

08/06/2018

(1)

## Introduction to fisheries

Fisheries is divided into two groups;

- Capture fisheries
- Aquaculture fisheries
  - \* **Capture fisheries**: This is the first fish that has to do with the natural environment.
  - \* **Aquaculture fisheries**: This is the cultivation of aquatic organisms (plants & animals). The word "Aquaculture" is water cultivation while fish farming is an aspect of aquaculture.

Reasons why we should study fishes

- It is a major and best source of animal protein
- To provide its availability and demand for fish
- They are medicine to humans
- It increases foreign reserve for exchange
- It can be used for game, aesthetic value

## Fishing gear and methods

Fishing gear are instruments used for the harvesting of fish or fisheries product. Fish Cropping means the harvesting of fish.

Examples of fishing gear;

- Net
- Hook and line
- Traps
- \* **Non-living gears are**
  - Cutlass
  - Bow & Arrow
  - Caterapult
  - Spear

\* **Craft**; These are the instruments used to convert fish gear for fishing activities

Examples of craft;

- boat
- canoe
- Trowel / Trawler

\* **Fishing techniques**; These are the different methods used in harvesting fish by the different gears.

2 Methods of fishing techniques are;

- Passive method
- Active method

- **Passive gear**; These are gears designed to be stationary while the fish walk or swim into the gear i.e. the fish goes after the gear e.g. trap, gillnet

Active gear; These are gears designed to be mobile i.e. the gear goes after the fish e.g. Cast net, drift net.

There are various advantages & disadvantages of the active & passive gears.

## Advantages of passive gear

- It is not time consuming
- Most of them require just an individual to operate.
- Little money/capital is required; it is not expensive to operate.

## Disadvantages of passive gear

- Low productivity
- It is more effective during dry season.
- They are not commercialized.

## Advantages of active gear

- It is not seasonal.
- High Productivity
- It can be commercialized.

## Disadvantages of active gear

- High skill is needed
- It is time consuming
- It is labour intensive.

## Maintenance practices in fisheries

- By washing the net.
- Remove debris.
- Sun-dry them.
- Avoid using your net where there are rock grounds that will tear them.

## Illegal methods of harvesting

- Fish bomb
- Eco bombs
- Chemical
- Use of electrode
- Fish Harvester

Assignment, write out 20 fresh water fish species, their common & scientific names

HF

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11/06/2018

Adequate reference:

This is the role of fish and fish production through the relationship of food security and poverty alleviation in contribution to food, rural development and natural attributes.

Significance of fisheries:

Source of protein; fish protein is the cheapest when compared to the other source of protein such as beef, poultry etc.

- 2) Employment: It is recorded that fisheries sub-sector creates employment in the various sectors of the economy e.g. providing job for over 500,000 people in Nigeria. Fishermen in the coastal and riverine area are gainfully employed by the fisheries sub-sectors. Those that engage in processing and sale of fisheries products are also gainfully employed by fisheries sub-sectors.
- 3) Income generation: Fisheries sub-sector generates income for individuals who are involved in fisheries activities and the state and federal government at large.

4) Source of foreign exchange: The federal government earns foreign exchange for the exportation of fisheries products.

- 5) International co-operation: Fisheries gives opportunities for international co-operation

such as membership of international organization such as FAO (Food and Agricultural Organization), UNDP, IFAD etc. These organizations are channels for the provision of developmental funds for rural development within coastal areas & fisheries sector.

6) Rural development: Fisheries sub-sector assist in rural development through direct government intervention to improve the livelihood of the fishermen and other related stakeholders. For example in the 80's, the Government through DIFPERI brought rural intervention to develop the rural areas e.g. FADAMA 2 & 3

Objectives of fisheries

- 1) To increase fish production in the country by employing modern methods and gears.
- 2) To exploit as profitable as possible the fisheries resources of the country.
- 3) To improve the utilization of the resources by the introduction of the modern methods of processing and marketing facilities.
- 4) To raise standards of living and the socio-economic status of the fishermen through the provision of fisheries input.

(5) To train local fishermen and fisheries personnel in modern fishery management & operation to practice the implementation of fish to the benefit minimum in order to conserve the much needed foreign exchange.

