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Poultry Waste Recycling and Its Impact on Fish Production

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ABSTRACT

Fish is a animal source protein. It is one of the neglected areas because of unawareness among farming community, unfavorable government policies and high inputs involved in fish farming. Fish being rich in nutrients can help to alleviate the malnutrition of the local population. Fish plays an important role in the diet of the people of developing nations. In India, fish and fishing contribute immensely to the national economy by providing high animal food protein and generating employment, which is a means of poverty alleviation. Most importantly, it is the source of livelihood for a large section of economically backward population of the country. Integrated livestock farming will be novel approach for profitable and rumerative fish production. Poultry droppings can be a good source of nutrients for enhancing the productivity of aquatic production systems.

Keywords: Fish, Poultry waste, Integrated farming

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India has vast resource of livestock and poultry, which play a vital role in improving the socio-economic conditions of rural masses. Livestock wastes including animal manure and poultry by-products, which are a menace to the environment, are sources of wealth creation in fish farming (Adewumi *et al.* 2011). Livestock manure contains considerable quantities of nutrients for fish production. Protein content ranges between 10-30 percent, energy between 1100-1400 kilocalories per kilogram manure and soluble vitamins are synthesized in high concentration (Tuleun, 1992). It also contains non digested feed, metabolic excretory products and residues resulting from microbial synthesis. The livestock wastes such as cow-dung, poultry and pig excreta, goat and sheep pellets in fish culture are useful in enhancing the production of fish food organisms as well as in cutting down the expenditure on costly feeds and fertilizers. Fish plays an important role in the diet of the people of developing nations. In India, fish and fishing contribute immensely to the national economy by providing high animal food protein and generating employment, which is a means of poverty alleviation. Most importantly, it is the source of livelihood for a large section of economically backward population of the country.

According to nutritionists, fish is an excellent source of protein and substitute for red meat. Fish flesh contains all the essential amino acid and minerals viz., iodine, phosphorus, potassium, iron, copper and vitamin A and D in desirable concentrations. It serves as a valuable ingredient to a healthy diet because of its low carbohydrate and unsaturated fat contents. It is often recommended by doctors to heart patients since it is an excellent source of Omega 3. So the inclusion of fish in our diet can make a valuable contribution to any diet that contain mainly of cereals, starchy roots and sugar for the healthy growth (Sandhu, 2005; Razvi, 2006; Salim, 2006; Yildrim *et al*., 2008).

Fish provides an average of 25% of animal proteins consumed world-wide and in some countries this value can reach 50%. In India, carps contribute around 80% of total fish production. They are cultured mostly in semi-intensive culture systems using fertilization. Nevertheless, variety of pond input schemes, including inorganic or organic fertilizers, formulated feed and combination of both are involved in carp production. Pond fertilization through organic and inorganic sources has become a management protocol in aquaculture (Bhakta *et al*., 2006). Natural food supply can be enhanced by using organic and inorganic fertilizers and low-cost supplemental feeds derived from agricultural by-products. The best way to reduce the cost of fish production is to minimize the use of supplemental food. According to Moav *et al.* (1977), judicious organic manuring of fish ponds can eliminate the need for supplementary feeding. It is well known that high fish yield can be achieved by higher abundance of plankton in culture system (Jha *et al*., 2004).

In India, increasing attention has been paid towards recycling of various agricultural and animal wastes through aquaculture production process for enhancing fish yield. The major objective of utilizing wastes in fish farming system is to recycle different nutrient elements present in such wastes. Due to energy crisis, prohibitive cost of chemical fertilizers and poor purchasing power of marginal and small farmers, it is necessary to use organic manure/waste to its maximum potential with proper technology to meet the shortage of chemical fertilizer under sustainable fish pond ecosystem. However, proper pond management ensuring continued maintenance and building up fertility of an ecosystem is indispensable for greater productivity. This necessitates the importance of recycling organic wastes like poultry and livestock for enhancing the productivity of fish pond ecosystem. Therefore, integrating livestock and agriculture with fish farming can be called model of recycling wastes, comprehensive utilization of various farm products, saving

energy, full exploitation of the natural resources and finally maintaining the ecological balance.

Pond fertilization practices using animal wastes are widely used in many countries to sustain productivity at low costs (Gupta and Noble, 2001; Majumder *et al.,* 2002) since soluble organic matter supplied to ponds by using manure stimulate phytoplankton growth (Sevilleja *et al.,* 2001). Moreover, it also increases biomass of zooplankton and benthic organisms. Consequently, animal wastes lead to increased biological productivity of ponds through various pathways, which result in an increase in fish production (Dhawan and Kaur, 2002). Several studies showed that organic supplements contributed to fish yield by supplying P, N_2 and C for algal growth and by stimulating detritus production and heterotrophic utilization.

Reducing amount of feed is a means of lowering costs if production is not reduced. In attempts to reduce feed costs, integration of chicken with fish farming might be an economically viable and productive system for both rural farmers and commercial entrepreneurs. Poultry production wastes have inherent qualities that make them particularly valuable for fish production compared to other livestock wastes. Poultry manure is a complete fertilizer, with the characteristics of both organic as well as inorganic fertilizers and fresh chicken manure contains 1.6% nitrogen, 1.5% phosphorous and 0.9% potassium (Woynarovich, 1980). Recent studies have demonstrated high yields from ponds loaded with manure from feedlot livestock. Hopkins and Cruz (1982) obtained extrapolated net fish yields of up to10 t/ha/year from 400-m2 and 1,000-m2 ponds in the Philippines, using only pig or poultry manure, without inorganic fertilizer or supplementary fish feed. Similar yields were obtained at the Asian Institute of Technology (AIT), Bangkok and in villages of Central and Northeastern Thailand using duck manure as the sole pond input (Edwards 1986). A mean annual net yield of 175 kg of fish was obtained from a 200 m^2 pond fertilized with the manure of 27 ducks in villages. It was estimated that this could supply almost all the annual animal protein needs of a family of five people.

Poultry manure is rich in nutrients. It contains 1.6% nitrogen, 1.5% phosphorus,and 0.9 % potassium(Woynaropvich, 1980) with 20-30% total protein, 80% undigested feed stuff and 25% dry matter content which can be used directly by fish as feed. Fresh duck manure contains about 57% water and 26% organic matter including 10% carbon, 1.4% P_2O_5, 1% nitrogen, 0.6% K_2O, 1.8% calcium and 2.8% other materials.(Chauhan et al., 1998)

Integrated fish farming is a multi commodity farming system in which fish culture is effectively combined with livestock production. The livestock wastes are considered for use as fish pond inputs. The fish pond ecosystem transforms low grade protein in the manure into fish protein with a high efficiency. Therefore, use of livestock manure for fish production has a high economic efficiency (Priyadarshini *et al*., 2011). There is a need to keep all the aspects of integrated systems in balance and to develop, strengthen and coordinate the work of experts in agriculture, animal sciences and aquaculture. Integrated poultry cum fish farming has proven to be highly productive, economically viable and environmentally stable.

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