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Original Article

Effects of different traditional and commercial feed on growth, survival and proximate composition of Rohu (*Labeo rohita*) reared in the semi-intensive composite culture system

Efeitos de diferentes rações tradicionais e comerciais no crescimento, sobrevivência e composição centesimal de Rohu (*Labeo rohita*) criado no sistema de cultivo semi-intensivo composto

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Abstract

This study was investigated to assess the effects of different traditional and commercial aqua feed on proximate composition, growth performance and survival rate of *Labeo rohita* reared in the composite semi-intensive culture system. The aqua feeds of various companies (AMG, Supreme, Aqua, Star Floating, Hi-Pro and Punjab feed) used as commercial feed. Farm made feeds were maize gluten and rice polish. For confidentiality, these feeds were randomly given code labels T1, T2, T3, T4, T5, T6, T7 and T8 which were only known to investigating staffs. There were two replicates for each treatment. In this experiment, higher growth rate was observed in T3 as compared to other treatments. Lesser weight gain was observed in the T1 (270.30 ± 0.5).The maximum body length (19.25 ± 2.19) was found in T3. Similarly, the minimum body length (5.97 ± 2.94) was seen in T2. FCR ratio (2.36 ± 0.01) was recorded in T3. Simultaneously, FCR (1.86 ± 0.002) was also recorded in T4 that is the perfect ratio for farmers. Higher SGR was noted in T3 (1.62 ± 0.05). Overall, T4 showed lesser SGR (1.05 ± 0.001). T4 showed the higher crude protein (28.66 ± 0.24%). In the body composition higher level of fat content was recorded in T3 (5.46 ± 0.33%). These outcomes also proved that the rise in the dietary protein level and lipid content can improve the fish's body crude fats and protein level. Thus, based on growth performance, survival and proximate composition. It is concluded that T3 and T4 may be recommended for commercial culture of *L. rohita*.

Keywords: *Labeo rohita*, commercial aqufeed, traditional feed, growth, body composition.

Resumo

O objetivo deste estudo foi determinar os efeitos de diferentes rações aquáticas tradicionais e comerciais na composição centesimal, o desempenho de crescimento e a taxa de sobrevivência de *Labeo rohita* criado em sistema de cultivo semi-intensivo composto. Foram utilizadas diversas marcas de ração aquática comercial, das seguintes empresas: AMG, *Supreme*, *Aqua*, *Star Floating*, *Hi-Pro* e *Punjab feed*,. As rações, à base de glúten de milho e polimento de arroz, foram produzidas na fazenda. Para fins de confidencialidade, esses *feeds* receberam aleatoriamente os rótulos de código T1, T2, T3, T4, T5, T6, T7 e T8, que eram conhecidos apenas pelos funcionários da investigação. Houve duas repetições para cada tratamento. Neste experimento, maior taxa de crescimento foi observada em T3 em comparação com outros tratamentos. O menor ganho de peso foi observado no T1 (270,30 ± 0,5). O comprimento máximo do corpo (19,25 ± 2,19) foi encontrado no T3. Da mesma forma, o comprimento mínimo do corpo (5,97 ± 2, 94) foi observado em T2. A razão FCR (2,36 ± 0,01) foi registrada em T3. Simultaneamente, a TCA (1,86 ± 0,002) também foi registrada em T4 que é a razão perfeita para os agricultores. Maior SGR foi notado em T3 (1,6 2 ± 0,05). De maneira geral, T4 mostrou SGR menor (1,05 ± 0,001). T4 mostrou a proteína bruta mais alta (28,66 ± 0,24%). Na composição corporal, o maior teor de gordura foi registrado no T3 (5,46 ± 0,33 %). Esses resultados também mostraram que o aumento do teor de proteína e lipídio na dieta pode melhorar a gordura corporal bruta e o nível de proteína. Assim, com base no desempenho de crescimento, sobrevivência e composição aproximada, conclui-se que T3 e T4 podem ser recomendados para cultivo comercial de *Labeo rohita*.

Palavras-chave: *Labeo rohita*, alimento aquático comercial, alimentação tradicional, crescimento, composição corporal.

