



Study on the effects of different dietary lipid on growth of triped murrell *Channa striatus* (Bloch)

M Purna Chander^{1*}, G Sunitha Devi², M Sucharith¹

¹ Research Scholar, Department of Zoology, University College of Science, Osmania University, Hyderabad, Telangana, India

² Professor, Department of Zoology, University College of Science, Osmania University, Hyderabad, Telangana, India

Abstract

Growths, survival, and feed, conversion ratio, of striped snakehead, (*Channa striatus*) larvae, fed on different feeds, during nursery rearing, were evaluated. Three different experiments, were conducted using different dietary lipid and fingerlings of *C. striatus* with three replicates, per treatment. Growth performance of snakehead waight gain was examined by feeding them with the following diets. The feed ingredients (commercially available Fish Meal) will be grinded, and sieved, to pass through 0.5 mm size sieve before incorporation of lipid, with experimental diets. The experimental diets were prepared with soya bean meal and fish meal (1:1), control diet was prepared. Then, Lipid (Fish oil) was mixed 3 different groups of grinded fish meal at the level of 6%, 8% and 10%. Diet [1]: Control diet [The commercially available fish meal with lipid] Diet [2]: 6% of lipid diet. To make 100 grams of 6% lipid diet, take 6g of lipid (fish oil), soyabean meal 47gr, and 47 gr of fish meal powder. Diet [3]: 8% of lipid diet. To make 100 grams of 8% lipid diet. Take 8g of lipid (fish oil),46gr soyabean meal and 46 gr of fish meal. Diet [4]: 10% of lipid. To make 100 grams of feed 10% lipid diet, take 10g of lipid (fish oil), soyabean meal 45gr and 45 gr of fish meal powder.

Keywords: *Channa striatus*, fingerlings, food conversion ratio, formulated diet, striped snakehead

Introduction

Aquaculture, is the world's fastest growing food production, sector and plays a crucial role, food and nutritional security, by the farming of aquatic animals. In Indian aquaculture industry transformation, had occurred from highly traditional, activity to well-developed, technology. Considering the growing demand, of fish, for growing population, of India, the emerging regional preferences for various fish varieties; it is the need of the hour to focus efforts for species diversification in freshwater aquaculture [1]. Snakehead's popularly known as Murrells, or snakeheads, are a peculiar group of freshwater fishes, having accessory respiratory organ, to utilize atmospheric air, for respiration that enables, them to thrive in oxygen, depleted waters [2] (Kumar, *et al.*, 2012, and 2013). The striped morrell, *C. striata*, belong to the family, Chanidae, and it is a commercially, important, species for inland fisheries [3]. It is a valuable, food fish, (Wee, 1982; Sahu, *et al.*, 2012, a and 2012, b). Snakehead, can survive, in adverse environments, with low dissolved oxygen and high ammonia [4] (Ng and Lim, 1990; Mollah *et al.*, 2009 and Qin *et al.*, 1997a) [20, 28]. This fish is known for its taste, high nutrient and pharmaceutical values (Khanna, 1978). In Malaysia, it is known as "Haruan" and a wellknown remedy for wound healing [5]. The white, boneless flesh, of snakehead is believed, to have rejuvenating, *J. Exp. Zool. India* Vol. 21, No. 1, pp. 205-210, 2018 www.connectjournals.com/jez ISSN 0972-0030 strength, particularly for those recuperating, from a serious illness, (Ling, 1977) [21]. Striped murrell is, a commercially, important fish, for aquaculture, in Philippines, Thailand, Cambodia, and Vietnam, (Wee, 1982) and makes up 13%, of the marketable fishes, in India, (Chakrabarty, 2006; Aliyu-paiko *et al.*, 2010) [2, 6, 10]. High market value, growth, tolerance, of high stocking rates, and utilization of atmosphere, oxygen for respiration, in oxygen depleted, water are the characteristics, of this striped snakehead, that

