

Housing system: The poultry house can be constructed over the pond or on the embankment of pond. The height of the poultry house should be 2.1-2.4 m at side well and 3.0-3.3m at the centre to provide slope on the either side. The roofing materials like tins, asbestos sheets, tiles or thatches may be used for construction. The width of poultry house should not exceed 9 m to have effective cross ventilation and length of the house may be as per the requirement. The droppings of the birds fall on the floor from where these are collected and applied to the pond.

The birds are confined to the house entirely, with no access to the land outside. This housing system is of two types, viz. Battery system (Cage system) and deep litter system. The deep litter system is preferred over the cage system due to higher manurial value of the built up deep litter. In this system, the poultry birds are kept in pens up to 250 birds per pen on floor covered with litter. For starting the deep litter system, the floor of the pen is covered with dry organic material. The chopped straw, dry leaves,



Fig: Vanaraja bird in deep litter system



Fig: a view of battery system

hay, saw dust etc. to a depth of about 6 inches. 1 sq. feet floor space is required per bird. The dropping of the birds which fall on the litter gradually combine with the litter material due to bacterial action. When the depth of litter becomes less, more organic matter is added to maintain sufficient depth. In case the litter becomes damp superphosphate or lime is added to keep it dry. The litter is regularly stirred for aeration. In about 10-12 months, it becomes fully built up litter, having very high manurial value. The shed should be thoroughly cleaned, disinfected and rested before chicks are placed.

3. Selection of birds:

The dual purpose bird for meat and egg are Vanaraja, Grama priya or kuroiler and for egg purpose bird is white leghorn suitable for this integration. About 500 to 600 birds are required for one hectare water spread area. About eight week old chicks, after vaccination against viral diseases and providing other necessary prophylactic measures as a safeguard against epidemics are kept in poultry house near the pond.



Fig: White leghorn bird

4. Feeding:

Grower mash is provided to the farmed birds during the age of 9-20 weeks @ 50-70 gm/bird/ day. Whereas, a layer mash is provided to the birds above 20 weeks @ 80-120 gm/bird/day. The feed is provided to the birds in feed hoppers to avoid wastage. An ample supply of water is made available to all the birds at all the time. Egg-type birds are fed with starter 0-8 weeks, grower 8-20 weeks and brooder feed 20 weeks onwards, while broilers are fed 0-4 weeks with starter and 4-6 weeks with finisher feed.

5. Egg laying

Each pen of laying birds is provided with one nest for 5-6 birds. Egg production commences at the age of 22 weeks and then gradually decline. The vanaraja and Gramapriya and Kuroiler lay from 140-160 eggs and white leg horn lays egg 240-300 per year. After the age of 18 month birds are disposed.

6. Health care

The poultry house and equipment must be disinfected at least 30 days prior to bringing in the new flock. The birds are to be vaccinated against diseases like infectious bronchitis infected laryngo tracheitis, mark's diseases, ranikhet diseses, fowl pox, etc. at the appropriate age. Some of the bacterial diseases viz. salmonellosis, coryza, fowl cholera, etc. can be kept under control by maintenance of proper hygienic conditions. Broad spectrum antibiotics may be added to the water in case the infection is mild. In severe cases, veterinary expert should be consulted. The fully built up deep litter removed from poultry pens is stored in suitable place and supplied to the pond @ 50 kg/ha/day every morning after sunrise. The application of this is deferred on the days when algal bloom appears in the pond.



Fig: Foot dip as a prophylactic measure

Production.

Fertilization with poultry manure results in a production of 3000-4000 kg fish, 60,000-100,000 eggs and over 3,500 kg meat/ year can be obtained from a hectare of pond area in one year.. A fish production of 10 tonne/ha could be obtained by culturing tilapia, common carp and murels with a stocking density of 20,000 fingerlings/ha and chick density of 4,000/ha. No chemical fertilisers or supplemental feeds have to be given at any stage.

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Integrated Fish Cum poultry Farming System



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What is integrated Fish cum Poultry Farming?