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1. Introduction

Fish is a significant source of many nutrients, including high-quality protein, iodine, and various vitamins and minerals (Hassan et al., 2021a, b; Bilal et al., 2022). In fisheries and aquaculture production of freshwater species for protein sources was being fortified all over the world. Fish meal composed of all the essential amino acids and vitamin A and D as well as minerals viz, copper, iodine, iron, phosphorus and potassium in desirable concentrations (Sandhu, 2005; Ahmad et al., 2021; Hussain et al., 2022). Fish flesh is a major source of low carbohydrate, high protein and unsaturated fats particularly omega-3 fatty acids for a healthy diet (Razvi, 2006; Hussain et al., 2020; Hassan et al., 2021c). In composite culture system among fish species specific interactions are also significant in the nutrition (Sahu et al., 2007).

Traditional (rice polish) and commercial aqua feed in semi-intensive systems have signficant effect on growth performance and body composition of Indian major carps (*C. mrigala*, *C. catla* and *L. rohita*) (Khawar et al., 2017). Major carps: *C. catla*, *C. mrigala* and *L. rohita* in poly culture systems have high growth potential and survival rate (Chatta et al., 2015). In polyculture sytem total per-unit production increased by some species that enhance the availability of food for other species determined efficiency of traditional and commercial aqua feed on fish growth whether feeding frequency are too low or high (Eriegha and Ekokotu, 2017; Hassan et al., 2022).

In developing countries by using fertilizer and commercial aqua feed in semi intensive sytem give low cost fish production Commercial aquafeed along with fertilizer give high fish yields, maximum growth and survival rate in ponds then fertilization alone (Chakrabarty and Das, 2008). Fish feed with more protein provide high growth and yield as compared to that provided with low crude protein (Razvi, 2006). Rice polish is rich in carbohydrates and proteins, lower in fiber and fat is most abundantly used in fish culture (Diana et al., 1994). Maize gluten is a major by-products of the starch industry used as fish feed and also available in extensive quantities in many countries as well as in Pakistan. Maize gluten is a best protein source and has a significant effect on growth of fish (Ahmed et al., 2005). Polyculture research to estimate the overall fish production and specific growth rate of the *C. carpio*, *L. rohita C. catla* for one year (Sumaira et al., 2010). Commercial aqua feed have significant effect on fish production, consumption of feed and natural accessibility of feed on *L. rohita*, *C. carpio* (Rahman et al., 2008). Growth performance can be evaluated in hpersaline evvironment of *C. Idella*, *C. catla*, *H. molitrix* and *C. carpio* (Chughtai et al., 2015). In ponds supplemental diets with commercial aqua feed is essential to increase fish production (Abid and Ahmed, 2009). For fish growth the occurrence of vital nutrients in suitable amount plays a significant role (Bosma et al., 2012; Abidin et al., 2022; Syed et al., 2022). Specific aquafeed preparations with balanced ratio increase yield of fish and is also cost effective for farmeers (Iqbal et al., 2015). Therefore, this study based to find out the impact of different tradititonal and commercial aquafeed on proximate composition growth, survival rate of *Labeo rohita*.

2. Materials and methods

2.1. Area of study

This research was conducted for the proximate analysis of commercial aquafeed and fish feed ingredients (corn gluten, rice polish) purchased by visiting various commercial feed mills and numerous fish ponds in different regions of the Punjab, Pakistan. Research facilities were provided by Fish Nutrition Laboratory at Department of Fisheries and Aquaculture, University of Veterinary & Animal Sciences (UVAS), Ravi Campus, Pattoki, Punjab, Pakistan.

2.2. Experimental design

Two types of farm made and Six types of commercial aquafeed containing up to 20 to 30% CP provided by Pvt. Ltd. given in treated ponds at 2% feed of fish body weight two times per day for six months. Aquafeed of various companies (Supreme Feed, AMG Feed, Aqua feed, Star Floating feed, Hi-Pro feed and Punjab feed) were used as commercial feed. Sixteen ponds were treated with this feed. Farm made aqua feed were corn gluten and rice polish. Treatement design for confidentialy these feed were randomly given code labels T1, T2, T3, T4, T5, T6, T7 and T8 which were only known to investigating staffs. There were two replicates for each treatment. Ponds were supplied by tube well water up to 5 feet. Inorganic and organic manures were used to increase the fertility of ponds.

