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Effect of food additives, Thepax and Labazyme on growth performance and immune response of young common carp *Cyprinus carpio* L.

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Effect of food additives, Thepax and Labazyme on growth performance and immune response of young common carp *Cyprinus carpio* L.

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Abstract. This study was carried out for 60 day. A total number of 70 fish (*Cyprinus carpio* L.) with an average of 13.40±1.85 g and a length 11.07 ±1.27 cm were randomly divided into five treatments as a two tank treatment, similar to its contents of conventional ingredients (i.e., fishmeal, soybean meal, corn, barley and wheat bran as well as vitamin mixture premix and carboxy methyl cellulose (CMC)). They differ in their content from food additives. They were commercially ready made in dietary T1 and T2 (Thepax 0.5, 1 gm/ kg), T3 and T4 (Labazyme 1, 2 gm/ kg) and control (0.0 gm/kg) of experimental diets. Data collected included fish weight and feed conversion ratio measured at the end of the study. The results found that the addition of food additives has significantly been affected by weight gain, specific growth rate and feed conversion ratio (P<0.05), with the best results obtained in fish food additives, pellets have been supplemented to Thepax 1 gm/ kg to enhance growth and immune responses.

Keywords: Fish, *Cyprinus carpio*, Food additives, Growth

1. Introduction

The probiotic was first described to the secreted of substances by some microorganism that catalyze the growth of another, a development of this qualifier was coined by the propose while the probiotic is substances and organisms, that participate to microbial of intestinal balance, move a role in maintaining health and also innervate the host's immune system [1][2].

Uniform consuming of food contain probiotic is bespoke to institute a positive evenness of inhabitation of beneficial microbes in the intestinal flora, explore on the application of probiotics in animals of aquatic has increase the demand for sustainable cultivation (aquaculture) [4]. The benefit of supplement contain improvement in values of feed, donating to digestion of enzymatic, anti-mutagenic and anti-carcinogenic activity, inhibition of pathogenic microorganism, growth-promoting factors and an augmentation of immune response [3][4][5].

The expressed of prebiotic as food of a non-digestible ingredient, that financial gain effects of the host, by selectively component, that financial gain effects of the host, and by stimulating (selectively) the growth and activation of one (or limited number) of intestine bacteria, in order to can promote host health case [5]. It uses sometimes together (symbiotic) [6].

In aquaculture, use of antibiotics has advanced numerous questions on the expansion of resistance in persistence of the drugs, pathogenic organisms and in food chain [6]. The utilize of prebiotics, probiotics and seems to fashion an alternative wherewithal of disease monitoring in the cultivation fishery. The current study aimed to evaluate the effect of different diets supplemented with Thepax (prebiotic) and Labazyme (synbiotics) on the growth performance and immune response of young common carp *Cyprinus carpio* C. *carpio*.



2. Materials and Methods

In the growth experiment a group of young common carp was brought at an average weight 13.40 ± 1.85 gm and average total length 11.07 ± 1.27 cm from fish farming station (Marine Science Center) in Basrah University to the laboratory in the Department of Fisheries and Marine Resources placed in tank and were given a prophylactic treatment with 0.5 NaCl dip for 2 minutes then they were bathed in 0.5 ppm methylene blue for 24 hours. The fish were acclimatized for 20 days with experimental condition and diets before running the experiment at 3% /body weight/ day, after acclimatization process, 70 fish were distributed into 10 round tanks its capacity 30 liters were used with a density of 5 individuals per, (two replications for each treatment). Feeding frequency was twice a day at 07.00 am and 15.00 pm.

The water temperature ranged between 22-26 °C during the experimental period from July 2018 to August 2019. Before formulating the diet, the dietary ingredients were subjected to proximate analysis [8].

The composition of the feed was fishmeal, soybean meal, corn, barley and wheat barn as major source of dietary protein and lipid as well as carboxyl methyl cellulose (CMC) and it premix (sabra company Turkey) chromic oxide, all these ingredients were mixed at required amount so that the final diet contained 35% crude protein as shown in Table (1), food additives 0.5 gm/ kg and 1 g/ kg Thepax, 1 g/ kg and 2 g/ kg Labazyme diet as well as control diet without any additive (Table 2), cooked in autoclave for 30 minute at a temperature of 70 C° then left to dry in a laboratory atmosphere ,then grinded and added to the mixture of vitamins and food additives, then formed a 60 cc medical syringe and dried up, shaped, cut off and preserved in the refrigerator.