make it a desirable, cultivar [6] (Sampath, 1984). The growth, and survival, rate of larval fish, in hatchery, conditions are mainly, dependent, upon quality, of food supply [7]. Mass mortality, of larval, and juvenile, fish might occur if the food supply, is inadequate (Houde, 1978) [8]. The preliminary study on growth, and survival, of larval snakehead fish, fed with *Artemia* nauplii, and formulated feed, has been reported, (Qin and Fast, 1997; Qin *et al.*, 1997b) [10, 28]. In commercial culture, snakehead mostly depends, on capture of wild fry, which are further trained to accept, formulated, feed consisting, of Soyabean meal, and fish meal, are 1:1 proportion, and fish oil, was used as lipid, (Diana *et al.*, 1985). In Thailand, farmer feed, the snakehead, with trash fish, along with wheat flour, rice bran, vitamin, and minerals, (Boonyaratpalin *et al.*, 1985). [11] In some carnivorous fishes, cannibalism, is usually 206 Sangeeta Kumari *et al* associated with some variables, like heterogeneous, size variation, limited food availability, high population, densities, limited refuge areas, and light conditions, (Hecht and Pienaar, 1993) [13]. Among these variables, size variation, and limited food availability, are the primary reason, of cannibalism, (Hecht and Appelbaum, 1988; Katavic *et al.*, 1989). [14] In culture of striped snakehead, poor survival rate, is the main problem, in the initial period, due to cannibalism, and the huge size variation, during grow out culture, (Wee, 1982; Diana *et al.*, 1985). [15] Snakehead, easily swallows, the fish approximately, half of their length, and high, levels of cannibalism, occur with juveniles, (Wee, 1982; Diana *et al.*, 1985; Ng and Lim, 1990) [20]. Qin and fast, (1996) [27] reported that low levels, of food supply, might induce cannibalism, and showed, that when food supply, increases cannibalism, was reduced from, 86%, to 36%. [16] Further, they also reported, that food supply, alone could not completely, stop cannibalism. Qin and Fast (1997) [28] reported, that initial size, differences can lead, to cannibalism, between individuals. Therefore, there is an

urgent, need to minimize the cannibalism, and increase the survival, of striped snakehead, seed during its nursery, rearing. Since, feeding rates, vary across the species, and at each developmental, stage of fish, and successful culture, of fish, requires development, of appropriate feeds, and feeding rate. ^[18] The over-feeding, and feed wastage, deteriorate, the water quality, (Ng *et al*, 2000); while inadequate, food supply, has direct influence, on cannibalism. ^[19] There are several factors, which influence, the feeding rate, in culture system, like fish size, species and rearing systems, (Cho *et al*, 2003) ^[20]. Feeding rate, is also influenced, by the presence of the nutrients, in the feed, (Mihelakakis *et al*, 2002) ^[21]. By optimizing, the feeding rates, farmers can successfully, reduce cost, maximize growth, while managing, other factors, such as individual, size, variation and water quality, which are important, in rearing, of fish, (FAO, 1999). Therefore, this study has been, conducted to assess the effect, of different, feeding rate, on growth, survival, and cannibalism, of striped snakehead, fingerlings.

Material and methods

Experimental design, the experimental setup, was consisted of 12, rectangular FRP tanks, (250 L capacity), covered with nylon mesh mosquito net. The tanks, were initially washed, with potassium permanganate solution, and left overnight for drying. The very next day, tanks were thoroughly washed, and filled with clean water. One hundred twenty, striped Murrell fingerlings, were randomly distributed, equally in to 12 tanks, each containing 10 fingerlings. Four treatments, groups, were taken in triplicated, following a completely, randomized design. Total volume of the water, in each tank was maintained at 150 L, throughout the experimental period. The aeration, pipe in each tank, was furnished, with an air stone, and a plastic regulator, to check the air pressure uniformly, in all the tanks, and to maintain water temperature, water heater, was used. Fish was fed, with different dietary lipid, feeding such control, of (Tank 1) Control, 6% of (T2), 8% of (T3), and 10% of (T4). The daily, ration was equally divided, and fed at 9.00 am and 5.00 pm.