2.3. Growth and proximate analysis

At initial stocking stage individually measured total body weight and body length of trial fish. While during research, sampled fish fortnightly for total body weight and body length to evaluate the result of the feed were shown in Table 1 and Figure 1. Net weight gain, feed conversion ratio (FCR) and Specific growth rate (SGR) were find out by using the following (Equations 1-3).

$$\text{Net weight gain}\left(\text{NWG}\right) = \text{Final wet body weight}\left(\text{g}\right) - \text{Initial wet body weight}\left(\text{g}\right) \quad (1)$$

$$\text{feed conversion ratio}\left(\text{FCR}\right) = \frac{\text{Feed intake}\left(\text{g}\right)}{\text{Wet weight gain}\left(\text{g}\right)} \quad (2)$$

$$\text{Specific Growth Rate}\left(\text{SGR}\right) = \frac{\left(\text{W2} - \text{W1}\right)}{\left(\text{Number of days}\right)} \times 100 \quad (3)$$

where: W2 = Final weight; W1 = initial weight.

2.4. Proximate anaylsis

2.4.1. Moisture contents

Sample of 4-5g was taken and covered with aluminium file and then dehydrated at 100 °C to constant weight in furnace fixed in controlled conditioned. The weight reduce was recorded as moisture (Equation 4).

$$\text{Moisture contents}\left(\%\right) = \frac{\text{Fresh wet sample weight} - \text{Dry sample weight}}{\text{Fresh wet Sample weight}} \times 100 \quad (4)$$

Table 1. Proximate analysis of traditional and commercial aquafeeds.

Parameters	Treatments							
	T1	T2	T3	T4	T5	T6	T7	T8
Protein	6.00 ± 0.09	25.66 ± 0.08	26.705 ± 1.13	28.707 ± 1.47	24.57 ± 3.08	22.20 ± 1.67	24.328 ± 2.68	22.54 ± 1.8
Fat	3.08 ± 0.09	0.47 ± 0.04	15.828 ± 2.69	9.123 ± 0.17	10.47 ± 2.15	14.32 ± 1.2	13.449 ± 0.96	14.47 ± 2.02
Ash	6.24 ± 0.07	9.77 ± 0.02	14.157 ± 0.50	15.439 ± 1.46	15.44 ± 1.9	12.51 ± 3.76	11.464 ± 2.38	13.35 ± 1.38
Moisture	4.86 ± 0.07	12.21 ± 0.05	13.219 ± 3.05	11.931 ± 0.34	12.51 ± 1.24	19.36 ± 5.57	12.622 ± 1.35	14.34 ± 0.66

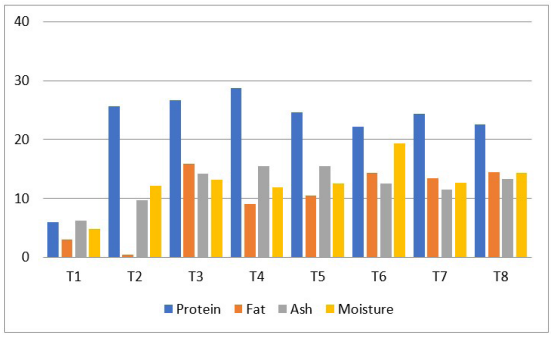

Figure 1. Proximate analysis of farm-made and commercial aquafeeds.

2.4.2. Crude protein

Sample of 1g was mixed with 0.7g mercuric oxide that also uses as a catalyst and 10g potassium sulphate and then processed in a Kjeldhal apparatus with long neck bottles for exactly 2 hours (one hour after contents are clear) with concentrated 20 mL sulphuric acid at an inclined angle after the addition of 25 mL sulphide solution, 80ml of 40% NaOH, 90 mL distilled water and were placed in the apparatus two layers were formed while oriented the flask then transfered to condenser, ammonia collected in 50 mL boric acid solution by a droplet of an indicator of methyl red. Afterward 2 minutes the colour of indicator changed from pink to golden yellow and ammonia was isloated from solution. Then ammonia that was present in solution of boric acid was titrated with 0.1N HCl. The volume of HCl that used were recorded and percentage of nitrogen was calculated by following (Equations 5 and 6):

$$\text{Nitrogen Content}(\%) = \frac{\text{Volume of acid} \times \text{Normality of acid}}{\text{Wet sample Weight (g)}} \times 1.14 \quad (5)$$

The crude protein percentage were find by:

$$\text{Crude Protein (\%)} = \text{Content of nitrogen in sample (\%)} \times 6.25 \quad (6)$$

