Effect of Sorghum millet (Jowar) supplementary diet on growth and survival of Oreochromis niloticus (Nile tilapia) (Linnaeus, 1758) Fingerlings

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Abstract

The current study was conducted to determine the “Effect of sorghum millet (jowar) supplementary Diet on Growth and survival of Oreochromis niloticus (Nile tilapia) (Linnaeus, 1758) Fingerlings” The experiment was conducted for 60 days. In this study 20 plastic tanks of 225 liters were used for 5 treatments with each of four replication. Fisheries respectively were homogeneously distributed in each tank at the ratio of 10 fishes per tank. Four experimental diets without sorghum millet(SM) at the ratio of 5%, 10%, 15%, and 20% in T0, T1, T2, T3 & T4. The weight gain was significantly higher in T4 (54.21±0.883) as compared to other groups. FCR was significant lower in T4 (1.56±0.013) as compared to other groups. SGR T4 (6.87±0.069) and GCE (0.64±0.015) were also significantly higher in T4 by this results we can conclude that addition of 20% sorghum millet can increase the growth & does not show any negative impact on fish health. During the experimental period the survival 98% found the end of experimental. Accordingly, from the results, it can be inferred that including 20% sorghum millet in the diet of Nile tilapia (Oreochromis niloticus) is beneficial for achieving the best fish development performance while also having an aqua-friendly influence on the rearing environment.

Keywords: Sorghum millet, Nile tilapia, Oreochromis niloticus, growth, survival

Introduction

Agriculture has become the most promising sector that plays a crucial role in global food producing sector. It is the fastest growing component of agriculture sector. At the present time the world’s greatest challenges include how to feed more than 9 billion people by 2050 in a context of climate change, economic and financial uncertainty, and growing competition for natural resources.

The global fish production is estimated to have reached about 179 million tonnes in 2018. Aquaculture accounted 46 percent of the total and 52 percent of fish for human consumption. In 2018, the global capture fisheries production reached the highest level ever recorded at 96.40 million tonnes. The increasing in 2018 was mostly driven by marine capture fisheries, whose production increased to 84.40 million tonnes in 2018 (SOFIA 2020) [2]. Global production of aquatic animals was estimated at 178 million tonnes in 2020, a slight decrease from the all-time record of 179 million tonnes in 2018. The amount destined for human consumption (excluding algae) was 20.2kg capita. In 2020, global capture fisheries production (excluding algae) was 90.3 million tonnes, with an estimated value of USD 141 billion, including 78.8 million tonnes from marine water and 11.5 million tonnes from inland water (SOFIA 2020) [2].

Presently, India is the second largest fish producing and aquaculture nation after China in the world. The total fish production during 2019-20 was 14.20 million metric tonnes (MMT) with a contribution of 10.30 MMT from inland sector and 3.72 MMT marine sector. Annual average growth rate of India was more than 10 percent in 2019-20. In aquaculture, more than 60 percent of the input cost of production is contributed by feed. (Handbook of fisheries statistics 2020) [2].

Oreochromis niloticus (Nile tilapia), occurs in a wide variety of freshwater habitats like rivers, lakes, sewage canals and irrigation channels. It is native to Africa and Middle east and has emerged from mere obscurity to one of the most productive and internationally traded food fish in the world. Nile tilapia is a tropical species that prefers to live in shallow water. It is an omnivores gazer that feeds on phytoplankton, periphyton, aquatic plants, etc. It belongs to family Cichlid under order Perciformes. Nile tilapia was introduced to India during late 1970s. In 2005, River Yamuna harbored only negligible quantity of Nile tilapia, but in two years, the
proportion has increased to about 3.50 percent of total fish species in the river. Presently in the Ganges River system, proportion of tilapia is about 7 percent to the total fish species (NFDB Tilapia manual). Sorghum (sorghum bicolor) is a crucial food crop, especially in the tropical arid and semi-arid regions. It is a crop with two uses; First is to provides a basic source of nutrition for people consumption (35%) and the second one is a remainder as food for livestock, alcohol production, and preparation of industrial goods. Sorghum is essential to the existence of many people in Asia and Africa. It produce a consistent and constant production during both the rainy and dry seasons because it is a drought-tolerant crop. It can be grown in some places where no other major cereal can be produced and can thrive with less rainfall than is required for rice and maize. Plants have well-known part in maintaining healthy health. These plants are a vast repository of many chemicals, many of which have therapeutic and nutritional qualities. The third most significant food grain in the world, also known as guinea corn or giant millet (sorghum bicolor) is sorghum. Wheat and rice are the only other grains are more often used as food. Most of Africa, Asia, and South America eat as their main grain meal. Sorghum and guinea corn are both terms used in Nigeria. Sorghum grain’s chemical make-up is remarkably similar to that of maize. Starch content ranges from 68 to 80%, p protein ranges from 10 to 15%. Moisture ranges from 11 to 12%, fat ranges from 3%, to 2% to ash ranges from 2%, and food energy ranges from 394 calories. Among cereal grains, it comes in second place to maize in terms of weight gain and growth performance in terms of the type of fish, the quality of fish feed was prepared by using (basal/control diet) Fish meal (46%), Soybean meal (25%), rice bran (20%), wheat flour (5%), vitamin mineral mixture (2%), and oil (2%). The experimental diets will be prepared by mixing graded level of sorghum millet T0 (without sorghum millet), T1 (5% SM), T2 (10% SM), T3 (15% SM), T4 (20% SM). The result of the current investigation shows that the weight gain was significantly higher in T4 (20% sorghum millet treatment) in compare to other groups. By the present study it can be concluded that addition of 20% sorghum millet supplementation in fish diet will show positive impact on fish health.

