

---

## **UNIT 3 LIVESTOCK AND AQUACULTURE AND MANAGEMENT PRACTICES**

---

### **Structure**

- 3.0 Introduction
- 3.1 Objectives
- 3.2 Farm Siting and Construction
- 3.3 Feed Practices in Aquaculture
- 3.4 Monitoring the Nutrient Balance
- 3.5 Water Utilization
- 3.6 Solid Manure Handling and Liquid Manure Handling
- 3.7 Composting and Anaerobic Lagoon System
- 3.8 Effluent Storage
- 3.9 Biogas Disposal
- 3.10 Manure Separation and Storage
- 3.11 Let Us Sum Up
- 3.12 Key Words
- 3.13 References and Suggested Further Readings
- 3.14 Answers to Check Your Progress

---

### **3.0 INTRODUCTION**

---

Coordinated cultivating of fish and animals is an old work on comprising of the way of life of fish (or shrimp) related with the cultivation of trained creatures, for example, pigs, ducks, chicken, etc. Integrated cultivating is customary in Asia, particularly in China and is presently likewise connected in Europe and, on a little scale, in Africa and some Latin American countries. In numerous nations, aquaculture is currently considered as a wellspring of contamination of the earth because of the arrival of natural issue into the waterways. This is especially the instance of trout ranches. Escalated cultivating of pigs and poultry deliver expansive amounts of excrement and creature wastewaters which should now be dealt with the goal to counteract genuine natural problems. The most pervasive technique for compost transfer is its utilization as manure ashore, yet exorbitant utilization of manures will prompt eutrophication of inland and waterfront waters. There is a plausibility of reusing natural squanders, composts and homestead effluents in angle lakes. Ancient practices based on the modifications of natural water bodies to entrap young fish in enclosures until harvest, have now evolved into more systematic and scientific methods. A number of aquaculture practices are used globally in three types of environments. They include the freshwater, brackish water, and marine

environments. Freshwater aquaculture is carried out either in fish ponds, fish pens, fish cages or, on a limited scale, in rice paddies. Brackish water aquaculture is done mainly in fish ponds located near the coastal zones. Marine culture uses either fish cages or substrates for molluscs and seaweeds such as stakes, ropes, and rafts. The fundamental standards engaged with coordinated cultivating are the usage of the synergetic impacts of between related ranch exercises, and the preservation, including the full use, of homestead squanders. It depends on the idea that “there is no waste”, and “waste is just a lost asset which can turn into an important material for another item”. Best management practices (BMP’s) are defined as the management of activities to achieve an ongoing minimisation of the activities’ environmental harm through cost-effective and continually assessed measures. By their nature, BMP’s refer to a wide range of interventions that can be made to improve or optimise performance in financial, social, environmental and in the prevention of avoidable impacts associated with aquaculture activities.

---

### **3.1 OBJECTIVES**

---

After reading this unit you should be able to:

- understand farm siting and construction;
- define the feed practices in aquaculture;
- describe the monitoring nutrient balance;
- explain about the solid and liquid manure handling;
- describe composting and anaerobic lagoon system;
- define effluent storage;
- understand biogas disposal; and
- describe manure separation and storage.

---

### **3.2 FARM SITING AND CONSTRUCTION**

---

#### **3.2.1 Farm Siting**

Proper site determination is a standout amongst the most vital elements that decide the accomplishment of the fish farming. Before the development of the lake, the water maintenance limit of the dirt and the dirt fruitfulness must be dealt with on the grounds that these elements impact the reaction to the natural and inorganic treatment in the ranch lake. The chosen site ought to have satisfactory water supply round the year for lake filling and different employments. The lake development must be founded on the topographic zone. In swampy and muddy regions, bunds ought to have a more prominent collection of soil to manufacture the lake of the best size. Self-depleting lakes are perfect for higher height zones. The site ought to be effortlessly open by street or any type of transport to achieve the market for simple fish transfer. What’s more, the openness of information sources, for example, encourage, seed, manure and the development material ought to likewise be accessible adjacent the site. The site ought to be free from contamination, modern waste, residential waste and some other unsafe exercises. Farm siting depends upon three factors:

- Ecological factors

1. **Soil:** The quality of soil impacts the lake efficiency and water quality and decides the dyke development. The properties of soil surface and soil porousness are resolved to choose the appropriateness of a site. Lake base ought to be able to hold the water. Loamy, mud loamy and sediment earth soil writes are most appropriate for lake development. A decent quality rock ought not to surpass 10 percent. In this way the rough, sandy, rock and limestone soil composes are to be avoided.
2. **Water:** A satisfactory measure of water is required to construct the fish cultivate on the grounds that water profundity should be balanced at consistent interims. Characteristic water bodies, for example, repository, stream, and lakes have stable water quality parameters (Water temperature, broke down oxygen, pH, alkalinity and water hardness) when contrasted with borewell and well water. The site ought to be far from the surge zone. Water ought not be acidic or basic and if observed to be along these lines, appropriate amendment is to be finished by applying lime or natural excrement separately. The perfect water temperature is 20 – 30 degree Celsius for a fish cultivate. Water Salinity is the measure of salt break up in water.
3. **Topography:** Sort of lake development is dictated by the land geography. Ordinarily, regions affected by the flood and poor precipitation territories should be maintained a strategic distance from. Territories, for example, modern zones, fields with underground oil pipelines, unpredictable land region, fields with high power posts and radio poles and very established vegetation region are additionally not suggested for lake development.
  - **Biological factors:** Organic elements incorporate the species to be refined, seed source and type of culture and they should be considered before site determination of farm.
  - **Social and economic factors:** The environmental and natural components are an essential for good practices in aquaculture site determination and site administration. It is additionally critical to become more acquainted with the social and financial foundation of the region and comprehend the way of life and conventions, especially thoughts and convictions privately connected with aquaculture hones. The social texture, market, and its structure, benefits specifically or in a roundabout way connected with aquaculture area, for example, transportation, stockpiling, discount advertise viewpoints and so forth are to be considered. The land recognized for homestead ought to be without lawful issues and fish cultivating ought to be acknowledged by the nearby individuals. Different variables incorporate accessibility of work, power, therapeutic offices, and transportation.

### 3.2.2 Construction

Plan and design is essential for a pond or lake development. The unearthed earth ought to be utilized to build the dyke and with a trudging incline towards the outlet for the best possible depleting office. Ideally development of lake must be finished amid summer with the goal that the lake can be utilized for stocking. Various steps involved in construction are the following:

- Set up the site by evacuating undesirable things, for example, the trees,

shrubberies, and shake

- Development of drainage free and secure dyke by utilizing the mud center
- Burrowing the lake and development of dyke over the mud center
- Bay and outlet development
- Lake dyke secured with soil and plant grass species (maintain a strategic distance from since quite a while ago established plants, for example, Rhodes grass and star grass)
- Lake ought to be fenced to maintain a strategic distance from burglary and section of savage creatures.

1. Preparation of sites: The place is cleared of ropes, links and different things. Trees and brambles and different obstructions that upset development of substantial hardware around the site are to be evacuated - physically/creature control/utilizing apparatus. All vegetation including wood is to be cleared in the territory. Trees inside 10 meters encompassing, tree droops, huge stones, are likewise to be expelled. The surface soil which has the most noteworthy convergence of roots and natural material isn't reasonable for lake development. Consequently, around 30 cm of surface soil must be expelled.

2. Dyke construction: Dykes ought to be minimal, strong and release free. An attractive dyke is built utilizing 15 - 30 percent of sediment, 45 - 55 percent of sand and 30 - 35 percent of dirt. To raise the dyke, the mud buddle (1:2 sand and earth) is kept as 10 - 15 cm thick layer and it can be shaped at focus or inside the waterside of the lake. The peak of the dyke ought to be adequate to help united ranch exercises and the highest point of bank ought to be over 1 m. Additional outlet is basic on the dike as a wellbeing measure to evade harm because of overabundance bring up in the water level.

3. Inlet and Outlet construction: Feeder trenches are developed to give adequate measure of value water to the lakes aside from in lakes which are filled by water. Deltas are given at best of the lake and screens are utilized to channel the directed water to dodge passage of undesirable particles to the way of life framework. The channel pipe estimate must be planned is such a path, to the point that it ought not to take more than 1 or 2 days to fill the lake.