2.4.3. Crude fat

2g samples of dry feed were transfered to Soxhlet apparatus. Put a dehydrated, tared flask of solvent then added 25 mL ether that were used as a solvent and attached to condenser unit. Maintain ratio of heating that provided 2-3 drops/second condensation rate and extracted for 6 hours. Then thimble removed and regained ether extraction by using Soxhlet apparatus. Ether elimination was done on a hot water bath and then flask was dehydrated for 30 minutes at 105 °C. Then in a desiccator cooled it and weighed (Equation 7).

$$\text{Crude fat}(\%) = \frac{\text{Weight of fat}}{\text{Sample weight}} \times 100 \quad (7)$$

2.4.4. Crude fibre

Samples of 2g fat free feed were taken into a beaker of 600 mL capacity, then added 200 mL sulphuric acid. Beaker kept under the condenser and brought boiling for 30 minutes to maintain volume by using distilled water and to rinse down particles sticking to the edges. Filtered by taking Whatman paper No. 541. Done suction in Buchner funnel and rinsed by warm water. Then filtrate again shifted to the beaker after the addition of 20 mL hot NaOH solution. Kept in condenser unit and then brought boiling approximately for 30 minutes, after boiling filtered done by porous crucible and was rinsed by using warm water and 1% HCl, then again rinsed with warm water. Rinsed dual times by using alcohol at 100 °C and dehydrated overnight and then cooled and finally weighed. Ash for 3 hours at 500 °C, cooled and then weighed (Equation 8).

$$\text{Crude fibre}(\%) = \frac{(\text{Crucible Weight} + \text{Dried residue}) - (\text{Crucible Weight} + \text{Ash residue})}{\text{Sample weight}(\text{g})} \quad (8)$$

2.4.5. Ash content

2g samples of feed was weighed and dehydrated in tarred porcelain dish and placed for 6 hours in a muffle furnace at 600 °C. Then cooled in a desiccator and weighed (Equation 9).

$$\text{Ash (\%)} = \frac{\text{Ash weight}}{\text{Sample weight}} \times 100 \quad (9)$$

2.5. Statistical analysis

The impact of traditional and commercial aqua feed on, proximate composition, growth and survival rate were studied through a technique of one-way ANOVA. Procedure of General Linear Model were applied by SAS software (version 9.1). Significant Means of treatment were obtained by Duncan's Multiple Range Test. Statistics data were characterized as mean ± standard errors.

3. Results

Treatment 1 and 2 were treated with farm made traditional feed and treatment 3 to 8 were treated with commercial aquafeed. The average initial body weight of *L. rohita* of treatment 1 was 270.00 ± 49.01 g. Similarly, the average final body weight of *L.rohita* of treatment 1 was 541.30 ± 72.62 g. The net weight gain of *L. rohita* of treatment 1 was 270.30 ± 60.5 g. The average initial body weight of *L. rohita* of treatment 2 was 277.30 ± 49.62 g. Similarly, the average final body weight of *L. rohita* of treatment 2 was 642.15 ± 119.51 g. The net weight gain of *L.rohita* of treatment 2 was 364.85 ± 84.50 g. The average initial body weight of *L. rohita* of treatment 3 was 189.00 ± 27.52 g. Similarly, the average final body weight of *L. rohita* of treatment 3 was 699.50 ± 129.71 g. The net weight gain of *L.rohita* of treatment 3 was 512.65 ± 78.61c g. The average initial body weight of *L. rohita* of treatment 4 was 337.03 ± 71.31 g. Similarly, the average final body weight of *L. rohita* of treatment 4 was 869.81 ± 202.02 g. The net weight gain of *L.rohita* of treatment 4 was 532.78 ± 136.65 g. The average initial body weight of *L. rohita* of treatment 5 was 268.00 ± 40.19 g. Similarly, the average final body weight of *L. rohita* of treatment 5 was 635.95 ± 149.07 g. The net weight gain of *L. rohita* of treatment 5 was 367.95 ± 94.63c g. The average initial body weight of *L.rohita* of treatment 6 was 274.50 ± 50.75 g. Similarly, the average final body weight of *L.rohita* of treatment 6 was 769.42 ± 108.43 g. The net weight gain of *L.rohita* of treatment 6 was 495.92 ± 45.66a g. The average initial body weight of *L.rohita* of treatment 7 was 184.50 ± 23.62 g. Similarly, the average final body weight of *L.rohita* of treatment 7 was 559.60 ± 67.71 g. The net weight gain of *L.rohita* of treatment 7 was 375.10 ± 45.16b g. The average initial body weight of *L. rohita* of treatment 8 was 339.20 ± 76.92 g. Similarly, the average final body weight of *L.rohita* of treatment 8 was 727.35 ± 222.61 g. The net weight gain of *L.rohita* of treatment 8 was 388.15 ± 45.66c g.

