

# Effect of an homeopathic complex on fatty acids in muscle and performance of the Nile tilapia (*Oreochromis niloticus*)



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**Background:** The homeopathic complex *HomeoAqua Mega 3*<sup>®</sup> was designed to stimulate fish liver function resulting in enhanced lipid metabolism and improved overall performance. The effect of the complex in fatty acid compounds in the muscle tissues and the performance of Nile tilapia (*O. niloticus*) were evaluated.

**Methods:** A control diet with 40 mL of alcohol solution (30° Gay Lussac (GL) alcohol) per kg of feed and another diet with 40 mL/kg of the homeopathic complex were analysed in sex-reversed juvenile male Nile tilapia with mean initial weights of 89.54 g ( $\pm 7.97$ ) and 89.74 g ( $\pm 8.83$ ) and initial total mean lengths of 16.93 cm ( $\pm 0.56$ ) and 16.85 cm ( $\pm 0.56$ ) for the control and homeopathy-treated fish, respectively. Overall, 200 fish were distributed into 10 water tanks, with 20 specimens in each 600 L tank, they were kept for 63 days. Monitoring of the water's physical and chemical parameters was performed. Additionally, the percentage chemical composition and the composition of the muscle tissue fatty acids were determined, and fish performance was evaluated.

**Results:** No significant differences ( $p > 0.05$ ) were found between treatments with regard to the water's physical and chemical parameters, moisture, ashes, proteins of the Nile tilapia muscular tissue and mean rates of total weight and length of the animals in the final period of the assay. The total lipid (TL) rates of the tilapia muscle tissue were  $1.133 \pm 0.2\%$  at the start (control and homeopathy) and  $0.908 \pm 0.14\%$  (control) and  $0.688 \pm 0.14\%$  (homeopathy) at the end of the experiment ( $p < 0.06$ ). The sum total of the SFAs (saturated fatty acids) was  $338.50 \pm 0.15$  at the start (control and homeopathy) and  $271.49 \pm 0.34$  mg/g of the TLs for the control and  $226.12 \pm 0.77$  mg/g of TL for the homeopathy at the end of the experiment ( $p < 0.05$ ). The  $n-6/n-3$  ratio was also lower for the homeopathy-treated fish ( $8.45 \pm 0.40$ ) compared with the control fish ( $9.60 \pm 0.14$ ), ( $p < 0.05$ ) at the end of the 63-day period.

**Conclusion:** Nile tilapia juveniles that received the *HomeoAqua Mega-3*<sup>®</sup> in their diets had a decrease in the TL rates, mainly for the SFAs, and the  $n-6/n-3$  ratio, compared with the control group, without any changes in the animal performance during the experimental period. *Homeopathy* (2014) 103, 178–185.

**Keywords:** Homeopathy; Population homeopathy; Aquaculture; Tilapia breeding; Total lipids; Fatty acids

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## Introduction

The use of homeopathy for herds has been called population homeopathy. This method involves using homeopathic complexes comprising several remedies, each with a separate indication and acting together synergistically. The complex may be administered to an animal population in feeds, mineral supplements or water. This technique was developed to reduce the stress during animal production and ensure a minimum well-being of the animals. Depending on the results (AFC and survival), the fish production should increase.<sup>1</sup>

Population homeopathy features three basic principles: herds should be considered as a whole organism; herds are in permanent imbalance; and homeopathy has modulating effects.<sup>1</sup>

Many scientists consider the Nile tilapia (*Oreochromis niloticus*) to be an ideal model for aquaculture studies, as the fish reproduces in captivity, has a short generational period, shows fast growth, feeds at low trophic levels, accepts artificial meals immediately after the absorption of the vitelline sac and has tolerance to variable environmental conditions.<sup>2</sup> According to the Ministry of Fisheries and Aquaculture,<sup>3</sup> the total aquaculture production in Brazil in 2009 and 2010 reached 415,649 tons (t) and 479,399 t, respectively. Fish culture reached 394,340 t overall, and tilapia culture ranked first in production, with 155,450.8 t (39.4%). Population homeopathy is the ideal for herds due to its low costs, efficiency and absence of toxicity. In addition, the use of extremely diluted active principles with ensures that there are no residues in the meat or milk that would endanger human health or contaminate the waterways or soil.<sup>1,4</sup>

