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FISH CUM DUCK INTEGRATED FARMING SYSTEM IN INDIA

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Livestock integration in fish culture is a remnant of a bygone era. Mixed farming sometimes involves the use of ducks, poultry, pigs, cattle, buffalo, sheep, and goats. In wetland and watershed areas of the entire country, the use of mixed farming systems with cattle and fish has become increasingly popular due to the continual shortening of farm holdings to achieve maximum output. The use of a subsystem's a result, including cattle excrement, as an input into different subsystem, like fish culture, occurs. Animal excrement might be effectively used as fish feed, which would prevent environmental issues in addition to manure production and produce important animal protein a much-needed resource for India. States like West Bengal. Orissa, Bihar, Jharkhand, Andhra Pradesh, Assam and North Eastern states the demand for fish and fish products along with meat and animal products are very high.

Integration with fish and cattle is a very promising way to match supply and demand, and it has the potential for substantial improvements in unit area profitability, specifically for small-holding farmers. The majority of small-holder farmers are unable to meet the fish in intensive fish farming systems' demand for concentrate feed. Hence, by cultivating fish food organisms like plankton in ponds or other bodies of water in addition to feeding animal waste, integrated fish farming with livestock and the use of livestock excrement might satisfy demand. Plankton production can benefit greatly from the nutrients included in duck excrement. Fish and ducks in the treated pond have a higher chance of survival because the physiochemical characteristics of the water and soil are in a more productive range. Fish farming combined with duck farming has lower costs and higher returns than fish farming alone.

Fish Species for Integrated Duck-Fish Farming

Fish that can filter water and feed on bacteria, zooplankton, and phytoplankton are the best candidates for integrated livestock-fish farming. The goal of integrated livestock and fish farming is to use manuring to create as much plankton as possible in the water. Plankton is high in protein and provides fish with natural food. Fish species that are eaten by humans, effectively utilise phytoplankton and zooplankton, and have a tendency to feed on macrophytes are ideal for integrated livestock fish farming. Fish are categorised into three groups based on how they feed: surface feeders, column feeders and bottom feeders. It is advised to use both native and foreign species in an integrated fish farming system. The finest examples of surface feeders include indigenous species like Catla (*Catla catla*) which feeds on phytoplankton, and foreign species like Silver carp (*Hypophthalmichthys molitrix*) which consumes phytoplankton. On the other hand, an indigenous species called Rohu (*Labio rohita*) is an omnivore and a column feeder.

The native species Mrigal (*Cirrhinus mrigala*) and Kalabasu (*Labeo calbasu*) are omnivorous, but the alien species common carp (*Cyprinus carpio*) is a bottom feeder and is also a detritivorous. Exotic species that are herbivorous cover the surface, column and periphery of the feeding zone, such as the grass carp (*Ctenopharyngodon idella*).

Catla

Rohu

Mrigala

Grass Carp

Common Carp

Silver Carp

Ideal Housing for Duck- fish Integrated Farming System

Order to achieve maximum productivity and ease of day-to-day farm administration, livestock houses are built above bodies of water, particularly for ducks or poultry, close to ponds or their banks, or partially on land and in water. When duck cum fish farming is practised, the duck house may be built above the pond, allowing the excrement and feed waste to fall into the pond and feed the fish. A waterway is channelled from the animal shed to the pond when the home is built on the shoreline of a body of water, allowing the excreta or feed waste to be washed into the pond.

The ideal livestock-fish ratio in this situation needs to be kept in order to prevent excessive manuring in the water. Both birds have a slatted floor in mind. The animal waste was simply piped into the pond. One can build a slatted floor out of bamboo, wood, or another material.

