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ORIGINAL PAPER



## Insights of Integrated Pig and Fish Farming

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### ABSTRACT

Pigs are the most prolific animals among all the livestock and have a feed conversion ratio of 3 to 3.5 kg per kg live weight gain. Fish are cultured for direct consumption of livestock manure in integrated farming system. Selected species of fish should be resistant to diseases who can tolerate low oxygen levels. Pig voids about 500-600 kg dung/year and has moisture percentage of about 69-71%, nitrogen percentage about 1.3-2% and phosphate about 0.36-0.39%. In pig cum fish integrated farming system the growth rate of catla, grass carp, common carp and mrigal higher compared to other fish farming. The economic return in integrated farming system with livestock like pig-fish farming system in first year in terms of input-output ratio is 1:1.95 and in second year ratio is 1: 2.23.

### FISH SUB-SYSTEM IN INTEGRATED FARMING

**Size of the pond:** Considering rural condition mainly smaller ponds can be used for integrated fish cultures. 0.3-0.5 ha size is manageable.

**Depth of pond:** Any pond that retain 2-3m water can be considered as suitable. Minimum of 1.5m of water depth is essential even during the summer season. In low water depth the danger of organic over-loading is high from the poultry sub-system.

**Fish pond management:** Fish species combination has to be adjusted according to the type of livestock sub-system to be integrated.

**Selection and stocking rate of fish species:** The selected species should be compatible with each other. The species should be fast growing. Selected species should be resistant to common diseases and parasite. It should be able to tolerate low oxygen levels and high organic content in water.

### SELECTION OF FISH FOR INTEGRATED FARMING

- The suitable fish species for integrated fish farming system is which are able to filter feed plankton and bacteria from water.
- The common filter feeders are carps and mixed feeders on algae detritus are species of tilapia.
- Indigenous species like catla, rohu, mrigal and kalbasu and the exotic varieties like grass carp, silver carp and common carp commonly used for composite culture.

### STOCKING OF FISH IN INTEGRATED LIVESTOCK FISH CULTURE

Depending on the availability of seed stocking can be done with 3, 4, or 6 species according to the feeding habit of fishes like surface, column or bottom feeder. Catla and silver carp are surface feeder and the stocking density should be 30 to 35%. Rohu is column feeder and the stocking density should be 15-20%. Bottom feeder like common carp and mrigal should be 40-45%. Herbivores fish like grass carp may be 5-10% in a pond and can be fed with aquatic weed, land grasses or with vegetable refuse.

### CONSTRUCTION OF PIG HOUSES

- The pigs are very sensitive to adverse climatic condition hence a well-protected house is needed. It should save from sunlight rain and wind. The walls and floor should be strong enough to withstand the rooting habits of swine. To provide thermal comfort in hot summer days a wallowing tank may be provided in pig houses. Pigs are kept under two housing system: indoor and open air system. A combination of these two systems is very advantageous and can be adopted in pig farming.
- **Space requirement:** For farrowing pen with to 16 sq ft sow having feed water trough including guard rails and creep area should be provided. A concrete yard with feed and water trough is sufficient for fatteners. A sow with her litter requires 80sq ft covered area 70 sqft open area. The height of the pig house should not exceed 1-1.5 m. The pig house can be constructed with locally available materials. It is advisable to provide 1-1.5 m<sup>2</sup> space for each pig.
- **Feeding management:** About 70% cost of pig farming is feed cost. An economical balanced ration is required for rapid growth of piglets. Swill feeding including leftover of human feed vegetables meat fish culling can be provided. A 30 kg pig can reach upto 70 kg body weight in 70 days with kitchen waste. Old and putrefied swill feed should be avoided. An adult boar should be fed 2kg concentrate mixture

daily. For a pregnant sow the ration is 2.5 kg and for lactating sow it is 3 kg. Piglets consume about 10kg creep feed upto 8 weeks of age.

