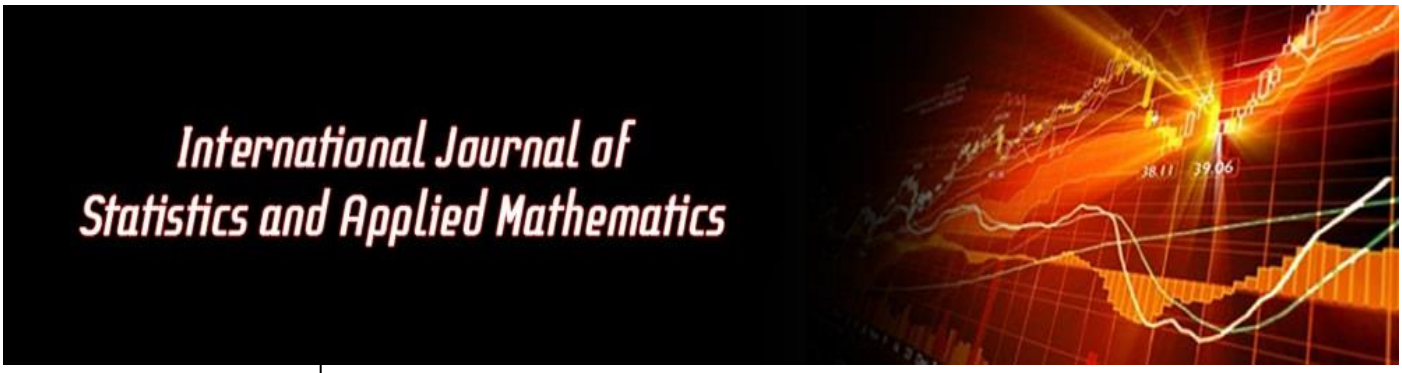

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Evaluation of growth performance of rainbow trout (*Oncorhynchus mykiss*) fed on pelleted feed in Doda district of Jammu and Kashmir

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Abstract
Year round study was made by covering six numbers of raceways (European type) at different locations in the farmer's field with an average altitude of approximately 1640 masl to evaluate the growth performance of rainbow trout (*Oncorhynchus mykiss*) fed on pelleted feed. All the studied raceways were of almost similar size (Length-70', Width-12' and Depth-6') and stocked with about 2500 nos. (in each raceway) of rainbow trout fingerlings (average weight-10g and average length- 11cm). The fingerlings were fed with pelleted feed (protein content-45% and fat content-8% approximately) initially @ 4-5% of their body weight in three equal installments and readjusted to 2-3% considering the feed utilization by the fishes. Water diverted from the natural streams were used with a flow of 3-4L/second and maintained by the farmers throughout the year. Growth performance of rainbow trout was evaluated in terms of weight gain (WG %), specific growth rate (SGR %), food conversion ratio (FCR) and survival rate. Trout showed an average WG of 2858%, SGR of 0.94% with FCR of 1.5. Highest growth performance was recorded during summer (April-September) with increased water temperature (20 °C on average), while a retarded growth recorded during winters (October-March) due to low water temperature (6 °C). However, on average farmers got 296gm fishes after one year of cultivation. The cost benefit parameter study showed a profit of Rs. 215/kg trout and was recorded with investment of Rs. 185/kg trout production cost (includes seed and feed cost only) which indicates 216% profit over actual expenditure obtained by the trout farmers within this period. The results obtained in present study are encouraging for farmer's, however more profit may be gained by them with utilizing some other feeds with lower FCR or using some other locally available live/other feed resources.