(6) To produce employment for fresh school leavers and qualified graduates.

The fish Industry(ies) of Nigeria:

Like most industries in the world, the fishery industry can be divided into three major sectors based on operation.

- Artisanal fisheries: This is the small scale usually organized by family unit. It is labour intensive and it is made up of four sub-sectors which includes;
  - Riverine and lake canoe fisheries
  - Flood plain fisheries based on the exploitation of flood plains. This sub-sector is seasonal.
  - Coastal Canoe fisheries; This is carried out along the coast and it is made up of fishermen scattered along the coast line.
  - Brackish water canoe fisheries. This is done along the creeks, lagoons and estuaries. It takes advantage of fresh & salt waters.

(2) Aquaculture: This is the cultivation of aquatic organisms in controlled environment for the purpose of food supply and income generation. It involves selection of sites for fish pond construction, dredging construction of check dams, feeding of culture species, treatment of ponds waters and harvesting of the culture after the culture period.

These sectors of industry is very versatile and active involving many stakeholders and professionals such as dome engineers, fish experts nutritionist & geneticist.

- (3) Industrial fisheries: This is the use of technology in form of equipments in the handling, distribution of fish and fisheries products. It is capital intensive and requires sophisticated technology. It involves highly technical processing and marketing facilities.
- Small fisheries has been divided into three groups. They are;
- a) Inshore fishing
  - b) Offshore fishing

\* Inshore fishing is within the territorial shore of the country

\* Offshore fishing is the distant water fishing outside the territorial zone of the country

The fishery industry will also be divided into different activities which includes production and utilization option based on production option

Production option

A) Aquaculture Industry - This is fish production in both fresh water, brackish and marine water ventures. These could be small or large scale production.

B) Harvesting Industry - This has to do with both trawler sub sector and artisanal fishery

Topography - This deals with the stability or the slope of the land or how slopy the land is. In fish farming, you locate your ponds where you have slopy land and not upper land.

Type of soil - In fish farming, we talk about the porosity, impermeable or milky. But, the impervious soil is the required one (clay soil). The clay soil has the ability to retain water.

- The nature of water
- The source of water itself
- The quality of water

\* Nature of water - It is regular or seasonal. In fish farming, we don't encourage seasonal water. We use perennial source of water ie the regular water source.

\* The quality of water - The transparency, the ammonia content etc. We can test them in the lab to determine their quality. 22°C + 30°C is the normal temperature we use for fish farming.

\* Biological aspect of quality water - Aquatic plants in water ie the algae which some of the fish can feed on. They are known as microscopic plants which are greenish in nature.

Security - Make sure it is secured from poaching activities so that people will not get access to, but it must be fenced. It should be accessible to the market and the roads must be accessible.

\* Weather condition

Criteria for the selection of fish species

\* Fast growth rate

\* Disease resistance ie the species should be hardy, ie not to the fact

- Ability to convert local fish source to flesh (local fish source, say a bean milk, groundnut milk, wheat grains etc.)

\* They should be able to withstand stress

\* Ability to withstand over crowding

\* They must have good flavor & taste in order to attract customers

\* Be conscious of the well-being of the fish in water

## AQUACULTURE

12/07/2018

### Concept of aquaculture

This is basically the cultivation of freshwater organisms in a controlled environment e.g. Carp (Cyprinus Carpio). Other organisms in water includes; Crustaceans, aquatic plants, Algae, phytoplankton, zooplankton

Fin fish = Catfish, tilapia, carp

Shell fish = Oysters, shrimps, periwinkles

### Objectives of Aquaculture

- 1) To supplement the protein from livestock. Fish has essential amino acids, minerals, Fesine, Lysine, methionine
- 2) Job opportunity (Aquaculture)
- 3) Self-income generation
- 4) Foreign exchange earning

### Areas of Aquaculture

Fish breeding

Fish Nutrition

Water quality

Fish Processing

Preservation (value chain)

Fish Conservation & management

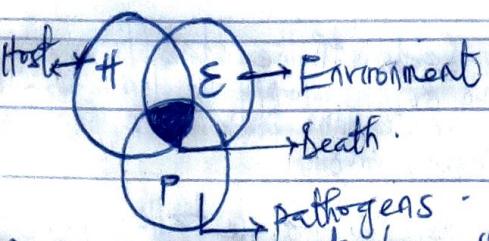
How to go into fish farming (things to consider)

Survey your kind

Determine the topography of the land

Type of soil

Source of water



\* E - The environment where the fish is kept, the environment needs to be conducive for the fish & N.B: You will notice that the fish will attempt jumping out of the water when the environment is clean.

