

Comparative Analysis of Antibiotic Resistance Profiles in Ornamental Fish Farms with Varying Operational Scales

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Ornamental aquaculture has progressed as a subset of aquaculture, one of the fastest -expanding industries in the global economic setting. Sri Lanka includes hubs for both production and export of ornamental fish. Commercial operations focus on disease control, using antibiotics due to preserve fish health. Overuse or misuse of antibiotics has led to the development of antibiotic-resistance bacteria (ARB) and antibiotic-resistance genes (ARG) transmission across organisms, posing as enhanced global threat. This study reflects a comparison of total viable count (TVC) and ARB in uniformly selected 15 farms, varying operational scales (small, medium, large, display, export) in the western province. Storage and culture water samples were collected and tetracycline (TET) and oxytetracycline (OTC) spiked non-selective agar media were analyzed, employing standard pour plate method. As observed, storage water TVC values ranged from 1.07×10^5 – 1.17×10^6 CFU/mL, while culture water TVC values ranged from 2.22×10^4 – 1.13×10^5 CFU/mL. The highest TVC of storage tanks was found within small-scale farms, and regarding the culture tanks, the highest TVC value resulted in export farms according to mean rank values of TVC within farm scales. For TET, a small-scale farm produced the highest ARB% of 13.46%, while the lowest ARB% of 0.00% produced by display and medium scale farms. Conversely, for OTC, an export farm produced the highest ARB% of 6.10%, while display and large-scale farms produced the lowest ARB% of 0.00%. Within storage tanks, the highest ARB% for TET (10.78%) and OTC (4.71%) were recorded in export farms. In culture tanks, the highest ARB% for TET (13.46%) was observed in a small-scale farm, while OTC showed the highest ARB% in an export farm (4.36%). These findings demonstrate that farm operational scales significantly influence antibiotic resistance profiles, highlighting the urgent need for scale-specific antimicrobial management strategies to mitigate the escalating global threat of antibiotic resistance in aquaculture.

Keywords: *Antibiotic-Resistance Bacteria (ARB), Total Viable Count (TVC), Tetracycline (TET), Oxytetracycline (OTC), Operational scales*