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FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

AQUACULTURE Value Chain

By

Presenter's Name

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Presentation Outline

- Aquaculture (Fish Farming)
- Obstacles to Fish Farming
- Production Methods
- Fish Pond Liming
- Pond Fertilization (Manuring)
- Pond Stocking and Management
- Culturable Fishes
- Fish Nutrition
- Fish Farm Management
- Characteristics of Good Water for Aquaculture
- Fish Tank Management
- Fish Health Management Control of Diseases And Predators
- Marketing Information

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Introduction

- Aquaculture is the rearing of aquatic organisms (fish, molluscs, crustaceans and aquatic plants) in enclosed water bodies such as ponds, dams, cages, raceways, tanks, reservoirs.
- Fish farming is a part of aquaculture but sometimes the two are used interchangeably because majority of output from aqua cultural production comes from fish farming. Fish farming/culture is the growing of fish in a controlled environment (concrete or earthen ponds), vats (wooden or fibre-glass) and plastics.
- Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated.

- Aquaculture has the potential to become a sustainable practice that can supplement capture fisheries, eliminate fish importation and significantly contribute to feeding the world's growing population.

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Obstacles to Fish Farming

Lack of experts mostly needed in areas of pond design and construction, fish genetics and

- Breeding, fish feed and nutrition, fingerling transportation management, fish pathology etc.
- Shortage of trained professionals and technicians to carry out advisory extension and training services;
- High capital cost in pond construction;
- Supply of poor genetic fingerlings which leads to reliance on fingerlings from the wild;
- Inadequate supply of inputs;
- Poor communication network in the producing area affecting fish distribution, marketing and extension work;
- Dishonesty of some farm labours;
- Management problems;
- Lack of efficient fish farmers' cooperatives societies to benefit from government financial assistance schemes;
- Poor maintenance facilities and spare part

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Production Methods

- Ponds and Tanks
- Cages and Pens
- Raceways
- Closed re-use systems
- Raft culture
- Close high-density culture

Note: Engage experts in the construction of Ponds or selection of Production Methods

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Fish Pond Liming

- Liming is the process of application of agricultural/industrial limes to fish ponds e.g. CaO, Ca(OH)2, CaCO3.
- Agricultural lime is the best liming material for fish pond.
- Lime corrects the acidity of pond water to the suitable PH range (Hydrogen Ion Concentration).

- Lime makes available phosphorus added in fertilizer for plant use.
- Lime acts as disinfectants of pond bottom, especially in newly constructed ponds or ponds in fallow.
- Lime helps in reducing water turbidity i.e. in settling soil particles in muddy ponds.
- It is applied by broadcasting or sacking.

Application of Lime (kg/ha)

S/N	Name of Neutralizers	New Pond (kg/ ha	Old pond (kg/ha
1.	Agricultural Lime	250- 500	200-300
2.	Slaked Lime	750-1,500	600-1,000
3.	Quick Lime	750-900	500-800
4.	Carbide Waste	250-500	100-250
5.	Wood Ash	2,500- 5,000	1,000 -1,500

Pond Fertilization (Manuring)

- Two types of fertilizers can be used for pond fish culture (organic manures and inorganic or agricultural fertilizers).
- Application could be done before or after impoundment;
- It could be done through broadcasting or sack method (Fig);

The following is the recommended fertilizer application rate:

- **Organic:** Cow dung – 500kg/Ha

  Poultry dropping (Guano dropping) 112-224kg/Ha

  Pig manure 560 kg/Ha
- **Inorganic:** NPK - 224 KG/Ha

  Triple Super Phosphate - 57kg/Ha
- Fertilizer helps in enriching water nutrients for plankton production on which fish feed

