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## TILAPIA: Profile and Economic Importance

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**Figure 1:** Nile tilapia (*Oreochromis niloticus*)

Tilapia is the common name broadly applied to a group of cichlid fishes native to Africa, the Mediterranean, and the Middle East. Tilapia are some of the oldest cultured fishes, as depicted in line drawings found in Egyptian tombs that date back to 2000 BC. This group consists of three economically important genera, which are taxonomically distinguished according to their reproductive behaviors: *Tilapia*, *Oreochromis*, and *Sarotherodon*, all are commonly known as “tilapia.” *Tilapia* are biparental caring-substrate spawners; *Oreochromis* are generally maternal mouth brooders; and *Sarotherodon* are generally paternal or biparental mouth brooders. Currently, Nile tilapia (*Oreochromis niloticus*; fig. 1) and various hybrids are the most commonly produced tilapine species (Green, 2006). Other less commonly cultured species include Blue tilapia (*O. aureus*), Mozambique tilapia (*O. mossambicus*), Zanzibar tilapia (*O. urolepis hornorum*), and red tilapia (*T. rendalli* and *T. zilli*).

Production culture is conducted “extensively” in pond systems or more “intensively” in cages and tanks. Tilapia can be cultured in either fresh or salt water in tropical and subtropical climates, but culture can be constrained in temperate climates—where production must be carried out in indoor tanks (Lim and Webster, 2006). Optimal growing temperatures are typically between 22° C (72° F) and 29° C (84° F); spawning normally occurs at temperatures greater than 22° C (72° F). Most tilapia species are unable to survive at temperatures below 10° C (50° F), and growth is poor below 20° C (68° F); Blue tilapia has the lowest lethal temperature (8° C, 46° F). Under good growing conditions, tilapia may reach sexual maturity at an age of 5 to 6 months and at a weight of 150 to 200 g (0.33 to 0.44 lb). They are primarily herbivores, feeding mainly on phytoplankton and other aquatic vegetation, but readily accept complete pelleted feeds that contain plant and/or animal proteins

and lipids. Because of their lower trophic level and fast growth, tilapia do not generally accumulate contaminants in their tissues under natural conditions. For example, mercury concentration in tilapia has been found to be 0.01 ppm (USFDA, 2009), compared to 0.20, 0.37, 0.56, and 0.71 ppm, respectively, for piscivorous fishes—such as yellow perch, channel catfish, northern pike, and walleye—found in natural water bodies in North America (Kamman et al., 2005). The levels of mercury in all of these fishes are all well below the safe guideline for human consumption of 1 ppm set by the U.S. Food and Drug Administration.

## WORLD PRODUCTION AND TRADE

Commercially, tilapia are the second most important group of wild-captured fish, after carps, with a global capture (harvest reaching) 769,936 tonnes (metric tons) in 2007 (FAO, 2009). Tilapia (all species) culture surged in the 1990s and currently ranks as the world’s eighth most common group of farmed fish species, with a commercial production of 2.5 million tonnes in 2007, corresponding to an estimated value of \$3.3 billion (FAO, 2009). In 2008, Nile tilapia (*Oreochromis niloticus*) culture alone was ranked fifth among the most cultured species in the world, with a total aquaculture production of 2.3 million tonnes (FAO, 2009). The other top four species were, in order, silver carp, grass carp, Japanese carpet shell (small-neck clam), and common carp (FAO, 2009). Nile tilapia represents approximately 84% of total global tilapia production (FAO, 2009). In 2010, it is anticipated that global Nile tilapia production will reach nearly 2.5 million tonnes (fig. 2), with a market value of nearly \$5 billion (FAO, 2010).

China is by far the largest consumer and producer (about 46% of global production) of tilapia, with a production estimated at 1.15 million tonnes in 2009, up

from 1.13 million tonnes in 2007 (FAO GLOBEFISH, 2010). Other main producing countries of farmed tilapia (2003–2004 data) are Egypt (290,000 tonnes), Indonesia (206,000 tonnes), the Philippines (241,000 tonnes), Thailand (180,000 tonnes), and Brazil (100,000 tonnes) (FAO GLOBEFISH, 2010). Projections indicate that Brazil is most likely to rival China in tilapia production within the next decade (FAO GLOBEFISH, 2010).

## UNITED STATES PRODUCTION AND CONSUMPTION

As of 2005, 128 operations produced food-size tilapia in the U.S. with a total production estimated at 7,802 tonnes (ERS, 2005). The majority of food-size tilapia operations were located in Hawaii (18 farms), California (15), and Florida (12); 47 other tilapia farms specialized in stockers (16), fingerlings and fry (28), and broodstock (3) production (ERS, 2005). The average price per pound for food-size tilapia was \$1.72, totaling \$29.6 million for 2005 (ERS, 2005). Typical size sold in the market is between 450 to 680 g (1.0 to 1.5 lb) (ERS, 2005). Tilapia is sold under different forms, including but not limited to live, fresh, frozen as whole, frozen fillets, gutted, gutted and scaled, fillets, skinless, and boneless.