Keywords: Raceways, rainbow trout, pelleted feed, SGR, FCR

1. Introduction
In India, fisheries have always been playing a pivotal role in the food and nutritional security of people, especially in rural areas [1]. For the development of aquaculture sector in the country, Government of India launched several schemes both for sub-tropical as well as temperate region and hence, aquaculture in the Himalayan region is now more remunerative, providing subsidy and attracting more farmers towards this venture. Himalayan region of India are bestowed with quality natural water resources, suitable for carp as well as trout farming. Fish farming in general and trout farming in particular, is only possible with availability of sufficient quantity of quality seed, quality feed and quality water. As quality water is not an issue in most of the Himalayan region, while year round availability of quality seed and feed are secured by different Govt. agencies through its various schemes, a rapid development in the hill aquaculture is likely to be noticed in coming years.
Trout, specially the rainbow trout (*Oncorhynchus mykiss*) is cultured in almost all the Himalayan states as well as in some other states of India where quality water, trout seed and feed are available. Amongst all these three necessities (quality seed, water and feed) for fish or trout farming, quality feed is very important and determines the profitability from culture system. In wild, fishes are getting quality food required for their proper growth, but, in cultured condition, lack of nutrients bearing substance, results in retarded growth of the fish [2]. Nutritionally balanced diet contains carbohydrate, fat, protein, minerals, vitamins, etc.

In sufficient quantity for proper growth, hence it is vital to provide a nutritionally balanced diet for optimum aquaculture production [3], or in other case one may not get sufficient remunerative of their efforts.

Several kind of feed made using different ingredients are being used in different parts of the country by the farmers with different FCR, results in different pattern of growth of trout and profitability from its culture. Though, the people of the district are educated and use several modern technologies in agriculture, horticulture, etc. sector, however they are having lack of knowledge in trout farming sector, they totally depends for trout seed and feed on State Govt. agencies. However, data from the trout farming sector regarding its annual growth in raceways and profit associated with it from the district Doda of Jammu region of the Indian UT of Jammu and Kashmir is lacking.

In view of the above all facts, this study was designed to evaluate the growth performance of rainbow trout (*Oncorhynchus mykiss*) fed on pelleted feed for an year by covering six numbers of raceways (European type) at different locations in the farmer's field.

2. Materials and Methods

The study was carried out for one year in district Doda of UT of Jammu & Kashmir during 2021-22 and 2022-23 by covering six numbers (RW-1, RW-2, RW-3, RW-4, RW-5 and RW-6) of raceways (European type) at different locations in the farmer's field with an average altitude of approximately 1640masl. All these raceways were of almost uniform size (70'x12'x6') provided with quality natural water (diverted from nearby natural streams) and in-out flow of 3-4L/second. Each raceway was stocked with 2500 nos. of trout fingerlings (average length 11cm and average weight 10g), fed by Govt. supplied feed (@ 3% of their body weight (divided into three split doses and readjusted subject to feed utilization) with prefixed protein level of 45% and fat content of 8-9%.

The growth performance data for studied trout were recorded in terms of weight gain (WG %), specific growth rate (SGR %) and feed conversion ratio (FCR) using the following equations.

SGR (%) = [(Log final weight – Log initial weight) / number of experimental days] × 100

WG (%) = [(final mean weight – initial mean weight) / initial mean weight] × 100

FCR= feed given (dry weight) / body weight gain (wet weight)

Table 1: Weight gain in rainbow trout (*Oncorhynchus mykiss*) fed on pelleted feed during the study period.

Raceway (RW)	Initial Weight (g)	Final Weight (g)	Weight Gain (%)	LN Initial Weight	LN Final Weight
RW-1	10	300	2900	2.303	5.704
RW-2	10	290	2800	2.303	5.669
RW-3	10	310	3000	2.303	5.736
RW-4	10	275	2650	2.303	5.616
RW-5	10	320	3100	2.303	5.768
RW-6	10	280	2700	2.303	5.634

3. Results and Discussion

Complete figure of average weight gain in different raceways recorded during the study period are reflected in the table-1, which shows slight variation in the final average weight gain and was recorded highest in case of RW-1 (320g), while lowest in case of RW-4 (275g), which may be due to several factors like slight change in temperature or other management practices.

Table 2: Performance in terms of SGR (%), FCR and survival (%) rainbow trout (*Oncorhynchus mykiss*) fed on pelleted feed during the study period.