Mode of application

- Broadcasting
- Spot placement

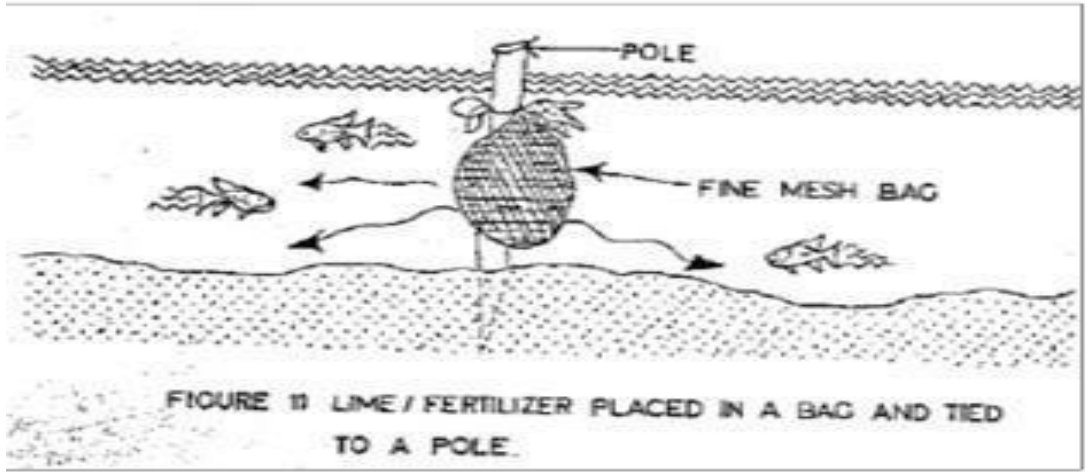

FIGURE 11 LIME / FERTILIZER PLACED IN A BAG AND TIED TO A POLE.

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Pond Stocking and Management

- Stocking is the introduction of fish (fingerlings or juveniles) into the new pond environment
- Fish seed can be collected from the wild (rivers, streams, lakes, etc.) or from hatcheries/existing fish ponds where fish are already adapted to culture condition;
- The right type and the right number of fish should be placed in pond at the cool hours of the day;
- Test stocking (pre-stocking) should be practiced by introducing few fish into the new environment.
- Test stocking period range from two days to one week. If fish survive, then the pond can be fully stocked;
- The type of aquaculture influences the type of fish stocked;
- Fish seeds should be transported and packed in water-filled oxygenated polythene bags or various containers used;
- Release fish fingerlings to their new home surroundings slowly to avoid shock due to temperature changes;
- Acclimatize/allow fish to swim out into pond;
- Recommended stocking rate of fish (ratio of one species to another or male to female) and stocking density
- (number of fish per cubic metre of pond water) to avoid overcrowding, should be practiced;
- This will ease management problems and enhance the success of the fish culture.
- Healthy fingerlings of 5-7cm should be stocked. Juveniles of 7-10cm (3”-4”) are most advisable;

Pond Stocking and Management cont.

- Stocking densities should range between 60 - 100 fish/m^3 depending on water conditions, size of fish seed, culture system and management, and specific specialist research-extensionist's advice;
- Procure your fish seeds from reputable sources and make allowance for mortalities (at least 10%);
- Fish seeds should not be fed for 24 hours before transportation as they survive better on empty stomach when in transit;
- Stocking of fish should be done early morning or late evenings in moderately cool weather &when fish are less active;
- Introduce feed into the fish tank/pond 6-12 hours after stocking;
- Stocked fingerlings should be sorted after 15 days (2 weeks) of initial stocking to remove shooters (jumpers)
- in order to reduce cannibalism and ensure even growth of fish;
- Sorted fish should not be fed for 2 hours minimum or 3 hours maximum. This will help to relieve the fish of handling stress and regain lost energy.

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Culturable Fishes

Fishes that can be raised in tanks or dugout ponds.

- Examples of culturable fish in freshwater aquaculture in Nigeria include:
- *Clarias gariepinus* (African mudfish catfish) - Aro
- *Heterobranchus sp* (African red mud catfish, sharp tooth)
- *Oreochromis niloticus* (Mango fish/NileTilapia - Epiya
- *Heterotis niloticus* (Boney Tongue) Aikaodo
- *Gymnarchus niloticus* (Trunk fish) – Osan
- *Cyprinus carpio* (Common carp)

Fish Nutrition

Feeding of Pond Fish

- Fish feed on a variety of foods. These include food produced from the natural pond environment and feeds given as supplement to the pond;
- Feed is placed in pond water by broadcasting, point placement or automation (Fig);
- Fish could be fed two or three times a day, at specific times;
- Quantity of feed depends on the size and age of fish;
- Pellet size of feed depends on the size of fish;
- Feed fish with high quality feed/diet.

Fish Farm Management

Water Quality Management

- This is the degree of excellence that given water possesses for the propagation of desirable aquatic
- organisms. The growth of the fish is dependent on the alter quality.
- The most important water quality to be monitored and controlled can be divided into physical, chemical and biological parameters of water.
- Allow fresh water into fish tank daily.
- Create water outlet to empty dirty water and tank bottom debris. Aerate concrete tanks by allowing a flow through system if possible or stirring the water
- Change water when you observe foaming or frothing, deep green or gray/black coloration, accompanied by foul odour/rotten eggs smell (Hydrogen sulphide).
- When fishes are swimming sluggishly, they are stressed, stop feeding and change water.
- Boil animal products before introduction into tanks
- It must not be too acidic or too alkaline (pH 6.5-9.0)

Fish Farm Management cont.