The diseases you can find in the water Bacteria, fungi, parasite etc.

\* At the visible aspect, if the water is not taken care of, all the fishes will die.

\* Water quality is the function of the physical chemicals & biological characteristics of the water that enhances the well-being of the fish

\* Physical properties: - Temperature

- Transparency
- Colour

- Turbidity etc

& chemical properties: - Dissolved oxygen

- pH

- Total Ammonia Nitrogen (TAN)

- Total hardness

- Total alkalinity etc

\* Biological properties - plankton

Besides this level, (lower or higher) will affect the fish. Each of these parameters have their level of operation.

\* Transparency: This is the ability of sunlight to pass through the water from 30cm - 50cm to use the Sacchi dish.

\* Plankton net / Microscope - plankton

\* Sacchi dish - transparency

\* Vision - colour

\* pH meter - Water pH.

\* Oxygen Meter - DO

\* Thermometer - Temperature

\* Test kit - TAN, TH, TA etc.

At range = 6.5 - 8.5 is acceptable, they dissolve oxygen not less than 5mg/l. The total ammonia nitrogen should not be higher than 1-1 depending on some other conditions you can have up to 2.0.

The total alkalinity hardness is within 600-200 mg/l. Blankson net is used to sieve out the silt and the microscope is used to know their morphology.

## Feed & Diet

Feed are the different ingredients of feeds that comprises of carbohydrate, protein and major minerals and vitamins including additives that are mixed and pelleted into appropriate press in order to provide the needed and properly balanced diet.

Diet is the quantity of nutrients in the feed are related to body needs. Nutritional balance fish feeds consists of different ingredients that combined in certain proportion, to maximize state of growth and reproduction with maximum efficiency of fish utilization.

## Fish Constitution (principles)

Has the knowledge of the nutritional requirement of the fish in terms of the age, size, species & the physiological stage of the fish.

Physiology → The state of body functioning of the nutrients composition of the ingredient in question thus has been protein sources, energy sources etc.

## Types of feed

Natural

Artificial/commercial (Imported or produced locally)

Supplementary

\* Natural feed - It's are feed gotten from water e.g. protists, blood meal & fishes egg. Feed can be classified into plant & animal sources. (It is advised to use plant sources, not animal source in fish farming).

\* Plant Sources: Feed obtained from the primary products of plants such as the bio-products of micro-industrial waste.

Cassava products are also plant sources.

\* Animal feed: It is the feed of many animal sources, fish scraps & trashes, poultry compost, pass.

\* Combined feeds: These are feeds that are made of both plants & animals, they are always in balanced and balanced diet.

Types of feed according to processing method

\* Pelleted feeds: These are feeds that are manufactured from毛主席便便 & pressuring that minimize the ingredients into greater larger

homogeneous particles, this is done to allow the feed to sink down the deeper water from the bottom killers.

- **Extruded or floating feeds**: These are extruded feeds that are made from a machine that turns the feed into lighter or flake form. It lasts longer in water especially at their surface. This is done to reduce feed for the surface feeders & equally to determine the state of health of the fishes at any point in time.

- **Purified feeds**: These are feeds that are formulated from purified diet. They are usually in powdered form and one of them is an acid.

- **Practical feeds**: These are feeds made on local materials which are processed but are not purified. They are always in form of balance forms.

### FEED FORMULATION METHODS

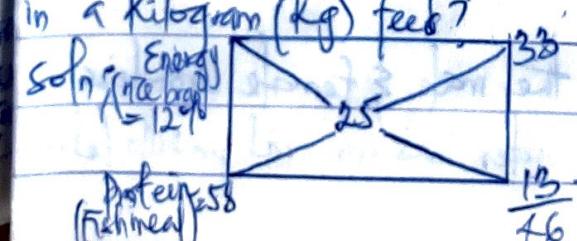
\* Pearson Square Method; A method of using a square to calculate the amount of ingredients needed to formulate a feed.

