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SUMMARY

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1. The thesis entitled "Efficacy of some non-conventional feed ingredients on the kinetics of food intake, growth promotion and associated biochemical changes in Indian major carps" contains the results on efficacy of some locally available feed resource of Darjeeling Hill areas on the growth promotion, feed conversion efficiency, protein efficiency ratio, digestibility of nutrients and associated biochemical changes in Indian major carps (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*). The Indian major carps as well as exotic carps are readily accept supplementary feed and the growth of the fish is directly related to feeding. The production of fish may therefore be augmented manifold by feeding them with nutritionally balanced supplementary diets in limited time and space. This will also reduce unnecessary wastage of fish fodder.
2. Considering the socio-economic status of the people, we should produce much more fish from an unit water area and at the same time we should not forget about the preferences and market value of the culturable species. There are a number of small ponds which have been prepared with the help of Fish Farmers Development with the help of Fish Farmers Development Agency (FFDA) at the basin of the Little Ranjit river (Darjeeling – Pulbazar block) and adjoining areas of the hills. Therefore, attempts had been made to introduce the Indian major carps into the 'Thora fed' fish ponds and to establish them with suitable artificial diets.
3. Total six ponds were selected for investigation viz. control pond and ponds ED – 01, ED – 02 , ED – 03 , ED – 04 & ED – 05 . The same series of ponds were named as control pond and ED – 06, (instead of ED – 01), Ed – 07 (instead of ED – 02), Ed – 08 (instead of Ed – 03), Ed – 09 (instead of ED – 04), ED – 10 (instead of ED – 05) in the next year experimental trial.
4. Twenty – one feed items of both plant (14) and animal (07) origin were screened for present investigation. Among the ten experimental diets (designated as ED – 01 to ED – 10) nine (ED – 01 to ED – 09) were isonitrogenous (crude protein level = 30%), prepared with ingredients of different protein sources and the last

- one (ED – 10) is casein – gelatin based diet (Halver's synthetic diet) to provide balanced nutrition and to get optimum growth of the fish.
5. All the pelleted experimental diets tested in the present study possessed necessary water stability. The pellets containing different oil cakes in their composition were highly stable than the others. Slow rate of sinking was recorded for the pellets containing high proportion of rice bran or wheat bran.
 6. Maximum amount of feed was consumed at 06 hours and minimum at 00 hours. No relationship between quality of the pellet and average daily dry matter intake by the fish could be established. It took two hours for the fish to reach satiation after introduction of feeds in laboratory condition.
 7. The growth of fish was found to be positively affected by dietary protein source (in case of the fish fed diets ED – 01 to ED – 09). Lipid in this diets evoked a protein sparing effect for growth. There is no marked differences in the gross energy content in the diets ED – 01 to ED – 09 although crude protein levels varied from 29.69% (ED – 04) to 35.46% (ED – 08). The diet ED – 10 content slightly higher amount of crude protein 45.62% and energy levels (5.09 Kcalg⁻¹).
 8. The average daily dry matter intake in terms of mg 100g⁻¹ body weight ranged between 4304 (ED – 10) and 2825 (ED - 01). The release of faecal matter however minimum 601 mg 100g bw⁻¹ with the diet ED – 10 and maximum 834 mg 100 gbw⁻¹ with the diet ED – 05.
 9. Although the weight increment, percent live weight gain and specific growth rate (%) of the fish were highest with the diet ED – 10, the ultimate net output was not high (negative) i.e. below the control. On the other hands, the diet ED – 05 exhibited a poor performance in comparison with other diet (ED – 01 to ED – 04, ED – 06 to ED –09).
 10. The condition factor values of the experimental fish in general reflected the well-being of the fish concerned, although the values decreased slightly in a very few cases.
 11. The digestibility of protein and lipid were found to be positively correlated with the crude protein and crude lipid levels respectively for the diets (ED – 01, ED – 04, ED – 05, ED – 06 and ED 08), but the digestibility's of total carbohydrate

and gross energy did not show much relationship with increasing dietary protein levels.

12. The fishes fed with different experimental diets were in positive nitrogen and energy balance. An increase in N intake and faecal N excretion was observed with corresponding increase in the dietary protein levels. A positive correlation between dietary protein levels and apparent energy retention by the fish was also recorded. Among the different protein sources, nitrogen and energies from the slaughterhouse waste, silk worm pupae and soybean meal based diet were efficiently utilised by the fish.
13. No relationship between the dietary protein levels and feed conversion ratio (FCR) was observed during the present investigation. However protein efficiency ration (PER) remained negatively correlated to the protein, lipid and P/E ratio of the diets. The plant protein based soybean meal diet resulted in poor conversion and protein efficiency ratios.
14. The moisture content of the muscle showed an inverse relationship between the dietary protein levels. A reciprocal relationship between moisture and crude lipid contents in the fish muscle was also observed. However, the values of moisture and fat in the muscle showed a greater degree of consistency totalling upto 80%. No significance difference in the moisture content in the muscle was observed due to inclusion of the different protein sources in the diets. A direct relationship between the levels of as content in the diets and muscle was observed in the fish fed the diets containing different levels of dietary protein (ED – 01 to ED 10).
15. The total protein content of the muscle was found to increase with the increasing dietary protein level. Among the isonitrogenous diets with different protein sources the diet ED – 10 gave the highest protein deposition in the muscle. Although there are no significant difference was observed with the diet ED – 01 to ED – 10, but it was significant when compared with the control and in some case with the protein source.
16. A linear relationship between the dietary lipid level and the body fat content was noticed in the fish fed with the diets ED – 01 to ED – 10. Crude lipid content was recorded lowest in the flesh of fish analyse from control pond and recorded highest in the ED – 10.

17. There is no significant differences were observed in the ash content of the fish flesh, although the variations were recorded in all the first and second year experimental trial.
18. The highest production was observed in the pond ED 10 and lowest in the control pond. The production of fish in term of Kg ha⁻¹ ranked first ED – 10 (Casein – gelatin), followed by ED – 03 (slaughter house waste), ED – 02 (Silk worm pupae), ED – 09 (Goat – blood), ED – 08 (Fish meal); ED – 06 (Fish meal and wheat bran), ED – 01 (Mustard oil cake), ED – 07 (Soybean meal), ED – 04 (*Nechamandra*) ED – 05 (*Nymphoides*).
19. The production cost was highest with the diet ED – 10 and lowest in the control pond. If compared with the gross output value (Rs.) then it was observed highest with the diet ED – 10 and lowest with the control. Highest net output value was recorded with the diet ED – 03 and lowest with the diet ED 07 negative net output was recorded with the diet ED – 10.
20. Analysis of water sample from the experimental ponds did not show significant differences in water quality between the treatments. In general the physico – chemical parameters of soil and water were co-genial for the growth of the fish.