Raceway (RW)	SGR (%)	FCR	Survival (%)
RW-1	0.94	1.5	80
RW-2	0.93	1.6	80
RW-3	0.95	1.6	80
RW-4	0.92	1.4	80
RW-5	0.96	1.5	80
RW-6	0.92	1.4	80

The results of the Specific Growth Rate (SGR %), Food Conversion Ratio (FCR) and Survival (%) are reflected in the table-2. Slight variation in terms of SGR and FCR were also noticed and the SGR showed highest in case of RW-5 (0.96%) and lowest in RW-4 & RW-6 (0.92%), while the FCR value was lowest in case of RW-4 & RW-6 (1.4), while highest in case of RW-2 & RW-3 (1.6). Slight variation in FCR value may highly impact on profitability from the aquaculture venture, and therefore, feed with lower FCR value are always good [4, 5].

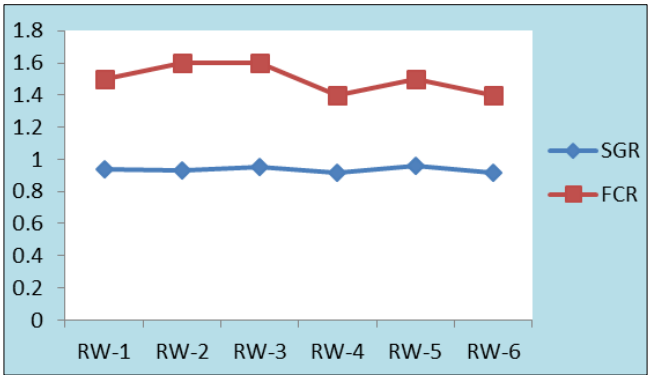

Fig 1: Showing relationship between FCR & SGR

Figure-1 reflects and compares the SGR & FCR in cultured rainbow trout during one year of study period. There is no clear cut relationship between SGR and FCR as observed in this study, however [6] reported an inverse relationship between the SGR and the FCR and with increase in Specific Growth Rate (SGR), Food Conversion Ratio (FCR) decreases.

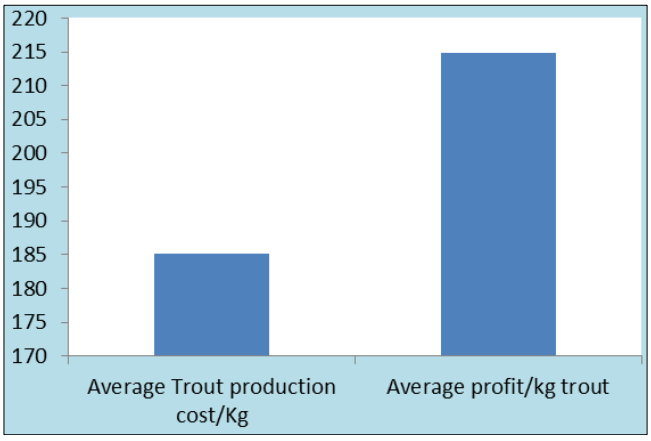

Fig 2: Average cost/benefit of trout production in one year

Figure-2 reflects the production cost of trout and profit from it after one year of culture period. Result showed that the farmers invested Rs. 185/- per Kg trout for the seed and feed however, they earned Rs. 400/- per Kg trout. There was a profit of Rs. 215/- per Kg trout, and they earned about 216% over and above the investment during one year of production period, which can be noticed as very good income and can be recommended for its replication in more farmers field.

4. Conclusion

This year round study as made by covering six numbers of raceways (European type) at different locations in the farmer's field to evaluate the growth performance of rainbow trout (Oncorhynchus mykiss) fed on pelleted feed with readjusted dose of 2-3% showed a good growth performance in terms of average WG of 2858%, SGR of 0.94% with FCR of 1.5. On average farmers got 296gm fishes after one year of cultivation. The cost benefit parameter study showed a profit of Rs. 215/kg trout and was recorded with investment of Rs. 185/kg trout production cost (includes seed and feed cost only) which indicates 216% profit over actual expenditure obtained by the trout farmers within this period. The results obtained in this study are encouraging for farmer's, however more profit may be obtained by them with utilizing some other feeds with lower FCR or using some other locally available live/other feed resources.

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