\* Substitution / Simultaneous Method

\* Linear Programming Method

\* Modified Pearson Square Method

① Example: Assume you are to formulate a crude protein diet of 25% using fish meal and rice bran. How much of each is required in a kilogram (kg) feed?



$$\text{Energy} = 33$$

$$\text{Rice bran} = 12\%$$

$$\text{Crude protein of fish meal} = 58\% \text{ vol.}$$

$$\text{Protein} = \frac{13}{46} \times 100$$

$$= 28.3$$

$$\text{Energy} = \frac{33}{46} \times 100$$

$$= 71.7$$

To make 1kg feed;

$$= \text{Fish Meal (Fm)} = 28.3 \text{ g}$$

$$\text{Rice bran (RB)} = 71.7 \text{ g}$$

$$\frac{150}{150} \text{ g} = 1 \text{ kg}$$

$$\text{Check; } \frac{58}{100} \times 28.3$$

$$= 0.58 \times 28.3 = 16.4$$

$$\frac{12}{100} \times 71.7$$

$$= 0.12 \times 71.7 = 8.6$$

$$25.0$$

Using the simultaneous equation to solve the same

Let  $x$  = amount of fish meal in 100g feed.

$y$  = amount of rice bran in 100g feed.

$$\text{equation (a)} = \frac{58x + 12}{100} y = 25$$

$$(b) = 0.58x + 0.12y = 25$$

$$x + y = 100$$

Multiply the 2 eqns by -0.58.

$$= 0.58x + 0.12y = 25$$

$$0.58x + 0.35y = 58$$

$$-0.46 = -33$$

$$y = \frac{-33}{-0.46}$$

$$= 71.7$$

Substituting  $y$  in eqn(b)

$$0.58x + 8.6 - 12(71.7) = 25$$

$$0.58x + 8.604 = 25$$

$$0.58x = 25 - 8.6$$

$$0.58x = 16.4$$

$$\therefore x = \frac{16.4}{0.58}$$

$$= 28.3$$

(2) Formulate a feed of 27% crude protein

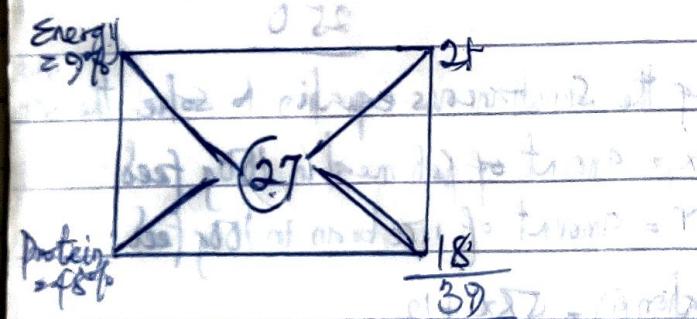
using two feedstuffs of both energy & protein sources.

- Energy sources are from corn (10%) and rice bran (8%) while the protein sources are

from soyabean (44%) and shrimp meal (52%) together.

Soln: For energy =  $\frac{10+8}{2} = 9\%$

For protein =  $\frac{44+52}{2} = 48\%$



$$\text{Energy} = \frac{27}{39} \times 100 = 53.8\%$$

$$\text{Protein} = \frac{18}{39} \times 100 = 46.2\%$$

$$\text{Energy} = \frac{53.8}{2} = 26.9$$

$$\text{Protein} = \frac{46.2}{2} = 23.1$$

$$\rightarrow \text{Corn Meal} = 26.90 = 269.0\text{g}$$

$$\text{Rice bran} = 26.90 = 269.0\text{g}$$

$$\text{Soya bean} = 23.10 = 231.0\text{g}$$

$$\text{Shrimp Meal} = 23.10 = 231.0\text{g}$$

$$1000\text{g} = 1\text{kg}$$

$$\text{check: } 0.09 \times 53.8 = 4.8$$

$$0.48 \times 46.2 = 22.2$$

$$27.0$$

## FISH PROPAGATION OR REPRODUCTION

- Natural propagation or breeding

- Hormone induced propagation or breeding

- Artificial breeding

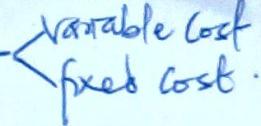
\* Fish propagation is the act of bringing together the male & female brooders.