- **Breeding management:** Pigs can be bred at the age of 8 to 9 months or 80 to 90 kg body weight and the boar- sow ratio should be 1:20. Generally, a sow can be bred 3 times in 2 years. Oestrous cycle in pig is 21 days. After 24 hours of onset of heat is right time for mating, followed by a second mating after 8 to 12 hours. Gestation period in pig is 114 days.
- **Care of newborns:** Sow give birth 8 to 12 piglets at a time per farrowing. The piglets are weaned at 6 to 8 weeks of age when they attain body weight 10 to 12kg. On second day of farrowing the piglets must be injected with 50mg iron injection. 1ml to prevent piglet anaemia. A second dose of injection may be given at 5 weeks of age. Creep feeding with 20% protein, vitamins and minerals should be ensured from one-week age for optimum growth of piglets.
- **Health management:** Pigs are susceptible to heat stroke. Provision of wallowing or water sprinkling is very important during summer months. Vaccinations for swine fever and foot and mouth disease must be done periodically. Regularly deworming is advised for a pig farm.

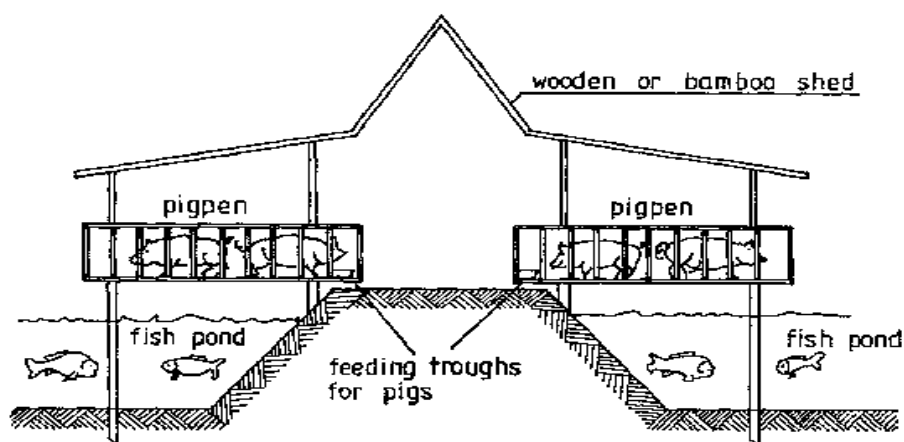


fig: integrated farming of pig and fish



fig: various type of pig houses for integrated farming system

#### **PIG WASTE AS MANURE**

- Sty washing including pig dung, urine is spilled into the pond. Each pig voids between 500-600 kg dung/year, which is equivalent to 250-300kg/pig/months. The excreta voided by 30-40 is adequate to fertilize one-hectare pond.
- When the first lot of pigs is disposed off after 6 months, the quantity of excreta going to the pond is decreases. This does not affect the fish growth as the organic load in the pond is sufficient to tide over for next two months when new piglets grow to give more excreta.
- Pig dung consist of 69-71% moisture, 1.3-2% nitrogen and 0.36-0.39% phosphate.
- The application of pig dung is deferred on the days when algal blooms appeared.

#### **LOCATION OF LIVESTOCK SHED AND WATER TANK MANAGEMENT**

- The livestock shed should be located at the higher side of pond nearer to bank. The feed and excreta may be rinsed to the pond easily, so that the fish can utilise easily.
- The animal house with cemented floor is preferred for better rinsing. Slatted floor design can also be followed by using bamboo sticks.

- The pond should not be in flood prone area. In integrated fish farming perennial water is important. The tank which retains water throughout the year is ideal for fish culture.
- The depth of the tank should be 2 to 3 meters. During peak summer at least 1.0m water for 8 to 9 months also can be utilize for integrated fish farming.
- A soil ph 6.5-7.5 is good for fish culture. To correct the soil ph lime may be used at the rate of 200kg/ha for 4.0 to 5.0 ph. The lime may be applied on 3 to 4 split doses.
- Care should be taken to prevent excessive growth of aquatic plants, which will restrict sunlight penetration and oxygen circulation besides sheltering of fish predators. The weeds can be controlled by manual, mechanical or biological means or by increasing the depth of water tank.
- Predatory fishes should be eradicated by frequent netting. Mahua cake *i.e.*, *Bassicalatifolia* can be used at the rate of 2500kg/ ha of water for killing unwanted fishes. It also acts as an organic fertilizer to the pond.
- Ammonia, bleaching powder and tea seed cake also can be used to eradicate undesired fishes.