- It must have an offensive odour
- It must be free of pollutants such as industrial waste (effluent, detergents and herbicides)
- Poor water quality can be improved through liming and fertilization
- Know hydrology of the water and ensure that all water parameters are in the right conditions for the fish production
- The desirable water temperature level varies between 21oc – 32oc.
- It must contain enough dissolved oxygen. The dissolved oxygen level should be between 4-8 mg/litre and measures through use of Secchi disc/hand.

Characteristics of Good Water for Aquaculture

- It should be bottle-green in colour reflecting the presence of plankton
- It must neither be too acidic nor alkaline; best pH range for fish production is between 6.5 – 9.0.
- It must contain enough dissolved oxygen of at least 4mg/litre
- It must not have offensive odour, colour, surface foaming, or scrumming
- Water temperature range should be between

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Fish Tank Management

- Proper tank management after construction ensures the durability of the tank. It involves the maintenance of
- tank environment and tank itself. That is meal control, pond bottom restoration, predations and competitors' eradication, liming and fertilization.
- Avoid cement toxicity in concrete tanks
- Allowed the tanks to stand for four weeks
- Wash concrete tanks thoroughly with hard brush or broom and allowed to dry for minimum of 24-48 hours before being impounded with water.
- Fill tank with water up to 50% volume wash again and discharge water.
- Fill tank with water up to 90% volume allow to stand for 7-10 days and discharge.
- Add dry poultry manure or inorganic fertilizer tied in a jute bag suspended in the water
- That tank is ready when the pond water turns "leaf green"
- Avoid over fertilization (deep green colouration and foul, odour and rotten egg smell).

Fish Health Management Control of Diseases And Predators

Common Fish Diseases

- Fish diseases are caused mostly by fish parasites.
- Maintaining a hygienic pond environment is the best preventive method of checking diseases outbreak.

Diseases can occur in fish pond due to:-

- Overcrowding, i.e. high density stocking.
- Poor water quality resulting in fish kill
- Erratic feeding practices. Starved fish are highly susceptible to diseases attack.
- Intrusion of predators into the pond. Most predators act as intermediate host to fish parasites.
- Over fertilization of pond water leading to high density algal bloom can reduce the amount of dissolved oxygen (DO), affecting fish health
- **Fish Predators**
- Predators are natural enemies of fish. Common fish predators that should be prevented from causing fish losses in ponds include water snakes, turtles, frogs, water birds, crocodiles, crabs, etc
- Wild carnivorous fish intruding into ponds are also predators and as such should be prevented.

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Fish Predators cont.

- Ensure regular clearing of pond site. Predators hide in bushes.
- As much as possible, the farmer should fence the pond site.
- Most aquatic predators get into the pond through flood water.
- Measures should be taken to protect the pond from flood water.
- Hunt the predators, using traps or point-blank killing.
- Keep pond well aerated to prevent disease outbreak.
- Foot baths are provided for visitors at the entrance of the farm.
- Farm appliance/tools/equipment are kept clean and disinfected;
- Minimize stress/handing fish;
- Fresh fish stocks are quarantined;
- In case of disease outbreak consult experts;
- Keep your surrounding clean;
- Maintain good water quality.

Marketing Information

Marketing Information is a broad concept that comprises information about the supply of, and demand for; commodities. It includes information about the availability and costs of farm inputs such as seeds, fertilizers, breeding stock, and value-adding. It is also data on prices and quantities exchanged, duly processed and available to market actors (e.g. agents, traders).

A Marketing Information system is a system that collects, processes, manages and disseminates marketing information using a variety of channels, which may include:

- An extension services, which may consist of public (government) and private-sector service providers.
- Institutions such as rural resource centers or commodity exchanges.
- The use of ICT such as mobile phones, internet and radio.

Market Information cont.

Merits of Marketing Information

- Know what products the market wants so that you can plan well to meet the market requirements
- By pass middlemen and reach the market directly
- Improve your bargaining power with buyers in the marketing place
- Obtain better input and product prices
- Be efficient in your production and competitive in your marketing activities
- Reduce costs and improve revenue and profit.

Thank you for Listening.

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