Short Communication

Pak. j. sci. ind. res., vol. 34, no. 12, December 1991

Preliminary Observations on the Use of Biogas Effluents for Common Carp (*Cyprinus carpio*-L.) Culture

R. KAUSAR AND A. ALI

Fisheries (AN), ASI/NARC, Park Road, P.O. N.I.H. Islamabad, Pakistan

(Received March 4, 1991; revised January 27, 1992)

The potential of recycling animal wastes into fish production has been demonstrated by the Chinese. They use animal manure as the main fertilizer in fish ponds [1]. The recycling of animal wastes after composting it in pits or fermenting it in biogas digestors, not only provides methane as energy source and fish production but also safeguards the environment from pollution and diseases of insanitation. Several workers have reported use of biogas slurry for fish production [2-4].

Since substantial quantities of animal manures, about 21.2 million tonnes are available in Pakistan [5], which is used for crop and vegetable production, it will be economically feasible if the wastes are recycled within integrated biogas and fish farming systems at all levels among the farmers.

The present study was undertaken to evaluate the growth of the common carp on biogas waste effluents, fertilizer and supplementary feed.

The study was conducted at Integrated Recycling Unit (Poultry-Livestock-Biogas and Fish ponds) of Animal Sciences Institute, National Agricultural Research Centre, Islamabad, in three cemented ponds having an area of 0.0021ha (7x3x1-1.5m). Ponds were filled with fresh water about 15 days before the start of the experiment and manured with biogas waste effluent. Fish ponds were stocked with common carp (*Cyprinus carpio*) fingerlings on 23rd June, 1986 at the rate of 25 fish/pond. At the time of stocking, the average body weight of the fish was 30gm and average body length was 9.7 cm. The fish was grown for a period of four months (from 23rd June-23rd Oct., 1986). All the three ponds were manured with biogas waste effluents at the rate of 500 lit./ha/ day (1 lit/ pond/day). Pond 'B' and 'C' were also fertilized with superphosphate (42 gm/pond/week) and ammonium sulfate (24gm/ pond/week). Whereas pond 'C' was supplemented with cotton seed cake and rice bran (1:1) at the rate of 2% of fish body weight. The chemical composition of the waste was determined by using AOAC methods [6].

Samples of 10 fish were netted monthly from each pond, weighed, measured and returned to the same pond. All the physico- chemical parameters of the pond water were monitored on daily basis. For dissolved oxygen and temperature determination, Oxygen Meter (Fisher, YSI-Model-57) was used and the pH was determined with a portable pH Meter (M-8E). At the end of the experiment, the fish samples were collected, cooked and were tested by a taste pannel of 7 judges on hedonic scale and organoleptic quality of the fish raised in this system was found good.

The average weight gain of fish in pond 'A' was observed as 350gm whereas weight gain in pond 'B' and 'C' was 485 and 1000gm respectively. The average body length of fish at the end of the experiment was 23, 30 and 43cm in pond A, B and C respectively (Table 1).

The average chemical composition of the biogas waste effluent was determined to be: 34.42% dry matter, 10.39% crude protein, 11.40% crude fiber and 7.0% total ash (on dry matter basis). The pond temperature varied from 18–34°during the whole experimental period. The dissolved oxygen ranged from 3-12 mg/1 and pH ranged from 6.7 – 8.5.

Results of the experiment (Fig. 1) shows that upto 30 days, no marked difference in growth pattern was observed in all the three feeding regimes. While after 30 days, it was observed that the growth of fish in pond receiving effluents was slow as compared to other two feeding regimes. However, the growth of fish in pond receiving effluents, fertilizer and supplementary feed was faster (almost double) than that of pond receiving effluents and fertilizer.

The growth of fish in pond receiving effluents seems better as compared to ponds receiving unfermented manure (normal practice at fish farms). The reason is that anaerobic fermentation of animal wastes in biogas units causes 70-90% reduction of Biochemical Oxygen Demand - a measure of the polluting strength of the waste water [7], which results in increased fish production.

The pattern of interaction between fish growth and feeding regime is in conformity with that of Schroeder, [8] Moav

TABLE 1. GROWTH OF FISH IN THE PONDS FED ON THREE FEEDING REGIME.

