34.0 Fish Farming

This is the rearing of fish in a controlled environment for food or for sale. Fish can be kept in a pond made by the farmer in areas where there is no lake or river.

Importance of fish farming

- It is a source of food rich in proteins and minerals.
- It is a source of employment.
- It is a source of foreign exchange after exporting the fish.
- Source of animal feeds e.g. the fish meal.
- Helps the farmer to diversify in his or her income.

Advantages of rearing fish

- It is cheap and a good source of proteins, vitamins and minerals.
- It makes proper use of land which is not suitable for crop or livestock production.
- It reduces dangers associated with fishing in rivers, lakes etc.
- It provides an easy and cheap source of fish instead of going to rivers or lakes.
- Farmers can economically control the type and number of fish in a pond.
- The market for fish and fish products is widely available.
- The fish fetch high incomes for the farmers.

Types of fish reared in Uganda

- **Tilapia**: it belongs to the family *Cichlidae*. It grows quickly in the pond, it is resistant to many diseases, it breeds well and can adapt easily to temperature changes in the pond, it has a better taste compared to other fish, and it has the highest demand on the market.
- **Cat fish**: it has the ability to breath and remain alive even after the pond has dried, it can with stand high temperatures in the water, it can feed on a variety of foods in the pond e.g. snails, worms and small fish, it can be kept in very shallow waters, can be kept together with tilapia in the same pond.
- **The carp**: it breeds well, grows faster and resistant to many diseases. It can be kept in cold waters or where temperatures fluctuate frequently.
- **Nile perch**; It attains a maximum weight of 200 kg. It is a fresh water fish, has distinctive dark black eyes with a bright yellow outer ring. Reaches maximum length of nearly 2 meters. It is a predatory fish.

Challenges facing fish farming in Uganda

- Shortage of inputs like feeds.
- Inadequate hatcheries for fingerlings used for restocking.
- Limited knowledge due to inadequate field extension officers.
- Lack of fish farming tradition in the country.
- Inadequate funding for constructing fish ponds that are expensive.
- Lack of aquaculture production parameters.
- Diseases and predators that attack fish.

Fish pond

This is an area which is dug and prepared so that the fish can be introduced into it.

Features of a good site for fish ponds

- Permanent/reliable water source throughout the year.
- The site should be free of gravel or stones and sand to prevent drainage of pond water.
- Should have a clay basement and walls to hold water.
- Gently sloping that allows free water flow in and out of the pond.
- Close to the homestead for security and supervision.
- Close to the market center since fish is perishable.

Procedure of constructing a fish pond

- Clear the site of vegetation, tree stumps and stones.
- Mark out the area of the pond with pegs before digging out the top and sub soils.
- Build the walls firmly using soil mixed with sand to prevent leaking of water through cracked walls.
- Fix inlet and outlet pipes in the walls which may be made of bamboo or metallic to improve pond drainage.
- Allow the floor/base of the pond to slope evenly and gently towards the lower end, put lime on the floor to maintain pH in pond water.
- Walls of pond should be planted with grass to control soil erosion.

Features of a good fish pond

- Should permit free flow of clean fresh water in and out of the pond.
- Mud should not stir up from the floor or the walls.
- Should provide good conditions for:
  - Efficient food utilization by the fish.
  - Health of the fish.
  - Rapid breeding of the fish.
  - Should be easy to drain.
  - Should be easy to fertilize to stimulate algae growth.
  - Should be well protected from wild animals and predators.

Care and maintenance of the fish pond

- Plant vegetation on the wall tops to control soil erosion.
- Cement the walls to avoid leakage.
- Slash or mow the vegetation that is over grown around the ponds to control predators.
- Maintain a good level of water in the pond and if the level is low, top it up.
- De-silt or drain the entire pond of foreign matter if needed.
- Maintain a proper fence around the pond to avoid predators.
- Remove weeds that grow from the pond.
- Fertilise the fish pond to stimulate algae growth.
- Dig out the pond floor, flatten and add lime from time to time.
- Add dewormers into the pond water to control worms in the fish.

Fertilizing pond water

The application of organic or inorganic fertilisers at least once every two weeks in pond water. Organic fertilisers recommended for new ponds are;

- Compost heap, Chopped vegetation and leaves, Animal manure and Urine. For old ponds, use Phosphatic fertilizer. Application of fertilisers

encourages the development of natural feeds (algae).

Introduction of fish in the pond

- Obtain fry (small recently hatched fish) or fingerlings (young fish about 10 cm long) from a fish breeding station for the new pond.
- Transport them in water contained in plastic bags or oil drums.
- Before putting the fish in the pond, make sure that the pond water has the same temperature as the container water.
- Young fish often die due to shock, especially if they are introduced into hotter or colder ponds.
- Gently lower the bag or container into the pond and allow the young fish to voluntarily swim out.
- Do not force them out or pour them into the ponds to avoid death through shock.
- Introduce the right number of young fish into the pond.