#### PRODUCTION PERFORMANCE OF FISH IN PIG-FISH INTEGRATED FARMING SYSTEM

- It was observed that in pig fish integrated farming system the growth rate of catla, grass carp, common carp and mrigal is 1.29, 0.87, 0.50 and 0.80 respectively. The economic return in integrated farming system with livestock like pig-fish farming system in first year in terms of input-output ratio is 1:1.95. In second year ratio is 1: 2.23.

**Table1. Economics of pig-cum-fish farming in farm condition (0.5 ha pond)**

Items	Quantity	Rate (Rs.)	Expenditure (Rs.)
<b>A. Expenditure</b>			
1. Cost of fish seed (Fry)	9000	135/thousand	1215.00
2. Cost of piglets (20)	247.2 kg	50/kg	14832.00
3. Cost of pig feed	4985.14	8.45/kg	41381.80
4. Cost of medicine	-	-	100.00
5. Netting charges	-	-	300.00
Total Expenditure			57828.00
<b>B. Return</b>			
1. Sale of pigs	1371 kg	45/kg	61695.00
2. Sale of fish	114.3 kg	30/kg	3429.00
Total Return			65124.00

<b>C. Net Profit Rs.(B-A)</b>			7296.06
Return on investment			
Return per Rs. on pig (6 months)			1.10
Return per Rs. On pig-cum-fish (fish alone)			226
Return per Rs. on pig-cum-fish			1.13

**Table 2. Economics of pig-cum-fish farming in village condition (0.16 ha pond)**

Items	Quantity	Rate(Rs.)	Expenditure (Rs.)
<b>A. Expenditure</b>			
1. Cost of fish seed (Fingerlings)	2100	400/thousand	840.00
2. Cost of piglets (5)	55 kg	60/kg	3960.00
3. Cost of pig feed	-	-	-
4. Cost of medicine	-	-	50.00
5. Pond preparation with bleaching powder for pond treatment	40kg	12/kg	480.00
Total Expenditure			5330.00
<b>B. Return</b>			
1. Sale of pigs(5)	147 kg	45/kg	6615.00
2. Sale of fish	60 kg	40/kg	2400.00
Total Return			3685.00
<b>C.Net Profit Rs.(B-A)</b>			7296.06
Return on investment			
Return per Rs. on pig (6 months)			1.67
Return per Rs. on pig-cum-fish (fish alone)			1.82
Return per Rs. on pig-cum-fish farming with (0.16 ha)			1.70
<b>D. Net profit from pig-cum-fish farming with 0.5 ha pond</b>			11516.00

Note: It is assumed that there is no need of labour, the farmer and his family members will look after the pigs. The pigs can be kept in the same house where the farmer lives, so depreciation on the sites has not been taken into account

## CONSTRAINTS FOR INTEGRATED LIVESTOCK-FISH FARMING

- Non availability of good quality fish seed.
- Non availability of quality feeds with affordable market price.
- Scarcity of water during winter months.
- Non-availability of credit facility.
- Lack of extension facility or awareness among the farmers.
- Marketing problem arising from the reluctance of consumers to eat fish produced from manure laden ponds.

## THUMB RULES FOR OPTIMUM PRODUCTION

- Maintain optimum water level in pond 1-1.5 m.
- Lime application (1200kg/ha).
- Organic manure application (5000kg cow dung/ha)
- Eradication of predatory fishes.
- Composite fish culture with catla, silver carp, rohu, mrigal, common carp, and grass carp.
- Stocking density@ 7000 fingerling/ha and monitoring water quality periodically.

## CONCLUSION:

In integrated pig fish farming system no additional land is require for pig farming or operations. Pig dung can be used as a substitute for pond fertilizer and also can be used fish feed. Integrated pig fish farming system have a high production of animal protein and increase amount of profit through less investment. The pond muck that gets accumulated at the bottom of the pond due to constant application of pig dung can be used as fertilizer for growing vegetables and other crops. Thus for marginal farmers this can be beneficial in a huge amount.

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