In this system fish farming is integrated with poultry farming where poultry droppings or deep litter materials are utilized by fish as feed materials. In India, this system of freshwater fish culture has assumed greater significance in view of its potential role in recycling of organic wastes and in integrated rural development.

Advantages of fish cum poultry farming:

- Save fertilizer cost.
- Save supplementary feed cost (account 60%).
- chicken get its required quantity of water from the fish pond.
- From the same places at the same time chicken meat, eggs and the fish can be produced.

This integrated farming of fish cum poultry has two practices-

- **Fish culture practice**
- **Poultry farming practice**

Fish culture practice

Fish culture practice followed in the integration of fish cum cattle farming is the "Composite fish culture system".

Composite fish culture:

composite fish culture system can be divided into-

1. Pre-stocking management.

i. Construction of a fish farm/ Renovation of an existing fish farm.

2. On stocking management.

- Selection of species.
- Fish species to be stocked.
- Stocking

3. Post stocking management.

- Liming.
- Fertilization.
- Feeding.
- Water quality management.
- Fish health management.
- Harvesting management.

1.. Pre-stocking management.

i. Construction of a new fish farm/ Renovation of an existing fish farm:

Pond digging: During digging of a pond along the side slope should be maintained so that it is not eroded. This side slope depends upon the soil quality. For loamy or clay loam soil the side slope should be 1.5: 1. If the selected site contains more sand then this side slope should be little more. Fish pond embank-



Fig: A view of construction of new pond

ment should be strong enough and their height should be 1 ft. more than the high flood level of the selected site. The bases of the embankments are constructed based on the height and slope required for it.

Renovation measures of fish ponds of an existing fish farm.

Pond should be completely dried during dry season by pumping out the pond water and the pond bed is exposed to sunlight. After drying mud from the pond bed should re-



Fig: Renovation of old pond

move. Here in this case pond water depth is need to be considered, in any case it should not go beyond 2.5 meters for good productivity. Then the pond bed is ploughed and dried. Then apply lime to the dry pond bed depending on the pond soil and water pH given in the table below:

Repairing of dykes:

During the drying period repairing of pond embankments (if required) are done.

Water filling, liming & fertilization:

Afterwards the pond is filled with water to a depth of 2- 2.5 meter. To maintain a desire 2- 2.5 m water depth water inlet and out let may be constructed at the pond dyke with measures to prevent the entry of unwanted organisms and also to prevent the escape of cultured fishes. Then water pH is measured and based on the pH value liming is done as mentioned above.

After 7- 10 days of liming fertilization is done in the pond. The droppings of chicks rich in nitrogen and phosphorus would fertilise fishponds. Poultry housing, when constructed above the water level using bamboo poles would fertilise fishponds directly. This system utilizes poultry droppings for fish culture. The number of chicks used for this system is about 2500/ha however; the stocking density of chicks may be increased in the event of increase in the stocking density of fish fingerlings. The deep poultry litter is applied to pond in daily doses at 30-35 kg/ha. One adult chicken produces about 25 kg of compost poultry-manure in a year; usually, 400-600 chickens/ha of pond water surface are used.

Renovation measures of a pond, which cannot be dried even by dewatering:

Renovation measures of an existing fish farm's ponds which can not be dried even by pumping out water are:

i) Removal of aquatic weed:

These unwanted aquatic weeds could be removed- manually, mechanically, chemically and biologically.

ii) Removal weed fishes, insects, unwanted organisms, etc.:

This is done by repeated netting or by using chemicals. Soap-oil emulsion (soap: oil = 1: 3) over the pond water surface is most commonly used technique to kill the insects in fishponds. Commercially available bleaching powder@ 97- 113 Kg/ha can also be used as fish toxicant.

iv) Partial replenishment of water:

Since total dewatering is not possible, so depending on the feasibility some percentage of pond water may be pump out and the same is refilled with new water. But the water depth should be restricted to 2- 2.5 m for good production of fish.

