# BIOECONOMICS IN AQUACULTURE.

# PRELIMINARY ANALYSIS OF THE CULTURE POTENTIAL OF THE FRESHWATER ANGELFISH - *PTEROPHYLLUM SCALARE*

by Shane Willis, B. App. Sc., Grad. Dip. App. Sc. (Aqua).

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Department of Aquaculture

University of Tasmania, at Launceston.

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Shane Willis.
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# ABSTRACT

The majority of ornamental fish sold in Australia are imported from overseas farms and wild fisheries mainly based in Asia. The number of ornamental fish imported into Australia in 1991-92 was 7,593,812 tails worth $2,385,000 landed in Australia. Due to the increase in importation costs, it has become more economical and attractive for Australian hobbyists and farmers to produce many species commercially, especially the more specialised higher-value lines of tropical ornamental fish. The industry is expected to expand rapidly during the 1990's and is rated as having sound prospects for the future, with production for 1994-1995 expected to be worth around $10 million (O'Sullivan, 1991).

At present over 20 species of ornamental fish species are cultured on a commercial scale in Australia (McKay and Reynolds, 1983). One such example is the freshwater Angelfish, *Pterophyllum scalare* (Lichtenstein) (Pisces; Cichlidae) , a popular medium-priced cichlid. Currently production of this species in Australia is minimal and the biological, marketing and economic aspects of commercial production are poorly understood.

This research project examines the current knowledge of the biology of *P. scalare* and establishes the performance of *P. scalare* under intensive culture conditions. In particular experimentation examines the following areas:

1. Length-weight and length-mouth size relationships;

2. Hatchery production, in particular the effect of artificial incubation of eggs on the reproductive performance of *P. scalare* under commercial culture;

3. Growth and survival of *P. scalare* during the nursery culture phase;

4. Effect of ration level on growth, survival and feeding efficiency; and

5. Effect of stocking density on growth, survival and fin factor.

The results from these experiments suggest that *P. scalare* is a good candidate for intensive culture, with reasonable growth rates, high survival and good feeding efficiency. However, there is potentially a problem with the reproductive output of *P. scalare*. Although these experiments indicate that artificial incubation of eggs can increase the cumulative fecundity of *P. scalare*, egg production is highly variable and large numbers of broodstock must be kept to supply eggs for an intensive culture system. This is an area that needs further research effort.

Preliminary market analysis, based on a survey of the Australian ornamental fish industry, indicates that the majority of *P. scalare* sold in Australia at present are imported. With the increasing costs associated with importing fish, there appears to be considerable market potential for Australian producers to supply P. scalare for import replacement. The survey also indicates the rapid growth of the Australian industry and its growing importance as part of the aquaculture industry. It is expected that the industry will continue to grow rapidly throughout the remainder of the decade.

A preliminary farm design is developed, based on these marketing data as well as the biological data, as a basis for assessing the culture potential of *P. scalare* under intensive culture conditions. From this farm design, financial statements are developed to analyse the economic potential of intensive culture of *P. scalare,* and recommendations made for marketing strategies for the enterprise. Analysis indicates that intensive production of *P. scalare* is feasible, but returns are limited due to high capital investment, long establishment and lag-time in production, and small market size. The analysis indicates that with an initial investment of $120,000, an owner/operator would realise a net present value of approximately $35,000 after five years. Improvements in the biological performance of *P. scalare*, the use of polyculture and increasing the market size may further increase the culture potential of this species.

*P. scalare* offers merit as an aquaculture species in Australia, particularly for a family business, with production and marketing strategies aimed at producing high quality fish for import replacement.