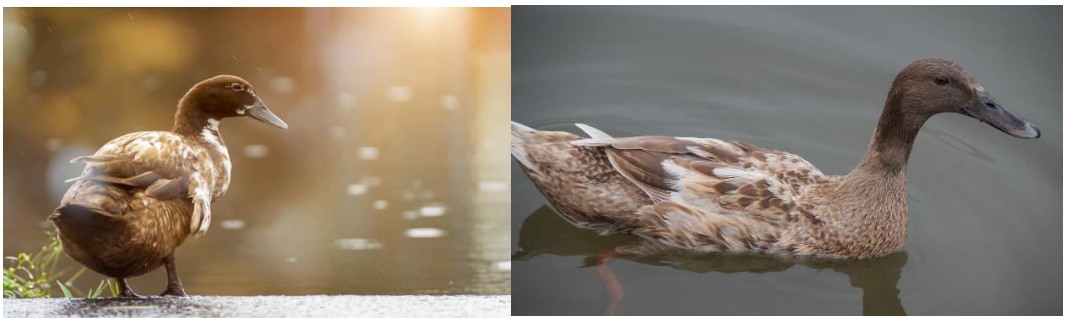
Management of Pond in Integrated Livestock-Fish System

The pond ought to be able to hold water and not be located in a place that floods easily. There should be a year-round source of water or at least some water in the pond. Seasonal ponds are a viable option for an integrated farming system since they can hold water for eight to nine months. A minimum of 1.0 m of water is required, with 1.5 to 3.0 m being ideal. The ideal pH range for soil is 6.5 to 7.5. The application of lime can be used to adjust the pH of the soil if it is not at the desired level. The amount of lime to be applied is 2000 kg/ha for pH 4.0 to 5.0, 1200 kg for pH 5.1 to 6.0, 1000 kg for pH 6.1 to 6.5 (mildly acidic), 400 kg for pH 6.6 to 7.0 (more or less neutral), and 200 kg/ha for pH 7.1 to 7.5, which is mildly alkaline. Lime assists in preserving pH and eliminates and breaks down parasites. Three to four divided dosages of lime should be applied. The recommended minimum dosage for applying lime and cow dung per acre of water bodies is 1200 kg and 5000 kg, respectively.

Regular cleaning of the pond is necessary to remove aquatic vegetation that block the passage of sunshine and oxygen, and also serve as a haven for fish predators. There are several methods for removing weeds from a pond: mechanically, chemically, biologically, or by raising the water level. Mahua (*Bassicala tifolia*) can be put at a rate of 2500 kg/ha to water bodies to kill predatory fish. Unwanted fish can be removed by netting repeatedly. Fish

that are adversarial can also be eliminated by using ammonia, tea seed cake, and bleaching powder.

Fish Cum Duck Integrated Farming



Khaki Campbell **Indian Runner**

Stocking and Harvesting Time of Fishes

The ideal months for stocking fingerlings are June and July. The ideal water level in a pond is dependent upon both the climate in various parts of the nation and the stocking period. Fish development is inhibited below 18 to 20 inches of mercury. Fish grow slowly during the winter, but during the wet season, they grow more quickly. In addition, the water level in the bodies of water decreases significantly during the winter and dry season. It is best to stock fingerlings during the rainy season, which follows the winter months, and to harvest them before the pond becomes too short of water.

Fish are typically taken a year after they are stocked. On the other hand, fingerlings may be stocked in April and collected in November or December in areas where water bodies are still operational after eight to nine months. Three, four, or six species may be stocked in composite fish culture, depending on the market's supply of fingerlings. The fish ratios in integrated livestock and fish farming, taking into account surface, column, and bottom

feeders, should be 4: 3: 3 (3 species) for Catla, Rohu, and Mrigal; in 4 species, the ratio is 3: 3: 3: 2, while in 6 species, the ratio is 1.5: 2.0: 1.5: 1.5: 1.5: 2.0, for Silver carp, Grass carp and Common carp, respectively.

For instance, since Catla and Silver carp are surface feeders, the total stocking density should not exceed 30 to 35%. On the other hand, Rohu, a column feeder that thrives in ponds with a water depth of 3 to 4 m, should be stocked at a rate of 15 to 20%, while the ratio may be as high as 40 to 45% for bottom feeders like Mrigal and Common carp. Grass carp should not exceed 5 to 10% of the total. Land grasses, vegetable waste, and banana leaves can be used as food. For an integrated duck-fish system, the Central Inland Fisheries Research Institute and the ICAR Research Complex for the NEH Region, Barapani suggested 6000 fingerlings per hectare.