Results
The result of the current investigation shows that the weight gain was significantly higher in T4 (20% sorghum millet in treatment) in compare to other groups. By the present study it can be concluded that addition of 20% sorghum millet supplementation in fish diet will show positive impact on fish health.

The results of the current investigation are shown below:

Table 1: Results of the current investigation

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Net weight gain (g)</th>
<th>Weight gain (%)</th>
<th>SGR</th>
<th>FCR</th>
<th>GCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 (Control)</td>
<td>32.28±1.102</td>
<td>109.28±4.687</td>
<td>4.91±0.147</td>
<td>2.22±0.064</td>
<td>0.45±0.012</td>
</tr>
<tr>
<td>T1</td>
<td>32.44±1.111</td>
<td>106.74±3.727</td>
<td>4.83±0.119</td>
<td>2.27±0.068</td>
<td>0.44±0.013</td>
</tr>
<tr>
<td>T2</td>
<td>43.62±0.837</td>
<td>147.62±2.412</td>
<td>6.04±0.065</td>
<td>1.73±0.029</td>
<td>0.57±0.009</td>
</tr>
<tr>
<td>T3</td>
<td>44.07±1.121</td>
<td>140.95±2.845</td>
<td>5.86±0.078</td>
<td>1.84±0.038</td>
<td>0.54±0.011</td>
</tr>
<tr>
<td>T4</td>
<td>55.19±1.382</td>
<td>180.20±4.382</td>
<td>6.86±0.104</td>
<td>1.53±0.068</td>
<td>0.65±0.019</td>
</tr>
</tbody>
</table>

Discussion
In present study, use of sorghum millet at different levels at 5%, 10%, 15%, and 20% in basal diet give out good performance in terms of weight gain and growth performance in terms of specific growth rate as well as food conversion ratio and gross conversion efficiency. Fish growth is highly dependent on a number of variables, including the type of fish, the quality of the food, and the habitat. During the present study fishes were fed with different levels of sorghum millet powder added in a different treatment control, 5%, 10%, 15% and 20% levels of significant. In this study best growth was obtained from T4 (20% sorghum mille powder). Similarly best weight gain and specific growth rate (SGR) were noted in T4 as 21.73±2.036 (55.19±1.382) and 1.94±0.183 respectively. If talk about FCR then minimum value was noted in T4 (1.94±0.183) compare to other treatments. The gross conversion efficiency and protein efficiency ratio of T4 was reported as (0.75±0.080) and (0.65±0.019) respectively. According to Tamiyu et al. 2016 [6], up to 20% of sorghum bicolor waste meal included in diet of Clarias gariepinus does not show negative effect. Hussein et al. 2016 [3], evaluated that the diet containing 75% sorghum + probiotic showed significantly better growth performance & feed utilization in tilapia diets. Yones et al. 2016 [7], use of sorghum starch in diet of Oreochromis niloticus show higher growth when added upto 30%. Solomon et al. use of fed Iso-nitrogenous and Iso-energetic 25% crude protein containing different grain sources sorghum millet showed significantly 57.60% significantly better growth performance & feed utilization in tilapia diets.

Conclusion
The incorporation of sorghum millet in fish feed has been found promisingly accepted by the growing fingerlings of Oreochromis niloticus and no detrimental effects on fish.
health was realized. On the basis of the results obtained in the current research work, it can be concluded that sorghum millet supplementation has significant potential to improve the growth performance in experimental fishes. Furthermore, addition of 20% sorghum millet powder supplementation in diet was found to have positive impact on growth and survival of *Oreochromis niloticus*. Sorghum millet supplementation in fish feed was also realized to maintain water quality throughout the growing period of model fish.

**References**

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