

Rainbow trout (*Oncorhynchus mykiss*)

Rainbow trout (*Oncorhynchus mykiss*) is one of the most extensively cultured fish species worldwide. In 2020, global production of rainbow trout reached a volume of 848,100 tonnes, valued at USD 3.6 billion (Tacon, 2019; FAO, 2020). Key producers include Iran, Turkey, Chile, and Norway, with significant growth in freshwater production over the last two decades, particularly in Iran and Turkey. Marine-based production, however, is dominated by Norway and Chile. Canada also has a growing industry, concentrated in Ontario, which produced 5,416 tonnes in 2018, with a farm-gate value of CAD 29 million (Moccia et al., 2019).

Rainbow trout is cultured in both freshwater and saltwater environments using a variety of systems such as ponds, tanks, recirculating aquaculture systems (RAS), and raceways, as well as freshwater and saltwater net-pens. Some operations are vertically integrated, managing broodstock, hatcheries, and grow-out farms, while others focus on grow-out using fingerlings from hatcheries. In hatcheries, broodstock are artificially stripped of eggs and milt, and selective breeding techniques, such as all-female or triploid production, are often used to enhance growth rates. Rainbow trout generally reach market size at 1–2 kg, though larger fish (3–5 kg) are produced in some countries. The fish are typically sold fresh as whole fish or fillets, with value-added products like smoked and canned trout also available.

Rainbow trout are fed extruded pellets, with nutritional specifications varying by life stage. Starter diets (for fish under 5 grams) contain approximately 43% crude protein, while finisher diets (for fish over 1.5 kg) contain about 40% crude protein. Lipid content increases from 13% to 18% as the fish grow. Feed ingredients commonly include marine-derived products like fishmeal and fish oil, land animal proteins, and plant-based components such as soybean meal and corn gluten meal.

Rainbow trout can tolerate temperatures ranging from 0°C to 25°C, with optimal growth occurring between 12°C and 21°C. Though they can survive in oxygen concentrations as low as 3 ppm, optimal conditions require dissolved oxygen levels between 5 and 7 ppm (FAO, 2011; Adeli & Baghaei, 2013). Due to their sensitivity to environmental conditions, maintaining optimal water quality is critical for their health and growth. Poor water quality such as temperature fluctuations, ammonia and nitrite accumulation can lead to challenges vulnerability to diseases, making water management a key aspect of trout farming.

In addition to production challenges, rainbow trout aquaculture is characterized by significant market demand, especially in North America and Europe, where it is consumed both fresh and processed. Farm-gate prices for rainbow trout vary, typically ranging from USD 3.50 to USD 6.00 per kilogram depending on size, region, and processing (Seafish, 2021). Advances in feed efficiency and breeding technology continue to improve the profitability and sustainability of rainbow trout farming, ensuring its position as a key species in global aquaculture.

References:

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