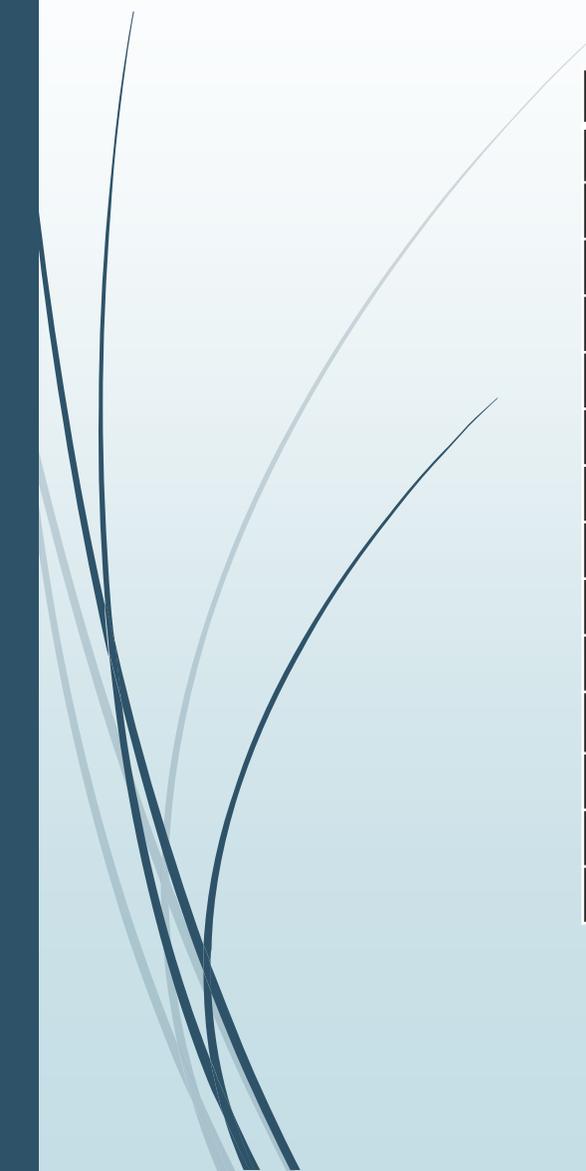
## 8. WEEK

Selection and Breeding Programs in Aquaculture



# WEEKLY TOPICS

Week	Topics
1. Week	Aquaculture Science and Aquaculture Engineering
2. Week	Aquaculture: Economic and Environmental
3. Week	Aquaculture: Innovation and Social Transformation
4. Week	Aquaculture: Food Ethics
5. Week	Shellfish Aquaculture and the Environment
6. Week	Advances in aquaculture hatchery technology
7. Week	Recirculating Aquaculture
8. Week	Selection and Breeding Programs in Aquaculture
9. Week	Ecological and Genetic Implications of Aquaculture Activities
10. Week	Aquaculture: Biotechnology
11. Week	Aquaculture nutrition: gut health, probiotics, and prebiotics
12. Week	Mucosal Health in Aquaculture
13. Week	Off-Flavors in Aquaculture
14. Week	Sustainable Aquaculture Techniques



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- ▶ The purpose of this manual is to outline selective breeding programmes that can be used to improve cultured populations of food fish on medium-sized farms. This manual is not a complete genetics text book; it is designed to explain one topic-selective breeding as it relates to aquaculture on medium-sized fish farms.
  - ▶ There is no good definition of what a medium-sized fish farm is, but it was assumed to be a farm with about 2 ha of ponds. The same principles and ideas that are discussed in this manual also apply to selective breeding programmes that could be conducted on larger fish farms, although some breeding programmes that could be conducted on larger farms are not included in this manual. Some of the selective breeding programmes discussed in the manual could be conducted on smaller fish farms.
  - ▶ There is no magic farm size that allows or prohibits a selective breeding programme. The number of ponds on the farm is more important than the overall size of the fish farm. The selective breeding programmes outlined in this manual can be conducted in one to 150 ponds, depending on the type of breeding programme that is used and the culture system that is typically used to produce the fish. Additional ponds would be needed to hold and/or spawn brood fish. Holding tanks and other facilities might also be needed.

<http://www.fao.org/docrep/field/009/v8720e/v8720e00.htm>

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- Most of the selective breeding programmes outlined in this manual are simple and inexpensive, although there is no such thing as a free breeding programme. Several of the breeding programmes that are presented can be conducted in only one to five ponds. Breeding programmes that require a large number of ponds are included to illustrate a particular type of selection and to contrast them with the simpler ones.
  - Even though selective breeding is a tried-and-true method of increasing yields, most farmers should not be encouraged to conduct one. The most important criteria that determine whether a farmer should conduct a selective breeding programme are his ability to conduct a breeding programme and his desire to conduct one. The farmer who conducts a selective breeding programme:

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- ▶ Must be a good manager.
  - ▶ Must be able to record data and to manage information. If he cannot do this, the extension agent must be willing to do it for him.
  - ▶ Must be willing to allocate ponds and other facilities for the breeding programme.
  - ▶ Must be willing and able to allocate money to conduct the breeding programme.
  - ▶ Must be willing to allocate the labour needed to conduct the breeding programme.
  - ▶ Must accept the fact that the benefits are long-term benefits.
  
  - ▶ Often, genetic gain is not transferred to the production ponds which are used to grow fish for market for one generation (the replacement of brood fish with their progeny). Annual gains made as a result of selective breeding are usually small, but they are cumulative, and over time they can significantly improve growth rate and yield.

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- ▶ The manual was written for extension personnel and for aquaculturists; it is not a genetics text book. It is written in a simple straightforward manner. I tried to use as little jargon as possible, but some had to be used. Scientific terms are defined in the text when they are first used, and there is an extensive glossary that defines the terms used in the book.
  - ▶ Finally, citations were not included in the text or tables. The omission of citations is not intended to slight the contributions made by others. I simply wanted to produce an uncluttered readable manual. A list of suggested references is provided at the end of the manual for those who want to pursue the subject of selective breeding in fish in greater detail.

<http://www.fao.org/docrep/field/009/v8720e/v8720e00.htm>

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- 1 VALUE OF GENETIC DIVERSITY AND THE NEED FOR GENETIC RESOURCE MANAGEMENT
  - 2 INTERNATIONAL SETTING
  - 3 BROODSTOCK MANAGEMENT:
  - 4 GENETIC IMPROVEMENT METHODOLOGIES IN AQUACULTURE
  - 5 DISSEMINATION OF GENETICALLY IMPROVED STRAINS AND MATERIAL TRANSFER AGREEMENTS
  - 6 ECONOMIC CONSIDERATIONS RELEVANT TO GENETIC IMPROVEMENT PROGRAMMES

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- 7 RISK ASSESSMENT AND MONITORING IN GENETIC IMPROVEMENT
  - 8 CULTURE-BASED FISHERIES
  - 9 CONSERVATION OF WILD FISH GENETIC RESOURCES AND AQUACULTURE
  - 10 BANKING AQUATIC GENETIC RESOURCES
  - 11 A PRECAUTIONARY APPROACH
  - 12 PUBLIC RELATIONS AND CONSUMER AWARENESS

<http://www.fao.org/3/a-i0283e.pdf>

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- References
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  - The State Of World Fisheries And Aquaculture 2016, Fao. 2016
  - Advances In Aquaculture Hatchery Technology 2013, Woodhead Publishing Series In Food Science, Technology And Nutrition: Number 242
  - Aquaculture: An Introductory Text, 2005, Robert R. Stickney
  - Aquaculture Farming Aquatic Animals And Plants, 2012, John S. Lucas