Formulation and preparation of experimental diets

The feed ingredients (commercially available Fish Meal) will be grinded, and sieved, to pass through 0.5 mm size sieve before incorporation of lipid, with experimental diets. The experimental diets were prepared with soya bean meal and fish meal (1:1), control diet was prepared. Then, Lipid (Fish oil) was mixed 3 different groups of grinded fish meal at the level of 6%, 8% and 10%. Diet [1]: Control diet [The commercially available fish meal with lipid] Diet [2]: 6% of lipid diet. To make 100 grams of 6% lipid diet, take 6g of lipid (fish oil), soyabean meal 47gr, and 47 gr of fish meal powder. Diet [3]: 8% of lipid diet. To make 100 grams of 8% lipid diet. Take 8g of lipid (fish oil), 46gr soyabean meal and 46 gr of fish meal. Diet [4]: 10% of lipid. To make 100 grams of feed 10% lipid diet, take 10g of lipid (fish oil), soyabean meal 45gr and 45 gr of fish meal powder. 100g diet to prepare experimental diets. Required amount of water was added to mix diet ingredients to form a dough and pellets were prepared using hand pelletizer, dried using air blower, sealed in vacuum packaged bags and stored until use to avoid bacterial or fungal contamination.

Growth efficiency

Weight gain/ loss - estimated by Ricker method (1975) = $W_2 - W_1$

Where W_1 and W_2 are the Initial and final weight in grams
Specific Growth Rate (SGR) - estimated by Ricker method (1975)

$SGR = 100(\log W_2 - \log W_1) / T$

T is the no. of days of the feeding period.

Hepatosomatic Index (HSI) - estimated by Parameswaran method (1974)

$HSI = \text{Weight of Liver} / \text{Weight of fish} \times 100$

Viscerosomatic Index (VSI) - estimated by Parameswaran method (1974)

$VSI = \text{Weight of Visceral Organs} / \text{Weight of fish} \times 100$

Food conversion efficiency (FCE) – Ince *et al*. (1982)

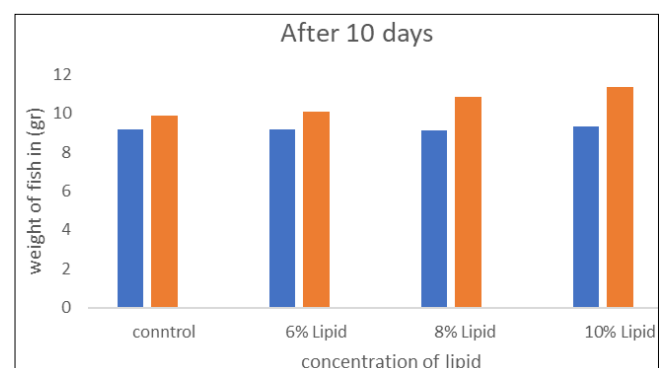
$FCE = \text{Wet weight gain} / \text{Dry weight of food}$

In the present investigation, the difference in weight gain was significantly increased compared to control. Weight gain was increased gradually from experimental duration from 10 days to 30 days and exposed 6%, 8% and 10% of high dietary lipid. After 30 days of lipid exposure, the difference in weight gain was increased under 10% Lipid (16.3g – 12.3g = 4.2g, $p < 0.002$) followed by 8% (15.4g – 11.8g = 3.6g, $p < 0.005$) and 6% (13.5g – 9.210.5g = 3g, $p < 0.0006$), compared to control (13.7g – 11.6g = 2.1g). A consumed x100

Result and discussion

significant increase was found in 6%, 8% and 10% treated fish. The increase in fish body weight by Lipid. In the present investigation, the difference in weight gain was significantly increased compared to control. According to Aliyu Paiko, M. and Hashim, R. 2012. Effects of substituting dietary fish oil with crude palm oil and palm fatty acid distillate on growth, muscle fatty acid composition and the activities of hepatic lipogenic enzymes in snakehead (*Channa striatus*, Bloch 1793) fingerling. Aqua. Res. 43(5):767-776.]