The average initial body length of *L. rohita* of treatment 1 was 25.00 ± 2.46 cm. Similarly, the average final body length of *L. rohita* of treatment 1 was 33.35 ± 1.63 cm. The net length gain *L. rohita* in treatment 1 was 8.35 ± 2.86c cm. The average initial body length of *L. rohita* of treatment 2 was 29.50 ± 3.17 cm. Similarly, the average final body length of *L. rohita* of treatment 2 was 35.47 ± 2.70cm. The net length gain *L. rohita* in treatment 2 was 5.97 ± 2.94b cm. The average initial body length of L. rohita of treatment 3 was 18.50 ± 2.21 cm. Similarly, the average final body length of *L. rohita* of treatment 3 was 37.75 ± 2.17cm. The net length gain L. rohita in treatment 3 was 19.25 ± 2.19 cm. The average initial body length of *L. rohita* of treatment 4 was 27.00 ± 3.44 cm. Similarly, the average final body length of *L. rohita* of treatment 4 was 38.20 ± 1.85 cm. The net length gain L. rohita in treatment 4 was 11.2 ± 2.64a cm. The average initial body length of *L. rohita* of treatment 5 was 26.00 ± 2.23 cm. Similarly, the average final body length of *L. rohita* of treatment 5 was 35.85 ± 2.36 cm. The net length gain *L. rohita* in treatment 5 was 9.85 ± 1.63 cm. The average initial body length of *L. rohita* of treatment 6 was 28.50 ± 3.48 cm. Similarly, the average final body length of *L. rohita* of treatment 6 was 35.85 ± 2.36 cm. The net length gain *L. rohita* in treatment 6 was 12.5 ± 3.36cm. The average initial body length of *L. rohita* of treatment 7 was 18.50 ± 2.21 cm. Similarly, the average final body length of *L. rohita* of treatment 7 was 33.50 ± 1.79 cm. The net length gain *L. rohita* in treatment 7 was 15 ± 2.05 cm. The average initial body length of *L. rohita* of treatment 8 was 26.50 ± 3.01 cm. Similarly, the average final body length of *L. rohita* of treatment 8 was 36.92 ± 1.83 cm. The net length gain *L. rohita* in treatment 8 was 10.42 ± 2.42 cm. The average value of feed conversion ratio (FCR) of *L. rohita* in treatment 1,2,3,4,5,6,7 & 8 were 2.82 ± 0.09, 3.02 ± 0.04, 2.36 ± 0.01, 1.86 ± 0.002, 2.69 ± 0.13, 2.64 ± 0.011, 2.53 ± 0.03 and 3.39 ± 0.051. The average value specific growth rate (SGR) of *L. rohita* in in treatment 1,2,3,4,5,6,7 & 8 were 1.23 ± 0.07, 1.21 ± 0.02, 1.62 ± 0.05, 1.05 ± 0.001,1.14 ± 0.015, 1.26 ± 0.08,1.36 ± 0.039 and 1.39 ± 0.07, were shown in Table 2 and Figures 2-4.

Average crude protein (CP) percentage level of *L. rohita* in treatment 1 was recorded 21.97 ± 0.48 % and the crude proteinof *L. rohita* in treatment 2 was recorded 17.62 ± 0.24 %. Similarly, the crude protein level of *L. rohita* in treatment 3 and treatment 4 were calculated25.80 ± 0.12 %, 28.66 ± 0.24 % respectively. The crude protein level of *L. rohita* of treatment 5 were recorded 24.65 ± 0.57 % and also crude protein of *L. rohita* in treatment 6 was calculated 24.45 ± 0.14 %. Similarly, the average percentage of crude protein crude protein level of *L. rohita* of treatment 7 and

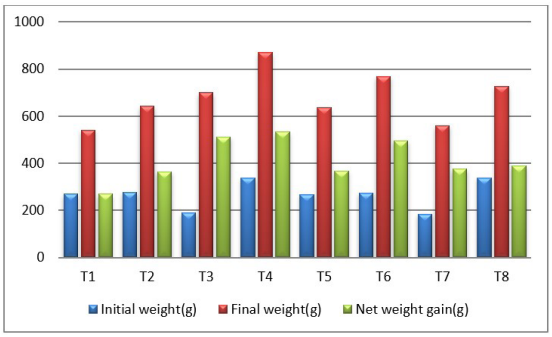

Figure 2. The average initial body weight (g), average final body weight and net gain in body weight of Rohu (*Labeo rohita*) fed with different feeds.