The U.S. is the world’s single largest importer of tilapia (ERS, 2010). The U.S. imported 183,295 tonnes of tilapia products in 2009, valued at \$696.1 million (fig. 3) (ERS, 2010). China is the largest exporter to the U.S., contributing 70% of total U.S. imports. Of the total tilapia imports, 158,937 were frozen whole and fillets and 24,358 tonnes were fresh fillets. China accounted for 82% of total imported frozen tilapia products (whole fish and fillets), while Ecuador, Honduras, and Costa Rica accounted for 87% of imported fresh fillets in 2009 (FAO, 2009).

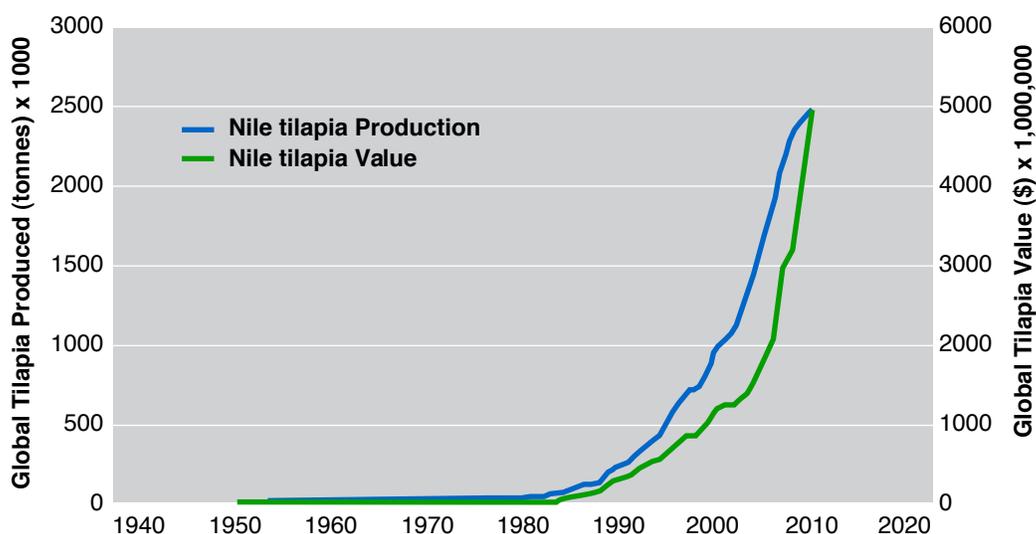


Figure 2: Global tilapia production.

**Table 1.** Nutrient composition of tilapia compared to other meats. \* Cholesterol refers to total cholesterol

Nutrient, per 100 g	Tilapia	Beef	Chicken
Energy, kcal	96	215	114
Protein, g	20.1	18.6	21.2
Total fat, g	1.7	15	2.59
Minerals, mg			
Ca	10	15	5
P	170	171	210
Mg	27	18	26
K	302	295	370
Na	52	66	116
Se	41.8	15.8	32.0
Zn	0.33	4.48	0.58
Fe	0.56	2.09	0.37

Nutrient, per 100 g	Tilapia	Beef	Chicken
Vitamins			
Thiamin, mg	0.04	0.04	0.06
Niacin, mg	3.90	4.65	10.43
B-12, mcg	1.58	2.17	0.20
Fatty acids, g			
Saturated	0.77	5.87	0.57
Monounsaturated	0.65	6.55	0.76
Polyunsaturated	0.48	0.43	0.40
EPA	0.007	0	0.002
DPA	0.057	0	0.004
DHA	0.113	0	0.003
Cholesterol, mg	50	68	64

\* Composition of raw tilapia, raw ground beef (85% lean meat/15% fat), and raw chicken breast; data adapted from ARS, 2009.

## NUTRITIONAL PROFILE

Tilapia has become a popular seafood to American consumers, mainly because of its high nutritional value, mild taste, and low expense relative to other finfishes. Tilapia appeared in America's top 10 seafoods list for the first time in 2002, and in 2008 it became the 5th favorite seafood after shrimp, tuna, salmon, and pollock (NFI, 2010). U.S. per capita consumption of tilapia was 540 g (1.19 lb) in 2009, up from 145 g (0.32 lb) in 2002 (NFI, 2010).

Tilapia is a rich source of protein, phosphorus, potassium, selenium, niacin, vitamin B-12, and is low in fat and saturated fat, omega-3 fatty acids, calories, carbohydrates, and sodium. Table 1 provides a brief comparison of select nutrients between raw tilapia, raw ground beef (85% lean meat/15% fat), and raw chicken breast.

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