Boonyaratpalin M. Lipid requirements of snakehead fingerling. Progress report of the regional project RAS/76/003. Bangkok, Thailand: Network of Aquaculture Centers in Asia 1981. p. 30. According to Lique who reported that increased of dietary lipid levels from 6% to 10% had significantly affect the growth of fish. Therefore, inclusion of 6%,8% and 10% dietary lipid in the diet for useful for maximum growth.



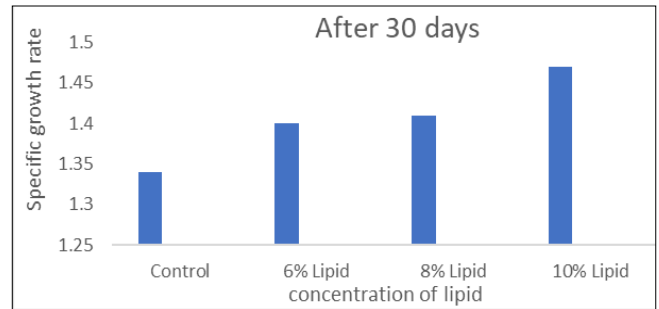
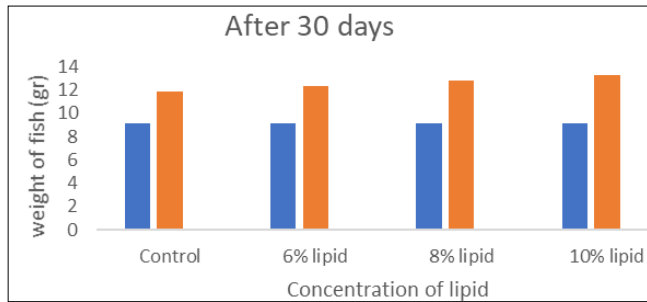
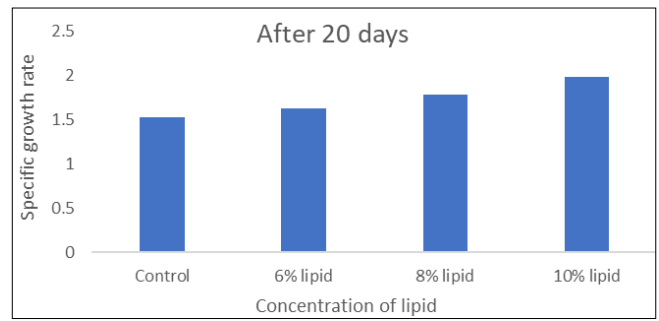
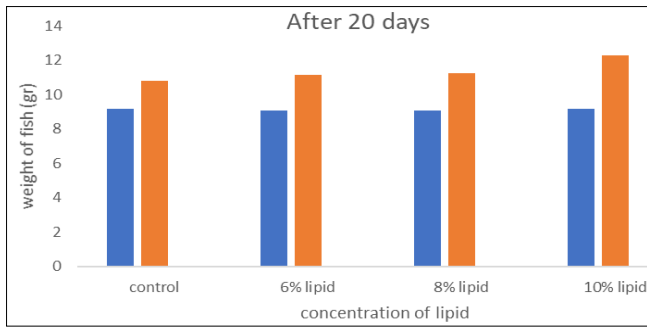


Fig 1: Containing different levels Weight gain of *Channa striatus* (Bloch) after fed with diet of Lipid (fish oil) used as growth promote