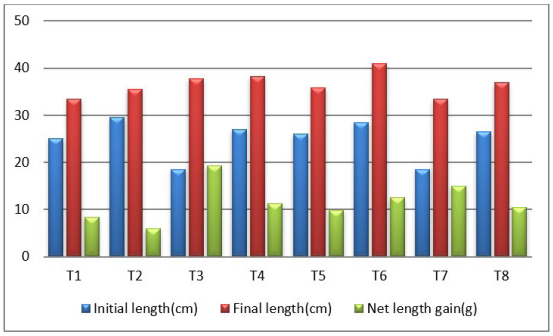

Figure 3. The average initial body length (cm), average final body length and net gain in body length of Rohu (*Labeo rohita*) fed with different feeds.

Table 2. The average initial body weight (g) and length (cm), average final body weight and length and gain in body weight and length, SGR and FCR of Rohu (*Labeo rohita*) fed with different feeds (traditional and commercial aqua feed).

Parameters	Treatments							
	T1	T2	T3	T4	T5	T6	T7	T8
IBW (g)	270.0 ± 4.01^{c}	277.3 ± 49.6^{c}	189.0 ± 27.5^{c}	337.0 ± 7.3^{c}	268.00 ± 40.1^{c}	274.50 ± 50.7^{c}	184.50 ± 23.62^{c}	339.20 ± 76.9^{c}
FBW (g)	541.3 ± 72.6^{b}	642.1 ± 119.5^{b}	699.5 ± 129.7^{a}	869.8 ± 202.2^{a}	635.9 ± 149.0^{a}	769.4 ± 108.4^{a}	559.6 ± 67.7^{b}	727.3 ± 222.6^{b}
NWG(g)	270.3 ± 60.5^{b}	364.8 ± 84.5^{c}	512.6 ± 78.6^{c}	532.7 ± 136.6^{a}	367.9 ± 94.6^{c}	495.9 ± 45.6^{a}	375.1 ± 45.1^{b}	388.1 ± 45.6^{c}
IBL(cm)	25.0 ± 2.4^{c}	29.5 ± 3.17^{c}	18.5 ± 2.21^{c}	27.0 ± 3.4^{b}	26.0 ± 2.23^{c}	28.5 ± 3.4^{c}	18.5 ± 2.2^{c}	26.5 ± 3.0^{b}
FBL(cm)	33.3 ± 1.6^{b}	35.4 ± 2.7^{b}	37.7 ± 2.1^{a}	38.2 ± 1.8^{a}	35.8 ± 2.3^{a}	41.0 ± 3.2^{a}	33.5 ± 1.7^{b}	36.9 ± 1.8^{a}
NLG(cm)	8.3 ± 2.8^{c}	5.9 ± 2.9^{b}	19.2 ± 2.1^{a}	11.2 ± 2.6^{a}	9.8 ± 1.6^{c}	12.5 ± 3.3^{a}	15 ± 2.05^{c}	10.42 ± 2.4^{b}
FCR	2.8 ± 0.09^{a}	3.02 ± 0.04^{a}	2.3 ± 0.01^{a}	1.8 ± 0.02^{a}	2.6 ± 0.13^{a}	2.6 ± 0.01^{a}	2.5 ± 0.0^{a}	3.39 ± 0.05^{a}
SGR	1.2 ± 0.0^{a}	1.2 ± 0.02^{a}	1.6 ± 0.05^{a}	1.0 ± 0.00^{a}	1.1 ± 0.01^{a}	1.2 ± 0.08^{a}	1.3 ± 0.03^{a}	1.3 ± 0.0^{a}

Means with same letters are not significantly different.

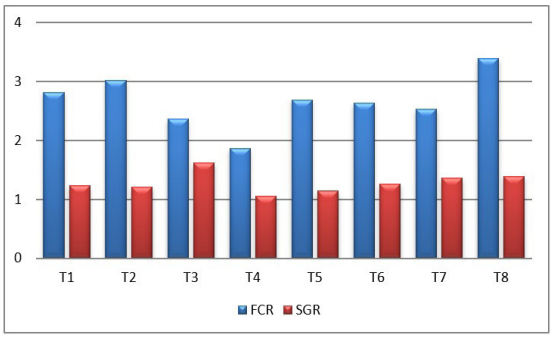

Figure 4. The feed conversion ratio (FCR) Specific growth rate (SGR) of Rohu (*Labeo rohita*) fed with different feeds.

treatment 8 was recorded 19.01 ± 0.24 % and 22.40 ± 0.14 %, respectively.