Types of Livestock- Fish Integrated Farming System

Duck-cum fish farming is a very common and widespread practise in our nation, especially in the north-eastern states, Assam, West Bengal, Bihar, Orissa, Andhra Pradesh, Kerala, and Jharkhand. It is among the best systems for integrating fish and livestock. Duck droppings can land in the water directly or be collected and added to a pond for fertilisation. Fish eat spilled feed or gather duck droppings as direct meal. Ducks eat the larvae of mosquitoes, tadpoles, dragonflies, and snails, which are also a source of certain parasites.

Ducks' dabbling habit makes more oxygen available in pond water. Local ducks are not preferred in favour of high-yielding commercial ducks like Khaki Campbell or Indian Runner, which produce more eggs for maximum profit. For commercial farming, 200–240 eggs per duck year are anticipated, while for duck–fish farming, 250 ducks per hectare are advised on average.

Benefits of Fish Cum Duck Farming

Raising ducks allows ponds to fully utilise their water surface. Fish ponds offer ducks a great environment that shields them from parasite illness. Ducks aid in the growth of the fingerlings by feeding on predators. Raising ducks in fish ponds lowers the amount of protein required in their diets to 2-3%. Duck droppings enter the water quickly and add vital nutrients that boost the biomass of naturally occurring food species. Duck feed waste (about 20 to 30 grams per duck per day) can be used as manure or fish feed in ponds to increase fish productivity. Ducks do the manuring, and their droppings are dispersed evenly and not piled

up. Ducks' digging for benthos causes the nutrients in the soil to disperse into the water, which in turn encourages the growth of plankton. As they swim, play, and chase about in the pond, ducks act as bio aerators.

Aeration is facilitated by this disruption of the pond's surface. Ducks' body weight and feed efficiency rise, and fish may be able to use the leftover feed. The clean environment of fish ponds boosts the survival rate of ducks raised in them by 3.5%. Fish production can be increased to 37.5 kg/ha by using duck droppings and the leftover feed from each duck. Ducks control aquatic vegetation. Activities related to duckeries don't require any additional land. Fish, duck eggs, and duck meat are produced in large quantities per unit of time and water area as a result. With less investment, a huge reward is guaranteed.

Stocking Density of Fish

After the pond's water has undergone a thorough detoxification, it is filled. A species ratio of 40% surface feeders, 20% column feeders, 30% bottom feeders, and 10%–20% weedy feeders is recommended for good fish yields. Stocking rates range from 6000 fingerlings/ha. It is possible to cultivate mixed cultures of just Indian main carps using a species ratio of 40% surface, 30% column, and 30% bottom feeders. Due to the harsh winters that hinder fish growth in the northern and north-western parts of India, ponds should be filled in March and harvested in October or November. Ponds should be supplied in June through September and fish should be caught after a year of raising them in the south, coastal regions, and north-eastern states of India, where winters are moderate.

Use of Duck Dropping as Manure

The ducks are allowed to roam freely around the surface of the pond from 9 AM until 5 PM, at which point they naturally manure the entire area by dispersing their droppings throughout it. Every morning, the duck house's voided droppings are gathered and added to the pond. per duck excretes 125–150 grams of droppings per day. 200–300 ducks per hectare at stocking density produce 10,000–15,000 kg of droppings annually, which are recycled in ponds covering one hectare. On a dry matter basis, the droppings comprise 81% moisture, 0.91% nitrogen, and 0.38% phosphate.

Duck Husbandry Practices

The following three types of farming practice are adopted.

I. Raising large group of ducks in open water

This kind of duck raising is known as grazing. When using the grazing approach, a flock of ducks typically consists of around 1000 ducks. During the day, the ducks are left to graze in huge bodies of water such as lakes and reservoirs, but at night they are confined in enclosures. In huge bodies of water, this is a useful way for increasing fish productivity.

II. Raising ducks in centralised enclosures near the fish pond

A centralised duck shed with a cementated area for wet and dry runs outside is built next to fish ponds. Ducks are typically stocked at a density of four to six per square metre. Every day, the wet and dry runs are cleaned. Waste water is permitted to enter the pond following cleaning of the duck shed.

