

Development of Inland Aquaculture in the Kingdom of Saudi Arabia



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Executive Summary

A detailed feasibility study of prospective species for the development of freshwater aquaculture in the Kingdom of Saudi Arabia (KSA), then development and testing of pilot recirculating aquaculture systems (RAS) for the selected species of rainbow trout (*Oncorhynchus mykiss*) and common carp (*Cyprinus carpio*) was conducted by an international team at the Al-Muzahmiya Research Station of King Abdulaziz University over a two-year period. RAS development for these very different species required significant capital, operating, professional staff investments, extensive modifications and upgrading to the Al-Muzahmiya Research Station. Allied immunostimulant, feed, fish preference, and financial feasibility studies were performed by KSA project partners from Cornell University, USA and their additional scientists. An analysis of species for freshwater aquaculture systems development in the Kingdom of Saudi Arabia was performed which considered available scientific data and professional expertise. The species selection process used a scoring system based on rankings of multiple Likert scales for: (1) species biology, (2) optimal environmental conditions, (3) biological feasibility, (4) annual imports, (5) profit, CAPEX, and risk (which were double weighted), (f) marketability and economic viability. The recommendation was to import two new species – rainbow trout (*Oncorhynchus mykiss*) and pangasius (*Pangasianodon hypophthalmus*) – and develop a local species, common carp (*Cyprinus carpio*). [See the Trout Feeding](#) | [See the Carp Feeding](#)

Scientists designed an ambitious experiment for rainbow trout that predicted—if successful—after 52 weeks of culture trout biomasses would reach 50 kg/m³ for fish stocked at a high density and 25 kg/m³ at a low density and that the trout would average 863g in both. After conducting the actual experiment for 293 days trout at high density averaged 835g (range 820-843g) reaching 48.1 kg/m³ and at low density fish averaged 864g (850-872g) at 24.9 kg/m³. Remarkably, over the last 122 days of the culture period when the majority of feed was fed trout Food Conversion Ratios (FCRs) were below 1.0.

The experimental RAS for common carp stocked at high (average 3.1 kg/m³) (HD) and low (LD) densities (average 1.5 kg/m³) produced 29.1 kg/m³ (HD) of 682.4g carp and 18.4 kg/m³ (LD) of 857.1g carp. Adding in the biomasses of carp sorted during the trial, the HD was 74.3 kg/m³ and LD 41.0 kg/m³, which are biomasses among the highest reported in the aquaculture literature.

Subsequently, the decision was made to focus on rainbow trout (*Oncorhynchus mykiss*) and common carp (*Cyprinus carpio*). [See the Trout Feeding](#) | [See the Carp Feeding](#)

Two batches of 50,000 triploid eyed eggs from Trout Lodge, South Africa were imported for the first time to Saudi Arabia and grown in an experimental RAS. The trout experiment was designed in three stages of sorting fish to accomplish new stocking densities as a function of ages/weights. Substantial numbers of trout were moved out of the RAS at each stage which the project dispersed to the first trout farms in Saudi Arabia. Eight shipments of an estimated 25,442 trout totaling 584.6 kg ranging in 3.2-75.7g average weights were dispersed from this project to five new trout farms.

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