The average percentage of crude fat (CF) level of *Labeo rohita* of treatment 1 was recorded 2.36 ± 0.41 % and the average percentage of crude fat level of *L. rohita* of treatment 2 was recorded 1.30 ± 0.54 %. Similarly, the crude fat of *L. rohita* in treatment 3 and treatment 4 were calculated 5.46 ± 0.33%,and 3.99 ± 0.38 % respectively. The crude fat content of *L. rohita* of treatment 5 was recorded 2.13 ± 0.51 % and the average percentage of crude fat (CF) level of *L. rohita* in treatment 6 was calculated 2.40 ± 0.21 %. Similarly, the crude fat of *L. rohita* in treatment 7 and treatment 8 were recorded 1.80 ± 0.41 % and 3.64 ± 0.70 %, respectively. The average percentage of dry matter level of *L. rohita* in treatment 1 was recorded 21.67 ± 0.34 % and the average percentage of dry matter level of *L. rohita* of treatment 2 was recorded 21.98 ± 0.49 %. Similarly, the average percentage of dry matter level of *L. rohita* of treatment 3 and treatment 4 was calculated 22.67 ± 0.52 % and 22.90 ± 0.54 % respectively. The average percentage of dry matter level of *L. rohita* in treatment 5 was recorded 22.81 ± 0.62 % and the average percentage level of dry matter of *L. rohita* in treatment 6 was calculated 19.45 ± 0.45 %. Similarly, the average percentage of dry matter level of *Labeo rohita* of treatment 7 and treatment 8 was recorded 22.64 ± 0.13 % and 21.45 ± 0.22 %, respectively. The average percentage of ash level of *L. rohita* in treatment 1 was recorded 2.65 ± 0.02 % and the average percentage of ash level of *L. rohita* of treatment 2 was recorded 1.67 ± 0.60 %. Similarly, the average percentage of ash level of L. rohita of treatment 3 and treatment 4 was calculated 2.34 ± 0.73 %, and 2.85 ± 0.63 % respectively. The average percentage of dry ash level of *L. rohita* in treatment 5 was recorded 2.16 ± 0.28%and the average percentage level of ash of *L. rohita* in treatment 6 was calculated 1.98 ± 0.33 %. Similarly, the average percentage of ash level of *L. rohita* of treatment 7 and treatment 8 was recorded 2.09 ± 0.18 % and 2.072.07 ± 0.35 %, respectively, were shown in Table 3. The physico-chemical parameters like Temperature, Dissolved oxygen (DO), pH, Alkalinity, phosphate, Nitrate and Hardness of water in ponds for different feed treatments did not show any significant variations were shown in Table 4.

4. Discussion

The aim of aquaculture is to produce maximum yield in terms of growth in fish accompanied with optimum qualitative characteristic of meat (Khawar et al., 2017). By using various feed ingrediens Fish growth, overall length and weight of fish can be increased. In this research, More significant higher growth and survival rate were recorded in *L. rohita* in T3 with contrast of T2, T3, T4, T5, T6, T7 and T8. In treatment T3 weight gain of Rohu was lower (512.65 ± 78.61) then T4. Less significant weight gain and survival rate were observed in the T1 (270.30 ± 60.5). There were significant variation in body length of Rohu (*L. rohita*) fed with commercial aquafeed and farm made feeds. The significantly maximum average body length 19.25 ± 2.19 was found in rohu (*L. rohita*) of treatment 3 fed with commercial aquafeed containing crude protein (CP) level of 26.705 ± 1.13. Similarly, the minimum average body length 5.97 ± 2.94 was seen in rohu fed with T2 farm made feeds with (CP) level of 25.66± 0.08 FCR ratio (2.36 ± 0.01) was also recorded in T3. These outcomes compared by the

Table 3. The average values of proximate analysis of Rohu (*Labeo rohita*) that were fed by farm traditional & commercial aqua feed.