2. On stocking management.

i. Selection of species.

Numbers of fish species are available for composite fish culture. But a species selected for culture should have the following characters-

1. Fast growth rate.
2. Good food conversion efficiency.
3. Acceptability of supplementary and natural food.
4. Adaptability to crowded conditions and resistance to diseases.
5. Ability to withstand changing physico-chemical and biological conditions of the pond water.
6. Good market value

ii. Fish species can be stocked:

Rohu (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus mrigala*), Silver carp (*Hypophthalmichthys molitrix*), Common carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idella*), Tilapia (*Oreochromis mossambica*), Magur (*Clarias batrachus*), Java puthi (*Puntius javanicus*), etc.

iii. Stocking:

Soil & Water pH	Lime (kg/ha)
4.5-5.0	2,000
5.0-6.0	12,00
6.0-6.5	1000
6.5-7.0	400

The stocking density depends on the species, culture period, desired individual size and intensity of management. In composite fish culture in stocking pond fish seed of 10- 15 cm length (fingerling) is stocked at the rate of 7000- 8000 nos. / ha.

1. Post stocking management.

i. Liming.

It is done based on the soil and water pH. Liming dose and schedule mentioned earlier.

ii. Feeding. & Fertilization.

No feed or fertilizer is applied in the pond, except aquatic vegetation for the grass carp.

iii. Water quality management.

Some of the water quality problems encountered in fish farms are-

a) Depth of water:

The depth of water in the fish cultured pond is important factor from the productivity point of view. The optimum depth of water in fish pond is 2- 2.5 m. If there is any change in the depth of water in the fish pond is seen then it should be corrected.

b) Turbidity of pond water:

This is occurring may be due to more clay content in the soil of fish pond or it may cause due to overgrowth of phytoplankton. To control this water quality problem apply aluminium (filter alum) sulphate i.e. $Al_2(SO_4)_3 \cdot 14 H_2O$ @ 10-40 mg/ lit of water. Actual quantity can be determined by putting alum in a glass of turbid water. After applying alum liming should be done as per the water pH as mentioned in the corrective measures of water pH.

c) Dissolved oxygen (DO):

Dissolved oxygen range in the stocking pond should be in between 5- 8 ppm. In low DO case feeding and fertilization in the pond should immediately be stopped. Turbulent the water with the help of a split bamboo. Harvest the table size fish and reduce the density of fish in the pond. Supply of water from a nearby source.

d) Ammonia:

Ammonia (NH_3) is lethal at a level above 0.02 ppm. If the unionized ammonia concentration is increased then the fish may die. Control the water temperature, pH and also the concentration of phytoplankton in the pond.

e) pH of water:

For fish culture soil and water pH should be in the range of 7.5- 8.5. Acidic pH is controlled through liming. Alkaline pH can be controlled by water replenishment and through the application of gypsum.

V. Fish health management:

Cultured fish should check regularly for their health.

Vi. Harvesting management:

After 7- 8 months of growing cultured fishes reaches marketable size. The grass carp and silver carp becomes 1 kg size in 7- 8 months cultured period. To reach 750 gm to 1 kg rohu, catla, mirika, etc needs about 1 year growing period. When the cultured fish reaches 750 gm to 1 kg. in weight then they are harvested from the pond. The harvesting may be done by removing the complete stocks of cultured fishes or by removing the only table size (750 gm to 1 kg) fishes partially based on market demand. In case of partial harvesting the numbers of fish harvested from a pond is replenished with equal numbers of small fishes from nursery ponds of the farm. This helps in getting more money.

Poultry farming practices.

In poultry farming along with fish the following management practices are followed:

1. **Construction of poultry house**
2. **Housing of birds**
3. **Selection of birds**
4. **Feeding**
5. **Egg laying**
6. **Health care**



Construction of poultry house: A low cost house can be constructed near the pond embankment using locally available materials like- bamboo, wood, etc.

Fig: Inside view of a poultry house constructed over the pond embankment.