

INTRODUCTION TO AQUACULTURE

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Aquaculture is the practice of farming aquatic plants or animals under controlled conditions. Fish are commonly cultured and have similar edible portions (49-52% of the animal) to other farmed species (i.e., chickens, pigs, and cattle; Bocek, 1992). Aquaculture enhances sustainability by diversifying food production. Fish are a protein source that can be harvested and consumed on an as-needed subsistence basis or produced on a commercial scale to provide supplemental income. Aquaculture can provide a sustainable, nutritional, versatile, and high-quality protein resource.

Fish convert food into muscle protein with about the same efficiency as chickens or pigs (Table 1). Fish expend little energy for locomotion and no energy for body temperature regulation. Therefore, the amount of food energy required to produce a kilogram of fish is less than the amount required to produce an equal weight of terrestrial livestock.



Aquaculture in northern Zambia. Chosa Mweemba/WorldFish

Table 1. Comparative Feed Conversion Ratios (Fry et al., 2018)

Livestock	Feed Conversion* Range
Cattle	6.0-10.0
Pig	2.7-5.5
Chicken	1.7-2.0
Fish	1.4-2.4

*Feed conversion is defined as the weight (kg) of feed required for weight (kg) gain in livestock.

Aquaculture ponds provide additional benefits as a supplemental water resource. Ponds can be multipurposed as a water resource for livestock, crop irrigation, and domestic uses. Ponds accumulate rainwater and runoff, which reduces downstream flooding and erosion. Ponds also serve as habitat for many wildlife and plant species.

Simple aquaculture systems requiring low levels of management and resource inputs are termed “extensive.” The simplest extensive systems only need to be stocked once with compatible species combinations allowing for sustainable annual partial harvests. However, annual harvests in extensive systems are much smaller than can be achieved with more intensive management using higher quantity and quality of fertilizers and feeds. Aquaculture becomes increasingly “intensive” as higher densities are stocked and more control of the environment is required.

There are many aspects to consider for developing a successful aquaculture enterprise. Some general environmental considerations include seasonal temperatures, rainfall, land elevation, topography, soil characteristics, the amount of water and its source (spring, watershed, well, river, or stream), and geographical barriers to supplies and markets. The type of species and life-stage(s) cultured are important factors. The type of culture unit (earthen pond, concrete pond/raceway, hoppers (net pen enclosures), or net cages) should be based on desired output, species cultured, and culture site. Availability and access to resources should also be investigated. There are also legal and permitting obligations that may be required through your local and regional government authority.

There are many aquaculture resources available to help you become more informed, which could increase your chances of success. This fact sheet and other resources are available on the Feed the Future Innovation Lab for Fish website: www.fishinnovationlab.msstate.edu.

References

- Bocek, A. (1992). *Introduction to fish culture in ponds*. United States Agency for International Development, International Center for Aquaculture and Aquatic Environments, and Auburn University.
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ABOUT THE FISH INNOVATION LAB

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