Parameters	Treatments							
	T1	T2	T3	T4	T5	T6	T7	T8
Crude protein (%)	21.97 ± 0.48[a]	17.62 ± 0.24[b]	25.80 ± 0.12[a]	28.66 ± 0.24[a]	24.65 ± 0.57[a]	24.45 ± 0.14[c]	19.01 ± 0.24[a]	22.40 ± 0.14[b]
Crude fat (%)	2.36 ± 0.41[b]	1.30 ± 0.54[c]	5.46 ± 0.33[b]	3.99 ± 0.38[a]	2.13 ± 0.51[b]	2.40 ± 0.21[a]	1.80 ± 0.41[a]	3.64 ± 0.70[a]
Dry matter (%)	21.67 ± 0.34[a]	21.98 ± 0.49[a]	22.67 ± 0.52[a]	22.90 ± 0.54[a]	22.81 ± 0.62[a]	19.45 ± 0.45[a]	22.64 ± 0.13[a]	21.45 ± 0.22[a]
Ash (%)	2.65 ± 0.02[a]	1.67 ± 0.60[c]	2.34 ± 0.73[a]	2.85 ± 0.63[a]	2.16 ± 0.28[a]	1.98 ± 0.33[b]	2.09 ± 0.18[b]	2.07 ± 0.35[c]

Means with same letters are not significantly different.

Table 4. Average values of physic chemical parameters of pond water under the influence of different traditional and commercial aqua feed.

Parameters	Treatments							
	T1	T2	T3	T4	T5	T6	T7	T8
Temperature	25.8 ± 0.35[a]	26.1 ± 0.25[a]	26.7 ± 0.34[a]	25.3 ± 0.14[a]	24.7 ± 0.61[a]	27.2 ± 0.15[a]	25.1 ± 0.14[a]	26.3 ± 0.32[a]
pH	7.92 ± 0.34[a]	8.19 ± 0.11[a]	7.89 ± 0.68[a]	8.05 ± 0.27[a]	8.02 ± 0.31 [a]	7.90 ± 0.14[a]	7.79 ± 0.61[a]	8.12 ± 0.35[a]
DO	6.98 ± 0.58[a]	7.15 ± 0.22[a]	7.67 ± 0.45[a]	7.49 ± 0.78[a]	7.55 ± 0.32[a]	6.35 ± 0.18[a]	7.54 ± 0.43[a]	6.76 ± 0.27[a]
TDS (ppm)	680 ± 0.76[a]	775 ± 0.49[a]	734 ± 0.24[a]	699 ± 0.33[a]	795 ± 0.65[a]	780 ± 0.51[a]	699 ± 0.42[a]	791 ± 0.22[a]

results (Abbas et al., 2021). Simultaneously, FCR (1.86 ± 0.002) was gained in the T4 which is the ideal ratio for fish farmers. In the same way higher significant SGR was gained in T3 (1.62 ± 0.05). Higher Significant SGR recorded in T8 (1.39 ± 0.07) as compared to T7 and T1. Similarly, T7 showed higher SGR (1.36 ± 0.039a) then T1. Overall, T4 showed lesser SGR (1.05 ± 0.001).These results compared with the results (Abbas et al., 2021). In the fish body Crude Protein can be increased by providing high protein in fish feed (Ayub et al., 2021). Similarly by increasing the crude protein level in the fish feed, the protein level can be enhanced in body composition of *L.rohita* . In our outcomes, higher crude protein was obtained in T4 (28.66 ± 0.24%) in *L.rohita* as compared to other treatment groups T1(21.9 ± 0.48%), T2 (17.6 ± 0.24%), T3 (24.65 ± 0.57%), T4 (25.80 ± 0.12%),T6(24.45 ± 0.14%), T7 (19.01 ± 0.24 %) and T8 (22.40 ± 0.14) by matching with (Khawar et al., 2017). These findings also proved that the rise in the nutritional level of crude protein can increase the fish body protein (Ayub et al., 2021). The lipids ratio in aqua feed is the critical energy source for the fish. Higher crude lipids content in the body composition of *L.rohita* was obtained when fed on aqua feed having high lipid level (Abbas et al., 2019). *L.rohita* fed on T3 showed significat higher fat (5.46 ± 0.33%) in their body. Physico-chemical parameters like Temperature,DO, pH, Alkalinity, phosphate, Nitrate and Hardness of water in ponds for different feed treatments did not show any significant variations . (Khawar et al., 2017; Abbas et al., 2021). The recorded values were within the optimum range for rohu (*L. rohita*).

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