

**Unit:4th (Animal
Husbandry &
Poultry)**

**Integrated
Animal Farming**

INTEGRATED ANIMAL FARMING

18.1. INTRODUCTION

Maximizing the animal protein production through optimum utilization of available resources has attracted great attention in the last 2 decades, particularly in Asia. The integration of livestock raising and fish culture has been found helpful to maximize production through recycling and reuse of wastes and optimum utilization of available resources. The approach is based on the principle of 'integrated resource management'. The benefits of integration of livestock production with fish culture are 'synergistic' rather than 'additive' and the 2 components benefit to varying degrees.

A. Definition : Integrated animal farming is commonly and narrowly equated with the direct use of fresh livestock manure in fish culture (Little and Edwards 1999). It is also defined as sequential linkage between 2 or more activities of which at least one is aquaculture. The integration process may occur **directly on-site** (housing of livestock over or adjacent to fish pond) or **indirectly through off-site** (livestock and fish are produced at separate locations) or both (Edwards 1997).

B. Potential linkages between livestock raising and fish culture : The main linkage between these 2 components of integrated animal farming revolves round the use of nutrients particularly reuse of livestock manures for fish production. These nutrients, particularly Nitrogen (N) and Phosphorous (P), help in fertilizing the pond to produce natural food web for fish culture. In return the livestock production is benefited from the fish culture.

The linkages, that benefit fish culture, operate through production and processing of

livestock, yielding by-products that are used in aquaculture.

The livestock production linkages are :

1. Direct use of livestock wastes which include manure, urine and spilled feed by adding these into the fish pond
2. Indirect use of wastes in which organisms like earthworms, insect larvae are produced from the wastes and used as feed for fish

Livestock processing provides a variety of wastes including high value meat and blood meal that can be directly used as fish meal to support the production of carnivorous fish.

Benefits of aquaculture to livestock include :

1. Production of aquatic plants like duckweeds and aquatic fern (*Azolla*) that are potential livestock feed
2. Use of invertebrates like snails and crustacean as poultry feed
3. Using pond water for drinking purposes and for bathing of livestock
4. Use of pond sediment for the production of arable crops for livestock

This **low cost farming** system is ideally suited for Indian conditions that need to be exploited for fuller utilization of available resources including the manpower to meet the increasing demand for animal protein of human population. The economic viability of such farming systems stands already verified and found feasible for farmers and in India such integrated farming systems include :

- ✓ Fish - cum - pig farming
- ✓ Fish - cum - duck farming
- ✓ Fish - cum - poultry farming

18.2. INTEGRATED FISH – CUM – PIG FARMING

Integrating pig husbandry with fish culture has proved economically the most viable system under Indian conditions. The **pigsties** are constructed either on the pond embankment for on-site farming or somewhere near the pond to facilitate off-site farming. The **pig wastes/manures** (faeces and urine) from these pigsties are either drained into the fish pond or manually removed from the off-site and then applied to pond water. The **manure acts as the best fertilizer for the pond water to generate phytoplankton which helps in the establishment of the natural food web for the fishes.** Besides, the fishes also feed directly on pig excreta as it contains more than **70 % of digestible matter.** Thus by directing the pig manure into fish pond, the application of **fertilizers and supplementary feeding for the production of fishes is not required.** This saves the expenditure on the fish culture by **60%, making the farming economical.**

18.2.1. Fish culture

The different steps involved in the procedure for fish culture, under integrated farming with pig husbandry, like selection of **pond**, clearance of aquatic weeds, removal of **unwanted fish species**, liming and stocking of the fish are followed in the same way as adopted for intensive composite culture of fishes. The **fertilizers however, are not added to pond as pig wastes are drained into the fish pond as manure to raise the biological productivity.**

The pig dung, urine and **spilled feed** are made to enter directly into the fish pond. In the event of production of algal blooms in the pond due to heavy organic load, the entry of the pig waste is stopped till the normal conditions of the water return after application of some **herbicides.** The waste of 30 – 40 pigs makes the right daily dose of fertilizer for fish pond of one hectare area

The **grass carp** is however provided aquatic weeds like *Hydrilla*, *Najas* etc and chopped green cattle fodder like **Berseem, Napier grass** etc from exogenous source. The cattle fodder is grown in the

vicinity of the fish pond and the area is occasionally irrigated with the pond water to promote the good growth of vegetation.

18.2.2. Pig husbandry

The raising of pigs on the pond embankment, to have their waste drained into the pond water, requires proper management which includes their **good housing** with adequate accommodation. A row of pig pens with **cemented floor and thatched roof** is constructed on the pond embankment. The drainage of pens is directed into the pond and these have the **built - in -shutter** to regulate the entry of waste into the pond.