S. No.	Description	Ponds A	B	C
1.	Area of the ponds $(m)^2$	21	21	21
2.	Number of fingerlings stocked	25	25	25
3.	Average initial weight of fish (gm)	30	30	30
4.	Average final weight of fish (gm)	350	485	1000
5.	Average initial body length of fish (cm)	9.7	9.7	9.7
6.	Average final body length of fish (cm)	23	30	43
7.	Average daily weight gain (gm/day)	2.6	3.8	8.1
8.	Number of fish recovered	24	23	25

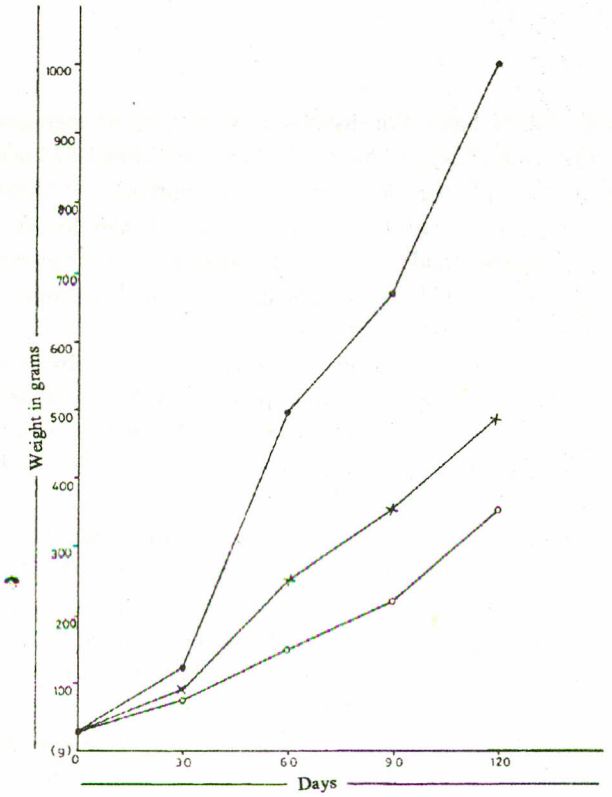

Fig. 1. Growth pattern of common carp (*Cyprinus carpio*) reared on biogas waste effluents (O----O----O-----O) waste effluent. Inorganic fertilizer (x x x x) and waste effluent, + fertilizer + supplementary feed (●-●--●----●----●) at a temperature of 18-34°.

et al. [9] and Wohlfarth [10]. They have reported growth of common carp by adding fertilizer and supplementary feed in polyculture system. Moav *et al.* [9] observed that common carp is highly responsive to added feeds which has also been observed in this experiment. Schroeder [11] stated that even in the presence of a full ration of supplied feed, approximately 50% of the common carp growth is based on natural food developed as a result of manuring and fertilization. Barash and Schroeder [3] have observed that the combination of fermented cow manure (biogas waste effluents) plus supplies of energy and protein in the form of feed increases the pond fish production.

Key words: Common carp, Biogas effluents, Fertilizer and feed.

References

1. FAO, Fresh Water Fisheries and Aquaculture in China FAO. Fish. Tech. Paper, No. 162:84. (1977).
2. P. Edwards, Aquaculture, **21,** 261 (1980).
3. H. Barash and G.L. Schroeder, Aquaculture, **36**, 127 (1984).
4. K. Kaur, G.K. Sehgal and H.S. Sehgal, Biological Wastes, **2,** 139 (1978).
5. H. Hasnain, Feed-The Key to More Food in Pakistan pp.4-15, In Proceedings of FAO-PARC Workshop on Least Cost Ration Formulation, 12-24th March (1983), pp. 232.
6. AOAC, *Official Methods of Analysis of the Association of Official Analytical Chemists* (Washington D.C. USA., 1984), 14th ed., pp.1140.
7. C.D. Parker, Prog. Water, Technol., **11,** 267. (1978).
8. G. Schroeder, Use of Fluid Cowshed Manure in Fish Ponds, Bamidgeh, **26,** 84 (1978).
9. R. Moave, E. Wohlfarth, G.L. Schroeder, G. Hulata and H. Barash, Aquaculture, **10**, 25 (1977).
10. G. Wohlfarth, Utilization of Manure in Fish Farming, In Proceedings on Fish Farming and Wastes, University College, London, Janssen Services, (1978), pp. 78-95.
11. G.L. Schroeder, Aquaculture, **35**, 127 (1983).