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Integrated Livestock cum Fish Production System

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Abstract

Integrated Farming System (IFS) is an efficient recycling tool of farm waste and by-products. The integrated livestock cum fish cultivation is a utilization of livestock farm wastes used to fish production. The commonly used livestock cum fish production systems are cattle/ buffalo cum fish integration, sheep/ goat cum fish integration, pig cum fish integration and duck cum fish integration systems. The successful livestock cum fish integration is depends upon selection of fish species, stocking rate & time of fishes, management of fish ponds and harvesting time of fishes. It was concluded that the livestock cum fish integration systems are effective tool to utilize the farm wastages, by-products and enhance the livestock farmer's livelihood.

Introduction

“There is no waste” and “waste is only a misplaced resource which can become a valuable material for another product” (FAO, 1977). Integrated Farming System (IFS) is an efficient recycling of farm waste or farm by-products and also an abatement of environment pollution in the world. The basic principle for integrated livestock cum fish production system is a full utilization of livestock farm wastes used to fish production. Commonly, the spilled over feed & leftover feed in the feeder and livestock manure may be utilized as fish cultivation. It is directly consumed by the fishes or helps in production of planktons in the fish bond which is also consumed by the fishes. The optimum stocking density with desired fish species, amount utilization of manure and lime also play an important role for successful fish production. The livestock cum fish production may be extensive, intensive or semi-intensive system depending upon the availability of capital and resources. The popular livestock cum fish farming system are,

- Cattle or buffalo cum fish integration system.
- Sheep or goat cum fish integration system.
- Pig cum fish integration system.
- Duck cum fish integration system.

Cattle/ Buffalo cum Fish Integration System

This is a common integrated system used in rural India to effectively use the natural water reservoir. The average dung production of cattle/ buffalo was varies according to their body weight and feed and water consumption. The cow and buffalo was produced the dung at 25 kg/day and 30 kg/day respectively. Generally, the peoples were mixed the cow/ buffalo dung in the water bodies. Otherwise, periodically put the manure to the water reservoirs. In commercial

livestock farms, the cow/ buffalo dung or other wastes were channelized directly from the animal shed to the fish pond. The basal rate of animals dung application to the fish pond was 5000 kg/hectare/year. Five cattle/ buffaloes are sufficient to enrich the one hectare of fish pond. The dung was an excellent fish food or indirectly as a source of plankton growth in the pond, which is consumed by fish. Avoid excess manure to the pond; it was caused by fish mortality.

Sheep/ Goat cum Fish Integration System

The Sheep/ Goat cum integration system is widely used integrated model in small ruminant’s popularized area. This system, the sheep/ goat shed was constructed over the fish pond. The slatted floor type also constructed with the use of wood, bamboo, iron and polyurethane etc. The animal’s dropping was directly drawn to the fish pond. Per unit sheep/ goat is produced around 0.15 tons of manure per year in dry matter basis. It is rich in N, P, and K. 50 - 55 goats are sufficient for one hectare water bodies for sheep/ goat

cum fish integrated farming system.

Pig cum Fish Integration System

The pig manure is a suitable for integrated fish farming system. In general, the pig sty is constructed in the bank of pond and wastes are directly channelized in to the fish pond. Sometimes pig manure is accumulated and fermented for some days and then applied to the pond. A pig of 50 kg can produce 2.5 kg dung per day whereas; 90 kg pig produces 5 kg dung per day. The pig manure contains about 70% of digestible food for fishes besides certain digestive enzymes. It is rich in nitrogen and phosphorus and thus it helps in very fast growth of fishes. Another method, the spillover feed and leftover feed in the feeder were collected, put to the fish pond (Figure 1). The pigs are mostly wastage the feed during the rainy days. The wastages feed is directly consumed by the fishes. The Large White Yorkshire, Middle White Yorkshire, Duroc, Landrace and Hampshire pig breeds are commonly used the pig cum fish integration system in India. 30-40 pigs are recommended for one hectare of fish pond. 6000 to 6500 fingerlings are used for integrated pig cum fish farming system.