Pig raising is **intensive** so that they attain maturity size in 6 months. They are fed mash @ 1.5 kg/pig/day in addition to grasses and green cattle fodder. Prolific breeders and good grower breeds of pigs like large **White Yorkshire, Middle white Yorkshire, and Berkshire Hampshire** are selected for the purpose of integrating pig farming with fish culture.

Fish are harvested after one year and the fish yield ranges from 6000 – 7000 kg/ha/year. During the same period under integrated farming **2 crops of pigs are raised each of 6 months duration.** The maturity size of pigs after 6 months is 60 – 70 kg.

18.3. INTEGRATED FISH – CUM – DUCK FARMING

Integrating duck raising with fish culture is economically viable, scientifically proven and ecologically safe and sustainable farming system. Under integrated farming, increased yield of ducks and fish results at a comparatively lesser input cost due to synergism between the 2 subjects.

18.3.1. Fish culture

The composite fish culture is adopted for integrating the farming with the duck raising. The different steps involved in the pond management, like selection of pond, control of aquatic weeds, removal of **undesirable fish**, liming, species mix and their ratio remain the same as described for composite fish culture. The fingerlings, measuring

over 10 cm to avoid the predation by the ducks, are stocked @ 6000 per hectare.

Pond manuring through duck droppings :

The ducks raised along with the fishes are given free range in the pond during the day. This brings about the direct distribution of their droppings into the pond water. The waste voided during night is collected from duck houses in the mornings and applied to the pond. The duck droppings fertilize the pond ; promote the generation of food web through the growth of primary productivity and save the cost input on the application of fertilizers or cow dung from exogenous source. About 250 – 300 ducks void nearly 10000 – 15000 kg of droppings in a year, sufficient enough to fertilize a fish pond of one hectare area. This directly benefits the fish farmer as he does not have to apply the fertilizers and manures from outside source.

18.3.2. Duck husbandry

Ducks are raised for getting eggs and meat. To optimize this yield, these birds also require proper management. Ducks require simple **thatched houses** made of split bamboo sticks as their night shelter. These houses, providing 0.3 – 0.6 m² of floor area per bird, are constructed on the embankment of the fish pond to make it an integrated farming.

The improved duck breed, **Indian runner**, is chosen for rearing along with the fish culture. Besides feeding on natural food available in pond, ducks are also fed supplementary feed which can be any poultry feed given along with rice bran in the ratio of 1 : 2 @ 100 grams/bird/day.

18.3.3. Harvesting

All the 6 species of fishes under polyculture are harvested after one year and the yield ranges from 3500 – 4500 kg/hac/year. Ducks are marketed after 2 years of rearing. During this period these birds continue to lay eggs which make this integrated farming all the more profit oriented.

18.4. INTEGRATED FISH - CUM - POULTRY REARING

Polyfish culture is integrated with poultry rearing for using the built up litter as manure for

fertilizing the culture pond. Under this type of farming the **cost input on the fish culture is comparatively reduced while the production of animal protein (fish, poultry meat and eggs) is maximized** from the available resources.

18.4.1. Fish culture

The pond management practices, like selection of pond, removal of aquatic weeds and unwanted fish, liming, stocking of fingerlings, remain the same as detailed out earlier in the chapter on composite fish culture.

The fish culture ponds are fertilized with fully built up poultry litter, collected from their pens. The poultry waste is applied @ 50 kg/hac/day in the morning. However in the event of the production of undesirable algal blooms in the pond, the application is deferred till the return of normal culture conditions.

18.4.2. Poultry rearing

Well managed poultry rearing is highly profitable. The production of meat and eggs is maximized through the selection of improved variety of breed, good housing for birds, feeding balanced diet and proper health care. **Deep litter housing** is preferred for poultry rearing under integrated farming with fish culture. This offers fully built up litter of high fertilizer value for the fish pond. **Rhode Island Red** and **Leghorn breeds** are chosen for rearing to have maximum eggs with fast growth and also the enough waste to fertilize the pond. About 600 layers produce litter sufficient to fertilize pond of one hectare area. The conventional but balanced feeds are generally given to poultry under this type of farming. The feeds are given either in pellet form or as dry mash and grain to minimize the wastage.

18.4.3. Harvesting

The fish are harvested after one year. The egg laying in poultry starts at 22 weeks of age and continues up to 18 months. Eggs are collected daily. The layers are marketed after 18 months when egg laying starts decreasing.

