Nile tilapia (*Oreochromis niloticus*)

Nile tilapia (*Oreochromis niloticus*) is one of the most widely cultivated aquaculture species globally, owing to its rapid growth rates, tolerance to extreme environmental conditions, resistance to stress and diseases, and ability to feed at low trophic levels. These qualities, combined with the ability to reproduce in captivity and stable market demand, have fueled the expansion of Nile tilapia farming. Global production of Nile tilapia surged from only about 5 tonnes in the 1950s to approximately 4.5 million tonnes by 2020. In contrast, other tilapia species, including blue, longfin, Mozambique, and redbelly tilapia, contributed just over 1 million tonnes (FAO, 2022). Nile tilapia is farmed in over 85 countries, with key producers including China, Indonesia, Egypt, Bangladesh, Brazil, Thailand, and the Philippines (El-Sayed & Fitzsimmons, 2023).

Nile tilapia production begins with the selection of healthy broodstock. Tilapia are asynchronous breeders, and spawning occurs naturally throughout the year in tropical climates or during warm seasons in subtropical regions. Breeding takes place in ponds, tanks, or hapas, with eggs developing into larvae, which are reared in specialized tanks for 20 to 30 days. Once they reach the fry stage (approximately 1 to 2 inches long), they are transferred to larger grow-out systems, which include ponds, cages, tanks, and raceways. Recirculating aquaculture systems (RAS) are also increasingly used, allowing for year-round production under controlled conditions. Tilapia typically reach market size at about 1 kg in body weight after 6 to 9 months under favorable conditions. Market preferences vary, but tilapia are commonly sold as whole fish or fillets, either fresh or frozen.

Nile tilapia is primarily fed pelleted or extruded feeds. The crude protein requirement varies across production stages, from 24% to 40%, with digestible protein ranging from 22% to 36%. Grow-out diets generally contain 5% to 7% lipids (Chowdhury et al., 2013). Common feed ingredients include soybean meal, corn, wheat, fishmeal, and rice bran, along with vitamin and mineral premixes. This species thrives in both fresh and brackish water and can tolerate a wide range of temperatures (14°C to 33°C) and low dissolved oxygen (DO) levels. However, optimal growth is achieved at temperatures between 25°C and 32°C, with DO concentrations of at least 5.5 mg/L. Commercial production often relies on mono-sex, all-male populations due to the faster growth rates of males compared to females (FAO, 2009).

The global tilapia market continues to grow, with the species becoming increasingly popular due to its affordability and stable supply. The market value for tilapia is expected to reach USD 23 billion by 2034, growing at a steady CAGR of 4.6% from 2023 to 2033. Frozen fillets are particularly popular due to their convenience and long shelf life, while fresh fillets command a premium price in markets such as the United States and Brazil. The average price of frozen tilapia fillets in the U.S. was USD 5.46 per kg in 2022, while fresh fillets sold for approximately USD 5.26 per kg (FAO, 2023). In addition to rising prices, global demand for tilapia is driven by growing consumption in regions such as North America, Europe, and Latin America, alongside the expansion of tilapia farming in Asia and Africa.

Nile tilapia farming continues to expand, driven by increasing demand for affordable, high-quality protein. However, challenges remain, including environmental sustainability, disease outbreaks, and the need for continuous genetic improvement. Advances in breeding programs and sustainable practices, alongside improvements in feed formulations, are expected to support the growth of Nile tilapia production, solidifying its role as a key contributor to global aquaculture, particularly in regions where accessible protein sources are vital.

References:

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