Piggery leftover feed



→ Collected and feeding to fish pond →



Fish Harvesting

Figure 1: Pig cum Fish Integration System

Duck cum Fish Integration System

The duck cum fish integration system is very popular and widely practiced in our country (Figure 2). In this system, the duck house may be constructed above the pond. So, the excreta and feed waste from the ducks were directly goes to the pond and serve as a feed for fishes. The ducks were also consumed mosquito larvae, tadpoles, dragon fly larvae and snails which also serve as vector for certain

parasites. Due to the dabbling habit of ducks, it was increases the available oxygen in the fish pond. The Khaki Campbell and Indian Runner duck breeds were commonly preferred for this integrated system. Commonly, 5000-6000 fish fingerlings and an average 250 ducks were stocked per hectare of duck cum fish integration system. It has been possible to attained fish production ranging from 3500-4000 kg/hectare/year and expected to produce 15,000-20,000 eggs/ 250 ducks/ year and 250-300 kg of duck meat/ 250 ducks/ year (Chakrabarti et al., 2014).



Figure 2: Duck cum fish integration system

Stocking Time of Fishes

The stocking time of fishes are varies depending upon the climate in different regions of the country and also the availability of optimum water level in the fish pond. The best suitable month is June to July in a year. The growths of the fishes were restricted at below 18 °C of pond water. During winter months the fish growth is slow and fast growth

is noticed at rainy seasons. So, usually the fishes are stocked during rainy season in a year. In Tamil Nadu, the fishes are stocked during North-East monsoon season. This season only the water level in the fish pond is optimum in nature. In composite fish culture 3 species, 4 species or 6 species may be stocked depending upon the availability of fingerlings in the market during that season. The commonly used fish species, feeding habits and stocking % in livestock cum fish integration was showed Table 1.

Management of Fish Pond

The fish pond should be water retentive and not to be situated in flood prone area. It should be constructed with received constant water supply throughout the year. The ideal pond water depth is 1.5-3.0 m with water pH is 6.5-7.5. If the water pH is not up to the desired level, the pH may be corrected by application of lime and the quantity of lime is 2000 kg/ ha for 4.0-5.0 pH, 1200 kg for 5.1-6.0, 1000

Table 1: Used fish species in livestock cum fish integration

Sl. No.	Common Name	Scientific Name	Feeding Habits	Stocking %
I. Surface Feeder				
1	Catla	<i>Catla catla</i>	Zooplankton	30 - 35
2	Silver carp	<i>Hypophthalmichthys molitrix</i>	Phytoplankton	
II. Column Feeder				
3	Rohu	<i>Labio rohita</i>	Zooplankton	15 - 20
4	Grass carp	<i>Ctenopharyngodon idella</i>	Phytoplankton	
III. Bottom Feeder				
5	Mrigal	<i>Cirrhinus mrigala</i>	Zooplankton	40 - 45
6	Common carp	<i>Cyprinus carpio</i>	Zooplankton	

kg for 6.1-6.5 (mild acidic), 400 kg for 6.6-7.0 (more or less neutral) and 200 kg/ha for pH 7.1-7.5, which is mildly alkaline (Chakrabarti *et al.*, 2014). Lime helps in maintaining pH, kills and decomposes parasites. The lime should be applied in 3 to 4 split doses. The liming schedules depending on soil and water pH were showed on the Table 2.

Table 2: Liming schedule depending on soil and water pH

Soil and water pH	Soil and water type	Quantity of quicklime required (kg/ha)
4.0-5.0	Highly acidic	2000
5.0-6.0	Acidic	1200
6.0-6.5	Low acidity	1000
6.5-7.0	neutral	400

The pond should be regularly cleaned from aquatic plants which prevents sunlight penetration and oxygen circulation in water as well as shelter fish predators. The weeding can be done by manually, mechanically, biologically, chemically or by increasing the water depth in the pond. By repeated netting unwanted fishes may also be removed in the pond. The ammonia, tea seed cake and bleaching powder also can be applied to remove enemy fishes.

Harvesting Time of Fishes

Generally, the fishes are harvested after 12 months of stocking. But, where water bodies remain functional for 6 months fingerlings may be stocked in April and

harvested in the month of November/ December. In Tamil Nadu, the fish fingerlings stocked during North-East monsoon season and harvested after 6 months. Normally, the fish survivability is above 80 percentages and total production ranging from 3,000-4,000 kg/hectare/year in integrated livestock cum fish farming.

Conclusion

The integrated livestock cum fish production is an effective tool to utilization of natural water reservoirs through recycling of livestock farm wastages and by-products. It is also an additional income to the livestock farmers for enhance the livelihood.

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