Table 1: Formulation of the experimental diet.

| Ingredients | % | Proximate composition | Dry weight basis % |
|--------------------------|----|-----------------------|--------------------|
| Fishmeal | 25 | Crude protein | 35.27 |
| Soybean meal | 40 | Crude lipid | 10.23 |
| Corn meal | 10 | Ash | 8.14 |
| Barley meal | 10 | Moisture | 9.39 |
| Wheat bran | 10 | Dry matter | 20 |
| Carboxy methyl cellulose | 2 | Carbohydrate | 17 |
| Vit premix* | 3 | | |

* Sebros Company Turkey

For growth data all replicate of different treatments weighed at the beginning and every 15 days by electronic balance (Digital counting Balance 1000 g/ 0.01g).

The parameters measured were weight gain, specific growth rate and feed conversion ratio. Fish growth was calculated based on the formula applied [9] as follows:

Weight gain, WG (g) = $W_t - W_o$

Specific growth rate, SGR (%/day) = $(W_t - W_o) / t \times 100$

Where t: feeding duration (days)

Feed conversion ratio, FCR = Total feed given (g) / WG

Where: W_t : final weight of fish (g) and W_o : initial weight of fish (g)

Table 2: Composition of food additives.

| Additive | Composition |
|-----------------------|--|
| Thepax (prebiotic) | Cell wall of yeast <i>Saccharomyces cerevisiae</i> , mannan and glucan |
| Labazyme (synbiotics) | 1. Probiotic: <i>Lactobacillus acidophilus</i> , <i>Streptococcus faecium</i> and <i>Bacillus Subtilis</i> . 2. Prebiotic: Amylase, Cellulose and Protease. |

2.1. Measurement of blood parameters

At the end of the experiment, the immune response of common carp measured: Hematocrit (Ht), Hemoglobin (Hb), Red blood cells (RBC), White blood cells (WBC), Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH) and Mean corpuscular hemoglobin concentration (MCHC) by [10]0-1 dependent the gauge protocols.

2.2. Statistical analysis

According to application of SPSS (version 22), the data were subjected to One way analysis of variance (ANOVA).

3. Results and Discussion

Probiotics, prebiotics and symbiosis have been nutrition on farm animals for a long time, the advantages of these stimuli over traditional antibiotic outgrowth promoters are: 1 - No retreat time, 2 - No residual active, 3 - No cause for bacterial mutation [6].

Infectious diseases were cost the aquaculture manufacture each year millions of dollars, thus there are great attention in developing alternate to traditional methods of prevailing disease with chemotherapy [11]. Traditional strategie for disease prevent and treatment, like the use of drugs and vaccines, and have limitation like regulatory restriction or unsuitable means of surrender, this interest in using diet additives that may influence aquatic species, disease resistance and immunity has increase [12][13][14]. Though the concept of practical, feed was relatively modern in the aquaculture manufacture, there is prospect for diets of developing, so as to requirements of meet minimum nutritional, resistance to stress and disease causing organisms, improve health [15].

Average water temperature was 24 ± 0.5 °C, dissolved oxygen concentration was 6.4 ± 0.3 mg/l, while the pH was 8.1 ± 0.11 and salinity was 2.1 ppt. The environmental factors in the study were within the reasonable limits for the common carp growth and survival [16].

The amelioration in growth may however, be related to the amelioration in the microbial flora balance of intestinal [13; 14]. In the fish given prebiotic with lower concentration (T1 and T3), fish growth tended to be lower slower than the growth of fish in higher concentration (treatment T2 and T4). This occurred because of the prebiotic and synbiotics concentration added had probably not equaled the required dose. This condition occurred because the administration of an ingredient such as prebiotic was highly influenced by the duration and dose of administration [14], and prebiotic is not an organism and has less influence in natural environment. Oral administration of baker's yeast increased the growth rate of *Labeo rohita*, where the amount of yeast was 5%, 7.5% and 10% in three experimental diets [17].

A similar result was observed in the survival rate of *Oreochromis niloticus* [18], also in study [7] use live *S. cerevisiae* demonstrates that probiotic based diets have a more positive influence on the growth, the five supplemented diets included three prebiotics (0.2% β -glucan, 1% galacto-oligosaccharides, 0.5% mannan-oligosaccharides and two probiotics (1% live yeast *S. cerevisiae* and 0.01% *Lactobacillus acidophilus*) powder.