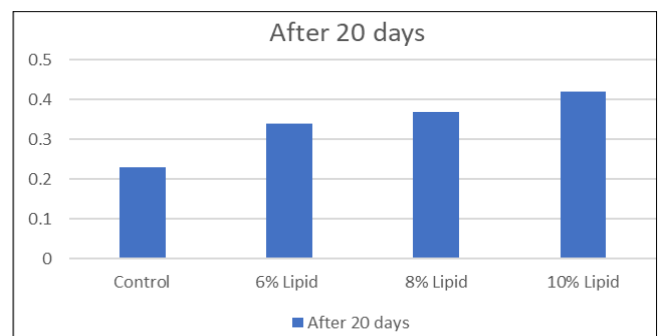
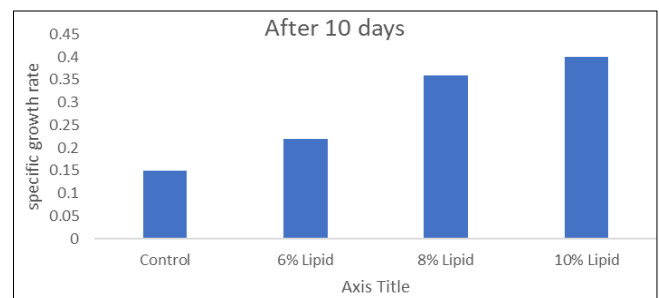
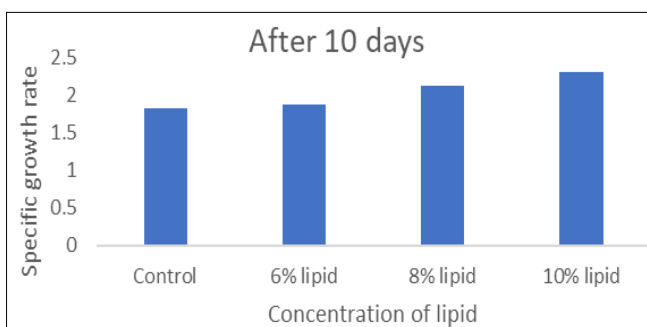
Fig 2: Specific growth rate of *Channa striatus* (Bloch) fed diet with containing different levels of Lipid

Specific growth rate (SGR)

In the present research study, Specific growth rate (SGR) of fish was gradually increased at all durations (10, 20 and 30) under 6%, 8% and 10% lipid diets compared to control. Specific growth rate (SGR) of fish was increased more under the higher concentration of lipid (10%) and longer duration of 30 days. At the end of the 30 days of lipid exposure, Specific growth rate (SGR) was increased more under 10% (0.43, $p < 0.001$) followed by 8% (0.38, $p < 0.001$) and 6% (0.38, $p < 0.0001$), compared to control (0.24). A significant increase was found in all different concentrations. The increase in Specific growth rate (SGR) by lipid containing diet was due to the increased body weight of fish. The present study indicates that increase of dietary lipid levels from 6% to 10% had significantly affect the growth of fish. Therefore, inclusion of 6% to 10% dietary lipid in the diet was useful for maximum growth. Alava V. R., (1998) reported that effect of salinity, dietary lipid source and level on growth of milkfish (*Chanos chanos*) fry.

Hepatosomatic index (HSI)

In the present research study, Hepatosomatic Index (HSI) of fish was gradually increased compared to control. Hepatosomatic Index of fish was increased more under the high percentage of lipid (10%) and longer duration (30) days. After 30 days of lipid exposure, Hepatosomatic Index was increased more under 10% (3.22, $p < 0.001$) followed by 8% control (2.86, $p < 0.01$) and 6% (2.26, $p < 0.01$), compared to control. A significant increase was found in all different concentrations. The increased level of HSI index by fed the diet containing different lipid percentage (6%, 8%, and 10%) may be due to the low glycogen deposition or fat accumulation in the liver affect proper liver function.



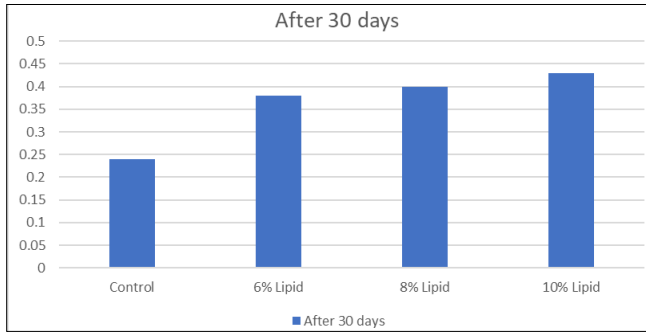


Fig 3: Hepatosomatic index (HSI) of *Channa striatus* (Bloch) fed with diet containing different levels of lipid.

