

Table 31. Dietary nutritional deficiency, vitamins

Vitamins	Species	Deficiency signs/syndrome
Vitamin B₂ (Riboflavin)	<i>O. aureus</i>	poor growth, high mortality, lethargy, fin erosion, anorexia, loss of body colour, dwarfism, cataracts
Vitamin B₅ (Pantothenic acid)	<i>O. aureus</i>	poor growth, hyperplasia of epithelial cells of gill lamellae, fin erosion, haemorrhage, anaemia, sluggishness
Vitamin B₃ (Niacin/nicotinic acid)	Hybrid tilapia (<i>O. niloticus</i> X <i>O. aureus</i>)	Haemorrhage, deformed snout, gill oedema, and skin, fin, and mouth lesions
Vitamin B₁ (Thiamine)	Hybrid tilapia (<i>O. mossambicus</i> X <i>O. niloticus</i>) and Nile tilapia	poor growth and poor feed efficiency, anorexia, light coloration, nervous disorders, low haematocrit and red blood cell count, and increased serum pyruvate
Vitamin B₆ (Pyridoxine)	Hybrid tilapia (<i>O. niloticus</i> X <i>O. aureus</i>)	poor growth and poor feed efficiency, high mortality, abnormal neurological signs, anorexia, convulsions, caudal fin erosion, mouth lesion
Vitamin B₇ (Biotin)	Hybrid tilapia (<i>O. niloticus</i> X <i>O. aureus</i>)	poor growth
Folic acid	Nile tilapia	poor growth and reduced feed intake and efficiency
Vitamin B₂ (Riboflavin)	Nile tilapia	Requirement not reported
Choline	Hybrid tilapia (<i>O. niloticus</i> X <i>O. aureus</i>)	Poor growth and survival, and reduced blood triglyceride, cholesterol, and phospholipid concentration
Inositol	Nile tilapia	Requirement not reported
Vitamin C (Ascorbic acid)	Nile tilapia	poor growth and poor feed efficiency, scoliosis, lordosis, poor wound healing, haemorrhage, fin erosion, anaemia, exophthalmia and gill and operculum deformity
Vitamin A (Retinol)	Nile tilapia	poor growth and poor feed efficiency, restlessness, abnormal swimming, blindness, exophthalmia, skin, fin, and eye haemorrhages, pot-belly syndrome, reduced mucus secretion, high mortality
Vitamin D (Cholecalciferol)	Hybrid tilapia (<i>O. niloticus</i> X <i>O. aureus</i>)	poor growth and poor feed efficiency, low haemoglobin, reduced liver size
Vitamin K	Nile tilapia	Requirement not reported
Vitamin E (α-tocopherol)	Nile tilapia	poor growth and poor feed efficiency, anorexia, skin and fin haemorrhage, muscle degeneration, depigmentation

Data source: Jauncey (2000), El-Sayed (2006), Lim and Webster (2006).