III. Raising ducks in fish pond

This is the normal operating procedure. To create a wet run, the pond embankments are partially caged with net. In order to prevent ducks from escaping below the walled net, the net is positioned 40–50 cm above and below the water's surface, allowing fish to enter the wet run.

IV. Selection of ducks and stocking

Since all domesticated races of ducks are unproductive, care must be taken while selecting the type to be raised. The Sylhet Mete and Nageswari.The ducks are two of the most significant Indian breeds. Although they are not as good layers as the exotic Khaki Campbell, the upgraded breed, Indian runner, has been proven to be the best ideal for this purpose due to their hardiness. Another thing to think about is how many ducks a one-hectare fish pond needs to be properly manured. It has been discovered that 200–300 ducks will yield enough manure to fertilise one hectare of water used for fish culture. After giving them the appropriate preventive medications, two to four-month-old ducklings are housed on the pond to protect against epidemics.

V. Feeding

While ducks in open water can obtain naturally occurring food from the pond, this is insufficient for their healthy development. The ducks can be given additional feed at a rate of 100 gm/bird/day, which is a blend of any regular balanced poultry feed and rice bran in a 1:2

weight ratio. Two times a day, one in the morning and one in the evening, the feed is administered. Feed is administered in the duck house or on the pond embankment, and any spilled feed is emptied into the pond Feed and water should be placed in receptacles deep enough for the ducks to dip their bills into. Without water, the ducks cannot eat. Since ducks are easily contaminated by aflatoxin, long-term storage of mouldy feed is not recommended. Aflatoxin contamination is caused by Aspergilus flavus, which can be removed from feed by treating maize and ground nut oil cakes.

VI. Egg laying

The ducks begin to lay eggs when they turn 24 weeks old, and they keep on laying for two years. Ducks only lay their eggs at night. For egg laying, it is usually preferable to have some hay or straw in the duck house's corners. Every morning, when the ducks are released from the duck house, the eggs are gathered.

Health Care

Compared to poultry, ducks are comparatively less susceptible to illnesses. Ducks native to the area have a higher disease resistance than other types. Just like with poultry, ducks require proper sanitation and medical attention. The diseases that can spread among ducks include keel disease, duck cholera, hepatitis, and the duck virus. It is necessary to vaccinate ducks against diseases like duck plague. Birds that are sick can be identified by their sounds, any decrease in their daily feed intake, watery discharges from their eyes and noses, sneezing, and coughing. The sick birds need to be isolated right away, kept out of the water, and given medication.

Harvesting

A portion of the table-size fish are harvested, taking into account the demand for fish in the nearby market. The pond should be replenished with the same species and quantity of fingerlings following partial harvesting. The last harvest is completed after a year of raising. Fish yields of between 3500 and 4000 kg/ha/yr and 2000 and 3000 kg/ha/yr are typically attained with stockings of six and three species, respectively. Every morning, eggs are collected. Ducks can be sold for flesh in the market after two years. There are roughly 18,000–18,500 eggs and 500–600 kg of duck meat produced.

Conclusion

Fish Cum Duck Culture was boosting for plankton production in culture ponds, duck manure is a very good way to increase fish pond productivity. Fish and ducks have good survival rates in treated ponds because the water's physio-chemical parameters are in a more productive range. Everything mentioned above has helped to maximise the fish output in the control pond. Fish farming in conjunction with duck farming has a higher cost-benefit ratio than fish farming alone.

Reference

Kumar, R., Singh, N., Jain, S., Singh, Y.P. and Singh, R., (2014) Integrated livestock-fish production systems-sustainable source of livelihood. *Progressive Agriculture*, *14*(1), pp.49-56.

Majhi, A., (2021) Chapter-2 Integrated Aquaculture. *Microbial flocculants as an alternate to chemical flocculants for wastewater treatment*, p.13.

Sapcota, D. and Begum, K., (2022) Integrated duck farming. In *Duck Production and Management Strategies* (pp. 247-264). Singapore: Springer Nature Singapore.

Srikanth, D., Brahmanandam, V. and Teja, M.R., (2018) Emerging trends in duck farming in India. *International Journal of Science and Management Studies*, *1*(1), pp.6-13.