Animals bred under low stress conditions have better production potentials with higher quality and higher survival rates.<sup>5</sup> Homeopathy is based on the similarity principle, *i.e.*, medicines cure those diseases with symptom pictures similar to the set of their physiological or pharmacodynamic effects in the healthy organism. This principle was discussed by Hippocrates and experimentally confirmed by Samuel Hahnemann, and is used widely in human medicine.<sup>6</sup>

*HomeoAqua Mega 3*<sup>®</sup> is an homeopathic complex was designed to stimulate the functioning of the liver in fry, juvenile and adult fish, improving liquid metabolism and overall performance. Vargas and Ribeiro<sup>7</sup> reviewed the use of population homeopathy in Nile tilapia, and their results on *Homeopatila RS*<sup>®</sup> and *Homeopatila 100*<sup>®</sup> showed that further complementary assays may allow the use of homeopathic complexes during the different growth phases of the tilapia.

## Methods

### Place and period

This experiment was performed at the Experimental Fish Culture Unit of the Universidade Estadual de Maringá (CODAPAR), district of Floriano, Maringá PR Brazil, between October and December 2011 for 63 days. The experiment was approved by the Ethics Committee in Animal

Experimentation of the Universidade Estadual de Maringá, Protocol n. 060/2010.

### Animals, installations and feed

Sex-reverted males from a homogeneous population of Nile tilapia (*O. niloticus*), strain Genetic Improvement of Farmed Tilapia (GIFT), with mean initial weights of 89.54 g ( $\pm 7.97$ ) and 89.74 g ( $\pm 8.83$ ) and mean initial total lengths of 16.93 cm ( $\pm 0.56$ ) and 16.85 cm ( $\pm 0.56$ ) for the control and homeopathic complex treatments, respectively, were randomly distributed into ten 600 L fibreglass water tanks, with a 30% daily renewal rate. The tanks were placed in a plastic-covered greenhouse within an area of 120 m<sup>2</sup>. 200 fish were distributed into 10 water tanks with 20 specimens each. Prior to the start of the experiment, the fish were acclimatised in water tanks for 7 days. Two treatments with five repetitions were evaluated using a completely randomised experimental design with 100 specimens per treatment.

The fish were fed on commercial extruded meals with 32% crude protein (CP) that were 5 mm in diameter during the first 35 days of the experiment. The meals were provided twice a day (at 10 h and 16 h) until apparent satiety. Feed with 8 mm diameter and 32% CP were supplied after 35 days. Table 1 shows the diets supplied to the animals during the entire experimental period with their percentage nutrient and fatty acid compositions (Table 1).

### Treatments

Two treatments were evaluated: control consisting of 40 mL of alcoholic solution (30° Gay Lussac (GL) alcohol) per kg of meal and with *HomeoAqua Mega 3*<sup>®</sup> added at 40 mL/kg of meal. The homeopathic medicine was prepared from the stock solution at a ratio of 1:10. The homeopathic complex in an alcohol solution was added to the feed every week. The solution was initially homogenised and left to dry in the air for 24 h. The control treatment had the same inclusion process. The prepared diet was conditioned in an airy place, out of direct sunlight, chemical products and magnetic field-emitting apparatuses until it appeared loose and had no alcohol odour.

The *HomeoAqua Mega 3*<sup>®</sup> homeopathic complex was specially prepared for this study by the REALH Company (Brazil). Table 2 shows its composition.

### Physical and chemical parameters of water

Approximately 30% of the water was removed from each tank three times a week to remove the accumulated organic matter. Temperature, pH, dissolved oxygen and electrical conductivity, were measured twice a week and verified twice a day at 9 h and 16 h. The temperature and oxygen were monitored by a dissolved oxygen meter; pH was monitored by an electronic pH-meter, and electrical conductivity by a portable conduction-meter.

### Percentage chemical composition and fatty acids

At the start of the experiment, nine animals were killed. Then, 15 animals were killed from each treatment

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