- Natural breeding :- The male & female are brought in

- Hormone induced breeding :- They are called synthetic hormones. There are specific doses for each of them. The hormones are injected into both the male & female.

- Artificial breeding :- In this method, the male is sacrificed (by dissectioning it and removing the testes). Then inject 0.5 ml of the dosage to stay from 9 hrs - 12 hrs to enable the hormone to activate the ovary. (The latency period)

Ideally identifying the male & female brooders. The male brooder has an oral papilla (also

Operating cost - 

(ated, oval papita), When the male is brought, Banking Institutions  
You turn it upside down.  
For the female, there would be a result off - Gives out loans to  
ce, they undergo natural propagation. It is to farmers and in return  
clipped by the belly being floppy & red colour gets interest.

### (FINANCIAL ANALYSIS OF AQUACULTURE) SOURCES OF FINANCIAL CREDITS:

- 1) Formal Sources
- 2) Informal Sources.

Informal Sources - These are the credits gotten from family & friends, from person of contribution and thrift societies also Co-operatives and well workers etc.

Formal Sources - These are gotten from banks, financial institutions @ the Non-banking Institutions

- Commercial banks

- Microfinance Banks
- Mortgage banks
- Merchant banks.

The Non-banking Institutions; These institutions are also called non-governmental organizations e.g FAO, IFAD N-PAD (New partnership for Agro dev.)

\* Differences between the banking institution and non-banking institution;

Financial Indicators for viability of a business

- \* Benefit-cost ratio
- \* Rate of return on capital investment
- \* Gross Profit
- \* Profit Index
- \* Incidence of cost
- \* Economic efficiency
- \* Capital cost; This is the cost incurred in the course of running the business such as the cost of transportation, cost of equipment
- \* Operating Cost;  This is the cost that changes in the course of running the business such as cost of fertilizers, cost of feed, lime, the fish stock and the cost of harvest

\* Fixed Cost; This is the cost that doesn't change in the course of running the business. This is also called the cost of wear & tear and it is calculated through depreciation

$$\text{Capital cost} = \$50,000$$

$$\text{Variable cost} = 20,000$$

$$\text{Fixed cost} = \$5000$$

$$\text{Receipt from harvest} = \$100,000$$

From the data above, determine the financial

drawbacks to ascertain the viability of the enterprise.

(a) Benefit of cost ratio

(b) Gross profit

(c) Rate of return on capital investment

$$= \frac{75,000}{50,000} \times 100$$

$$= 1.5 \times 100$$

$$= 150\%$$

Payback period - This is the time taken to pay back loans gotten from bank.

Mathematically; Capital cost

Gross profit

Cost of Production

Cost of production = Variable cost

\* Incidence of Cost = Cost of Production

Receipt from harvest

$$\text{Capital cost} = 50,000$$

$$\text{Variable + fixed cost} = 25,000$$

$$\text{Receipt from fish harvest} = 100,000$$

$$(a) \text{Gross profit} = \text{Revenue} - \text{Operating cost}$$

$$= 100,000 - 25,000$$

$$= 75,000$$

$$(b) \text{Benefit Cost ratio} = \frac{\text{Output cost}}{\text{Input cost}}$$

$$= \frac{100,000}{75,000}$$

$$= 1.33$$

\* When determining the benefit cost ratio, if the result is less than 1, then the business is not viable, but if it's above 1, then it's viable.

(c) Rate of return on capital investment

$$= \frac{\text{Gross profit}}{\text{Capital cost}} \times 100\%$$

\* Cost of Production = Cost of feed (Price of feed intake)

Output = (Weight gain  $\times$  Survival rate  $\times$  Price of feed)

Weight gain = final weight  $\times$  initial weight

\* Profit = Output - Cost of production