Factors that determine stocking rates of fish ponds

- The fish species.
- Fertility of the pond water.
- Availability of food at the time of introduction.
- Size of the pond.

Fish foods include; kitchen wastes, fish meal, chicken and pig dung, bread crumb, chopped grass/cassava/sweet potatoes.

Oxygen in the pond

Fish use the gills to take oxygen from the water during respiration.

The amount of oxygen in ponds may depend on;

- Water temperatures.
- Wind.
- Salinity of the water.
- Plant photosynthesis.

The amount of oxygen in ponds may be reduced by;

- Muddy pond water which reduces the amount of sunlight reaching the plants under water.
- Low rate of photosynthesis on cloudy days when the sunlight supply is low.
- High pond temperatures which reduces the water holding capacity for oxygen.
- Oil covering the pond water which prevents the sunlight rays from reaching the planktons located under the water.

Ways of increasing oxygen in ponds

- Use inorganic instead of organic fertilisers.
- Drain old water and replace it with fresh clean water.
- Introduce more plants into the pond.

Predators of fish and their control

- Predatory birds, snakes, rats, frogs other carnivorous fish.

Ways of controlling predators of fish

- Drain the pond to kill unwanted creatures left on the floor.
- Apply poisonous chemicals that kill predators e.g. ratenone.
- Use a net to catch some of the predators.
- Scare out predators like heron/eagles.

- Use the animals that eat the predators without catching the fish.
- Slashing vegetation around the pond.
- Constructing a wire mesh around the fish pond to obstruct predators.

Feeding fish

- Provide a complete diet.
- Feeds must be floating since sinking feeds fall at the bottom where fish cannot reach.
- Feed fish daily at least 6 days a week while observing them eat.
- Feed between mid-morning and late afternoon when temperatures are optimum.
- Over feeding fish lowers water quality and increases costs of fish feeding.
- Underfeeding fish lowers the growth rates of fish.

Fish health

The following should be done in order to maintain fish health;

- Keep the system clean from falling objects.
- Constantly remove algae from the bottom and from the sides of the pond/cage to improve water quality.
- Minimize bacterial infections in your fish farming operations by dis infecting tools such as nets.
- Keep pond water clean and of good quality.

Signs of disease in fish

- Skin discolouration.
- Open wounds and lesions.
- Fin erosion.
- Spots on the skin.
- General erratic behavior.

Considerations when conducting fish farming

- Depth and overall size of the pond.
- Source of the water.
- Soil types.
- Drainage system of the area.
- Power supply for aeration of the water.
- Feeding rates.
- Fish harvesting.

Systems of fish cultures

- **Pond system**
- **Cage system**: raising fish in large, submerged cages that can be used in ponds that otherwise would not be ideal for fish farming. The cage size determines the number of fingerlings to be purchased or stocked.

  Stocking rate = 7 or 5 fingerlings per cubic foot.

  Example; if a cage is 4 ft wide, 4 ft long and 4 ft deep, the stocking rate is:

  $$4 \times 4 \times 4 = 64\ cubic\ feet$$
  $$Stocking\ rate = 64 \times 7$$
  $$= 488\ fingerlings$$

- **Recirculating aquaculture systems:** An indoor system that allows farmers to control environmental conditions. It has a high maintenance cost.

Causes of fish mortality in ponds

- Wounds from territorial fighting or accidents.
- Oxygen depletion, low levels of dissolved oxygen in the water.
- Toxic algae blooms;
- Hydrogen sulfide; is a toxic gas created under cinotoxic conditions often found on pond bottoms covered with large amounts of organic matter.

- Bacterial or parasite infections.
- Sewage.

Fish harvesting;

This is the removal of fish from the pond ready for marketing. Tilapia reach maturity at 12 months, carp at 18 months.

Methods of harvesting fish

- **Drainage of pond water:** open the outlet pipe to drain the pond completely. Provide screens on the outlet pipe to prevent small fish from escaping.
- **Use of nets:** large fish is caught with a gill net having a mesh size of about 3cm. The net is reached at both ends of the pond with stones tied at the bottom. The nets are then dragged along the pond three or four times to catch the fish.

Fish processing and preservation

- **Drying:** the fish is dried under the sun to reduce the moisture content of the fish thus reducing bacteria growth rates.
- **Salting:** the fish is cut open along the backbone i.e. dorsally and the internal organs removed. It is then covered in a layer of salt.
- **Smoking:** fish is cut open and soaked in brine and placed in a large oven where smoke and heat from wood dries the fish.
- **Canning:** it involves sealing cut pieces of fish in metal or glass containers and cooking under pressure. The high pressure and temperatures kill any bacteria present.
- **Freezing:** fish is placed in very cool temperatures of about 10^0C to kill any bacteria and prevent decaying.
- **Dehydration:** involves removal of water from the body of fish under controlled conditions under mechanical means while maintaining the nutritional value of the fish.