Viscerosomatic Index (VSI):

In the present study, Viscerosomatic Index (VSI) of fish was significantly increased compared to control. Viscerosomatic Index of fish was increased more under the higher concentration lipid (10%) and longer duration (30 days). At the end of the 30 days of lipid exposure, Viscerosomatic Index was increased under 10% (8.42, $p < 0.001$) followed by 8% (7.62, $p < 0.01$) and 6% (7.35, $p < 0.01$), compared to control (6.18).

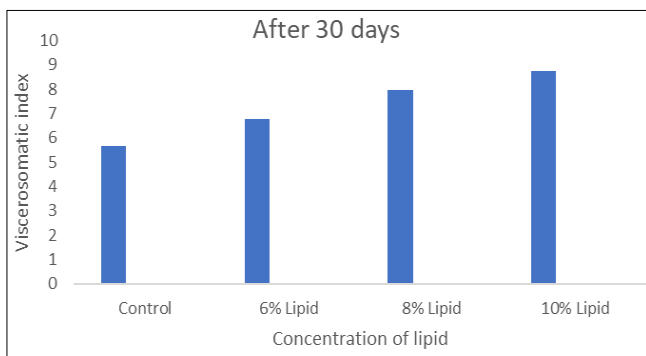
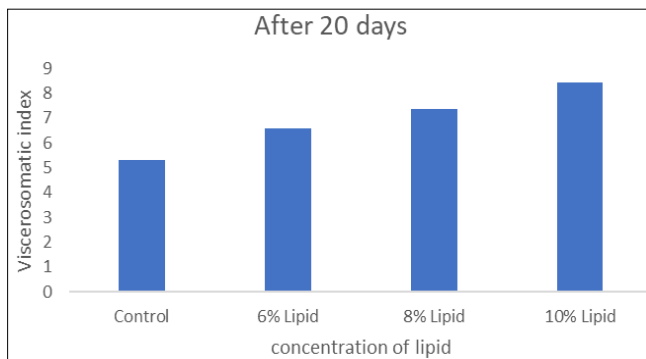
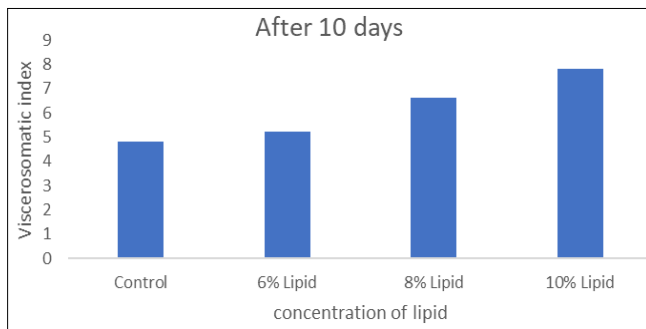


Fig 4: Visceral somatic index (VSI), of *Channa striata* (Bloch) after fed diet containing different levels of Lipid.

Food conversion efficiency (FCE)

Exposure to different concentrations of lipid exhibited a gradual increase in the Food Conversion Efficiency (FCE) of fish. Food Conversion Efficiency (FCE) was increased more under higher level of Lipid (10%) and longer duration (30days). After 30 days of lipid exposure, the Food Conversion Efficiency (FCE) was increased more under 10% (57.85, $p < 0.05$) followed by 8% (50.84, $p < 0.05$) and 6% (47.61, $p < 0.05$) compared to control (30.17). A significant increase was found in all different concentrations. The increase in FCE was due to the feed utilization and absorption rate. Exposure to different concentrations of lipid exhibited a gradual increase in the Food Conversion Efficiency (FCE) of fish. Food Conversion Efficiency (FCE) was increased more under higher level of Lipid (10%) and longer duration (30days). After 30 days of lipid exposure, the Food Conversion Efficiency (FCE) was increased more under 10% (57.85, $p < 0.05$) followed by 8% (50.84, $p < 0.05$) and 6% (47.61, $p < 0.05$) compared to control (30.17). A significant increase was found in all different concentrations. The increase in FCE was due to the feed utilization and absorption rate.

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