The supplementation of trout beginning diet with the proper consistency of probiotic (commercial) could be useful for growth of fry rainbow trout [19]. The considerable refinement of growth parameters can be attribute to the influence of prebiotic and probiotic, that improve assimilation of depressed, nutrients and harmful bacteria cause growth (expression) [20; 21].

In curreant study, the Thepax treatments (T2, 1 gm/kg) (Table 3 and 4) had higher significant ($P < 0.05$) growth performance (final weight (g), WG (g), SGR (%) and FCR) and immune response (RBC (million/mm³), WBC (10³. μ -l), Hb (g/dl), Ht (%), MCV (μ m³), MCH (μ g) and MCHC (%)) than control.

The modulation of immune system is one of the generally purported benefits of the prebiotics and their potency to stimulate the systemic and local immunity under in vitro and in vivo conditions is noteworthy. Different prebiotics supplementation can eventually elevate phagocytic, lysozyme, RBC and Hb [22][23][24][25].

Table 3: Effect of different food additives on the growth performance of common carp fish.

| Parameter | T1 (0.5 gm/ Kg) Thepax | T2 (1 gm/ kg) Thepax | T3 (1 gm/ kg) Labazyme | T4 (2 gm/ kg) Labazyme | T5 Control |
|------------------|------------------------------|----------------------------|------------------------------|------------------------------|--------------|
| Final weight (g) | 19.13±8.43 a | 18.61±7.89 a | 15.03±5.60 b | 16.61±2.46 b | 16.08±0.60 b |
| WG (g) | 28.00±0.02 a | 32.60±0.72 b | 19.25±0.36 c | 23.96±1.06 d | 27.45±0.67 a |
| SGR (%) | 0.58±0.04 a | 0.73±0.09 b | 0.49±0.04 ac | 0.57±0.03 ac | 1.04±0.47 ad |
| FCR | 7.71±0.20 a | 7.93±0.09 a | 8.69±0.08 a | 7.68±0.00 a | 11.36±0.45 b |

Different letters in the same row are significantly different ($p < 0.05$).

Table 4: Effect of different food additives on the immune response of common carp fish.

| Parameter | T1 (0.5 gm/ Kg) Thepax | T2 (1 gm/ kg) Thepax | T3 (1 gm/ kg) Labazyme | T4 (2 gm/ kg) Labazyme | T5 Control |
|--|------------------------------|----------------------------|------------------------------|------------------------------|--------------------------|
| RBC (million/mm ³) | 1.41±0.25 ^a | 2.72±0.33 ^b | 1.59±0.28 ^{ac} | 2.07±0.30 ^c | 1.02±0.20 ^d |
| WBC (10 ³ .µl ⁻¹) | 3.14±0.23 ^a | 5.46±0.83 ^b | 4.14±0.43 ^a | 5.2±0.48 ^b | 2.84±0.31 ^a |
| Hb (g/dl) | 9.01±0.26 ^a | 24.79±2.67 ^b | 12.13±0.32 ^c | 14.12±0.44 ^c | 7.02±0.42 ^a |
| Ht (%) | 17.10±1.79 ^a | 36.24±3.53 ^b | 21.56±3.10 ^c | 23.53±2.42 ^c | 13.24±1.05 ^a |
| MCV (µm ³) | 110.06±2.31 ^a | 132.20±1.77 ^b | 121.60±1.55 ^c | 125.62±2.14 ^c | 104.35±5.14 ^a |
| MCH (µg) | 59.08±6.41 ^a | 88.18±1.26 ^b | 68.92±5.48 ^c | 72.60±4.54 ^{bc} | 54.02±3.25 ^a |
| MCHC (%) | 5.23±0.35 ^a | 10.27±0.11 ^b | 5.40±0.32 ^a | 5.43±0.27 ^a | 5.06±0.13 ^a |

Different letters in the same row are significantly different ($p < 0.05$).

The cell wall of yeast *S. cerevisiae* is one of the effective adsorbents which is rich in crude protein (40-45%) with high biological value, is administered through the digestive tract, have a positive impact on the hosts health through its direct nutritional effect, *S. cerevisiae* contains enzymes alpha-amylase and protease that breakdown the starch and protein molecules, respectively, and help in digestion and efficient utilization [21].

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