The outlet pipe is set up at base of the lake. It is utilized to dewater the lake amid gather and fractional depleting for lake water trade to keep up the water nature of the lake amid the way of life period. The outlet is built preceding lake dyke development.

4. Soil and vegetation coverage of dyke: For the decrease in dirt disintegration, crawling grass can be developed on the best and sides of dyke. The banana and coconut trees can be planted in the bank. The slant of the dike can be planted with grasses, for example, Hybrid Napier, gunny grass and elephant grass to supply encourage to the grass carps raised in the lakes.

5. Fencing of ponds or lakes: The lakes are fenced. Live fences give protection

to cultivate and enhance the presence of the fish cultivates. Some examples are live fence, heaped fence, woven fence, post and rail fence, wire fence, wire netting wall and stone divider. Each kind of fence has its own points of interest. Wired net fence is essentially utilized as a part of fish homesteads to stop gatecrashers and secure the fish stock.

**Check Your Progress 1**

**Note:** a) Write your answer in about 50 words.  
b) Check your answers given at the end of this unit.

1) Explain farm siting.

.....  
.....  
.....

2) Describe the construction of aquaculture.

.....  
.....  
.....

---

**3.3 FEED PRACTICES**

---

Fish/shrimp developed in semi-concentrated and escalated culture lakes are given supplementary and full counterfeit sustains, separately, the previous to enlarge the characteristic nourishment in the lake, the last to thoroughly supplant the normal creatures in the water as a wellspring of sustenance.

A wide assortment of encourage fixings is utilized to get ready supplemental/ manufactured sustains. The easiest fish sustains are set up at the lake site utilizing locally accessible crude materials like rice or corn grain, copra dinner, and rice process sweepings as wellsprings of starches. These are typically blended with creature protein like waste fish/angle feast, shrimp heads, and snail meat. Supplemental nourishes for tilapia are readied utilizing 80% rice grain and 20% fish supper. Those for shrimps in enhanced broad culture as a rule incorporate crisp crude materials like snail/mussel/mollusk meat or carabao cover up and other slaughterhouse scraps.

Commercial feed (CP) arrangements are additionally accessible now in an extensive variety of brand names, generally for semi-serious and concentrated shrimp culture. These business weight control plans comprise of various fixings like fish dinner, blood supper, bone meat, and shrimp head feast, together with vitamin and mineral premix and starch sources like rice/corn grain or wheat. The unrefined protein (CP) substance of these shrimp bolsters is for the most part not lower than 30% to fulfill the protein necessity of shrimps.

Commercial feeds as a rule come in different details to coordinate the protein prerequisites. In this manner, shrimp sustains come in various structures as starter, cultivator, and finisher, with starter bolsters having the most noteworthy CP substance of around 40% and finisher nourishes having the least CP substance of around 20%. Starter sustains are normally given in the main month

of culture, finisher feeds in the most recent month, and producer in the middle. Some shrimp culturists incline toward not to give manufactured doses in the initial two weeks of culture when the recently supplied post hatchlings can subsist on the tiny fish accessible in the water.

The nourishing rate is figured as a level of the assessed creature biomass in the lake, with higher apportions given when the creatures are little and bit by bit diminishing as they end up greater. Every day sustaining rate, for the most part, begins at 5% and 10-15% of the evaluated biomass of fish and shrimps, separately, and declines to a low of 2% and 5%, for fish and shrimps, individually, toward gather. The day by day encouraged proportions are given in rising to partitions over the span of a day. Freshwater fish like tilapia are typically bolstered twice every day - early morning and late evening. Penaeid shrimps are nourished all the more habitually, from three to four to as regularly as six to seven times each day.

Sustains are communicated into the water or potentially provided on encouraging plate. In semi-concentrated and serious shrimp lakes, little feeding vessels are utilized via overseers who circumvent the lake circulating nourish by communicating. At specific focuses along the outskirts of the lake, feeding plate are submerged into the water after known amounts of bolster are put to supply nourishment to the shrimps in the lake and also to screen utilization and shrimp development. The nourishing plate is observed after a few hours to check whether the shrimps are solid and bolstering. By checking the feeding plate, one can get an idea of the sizes and amount of shrimps in the lake.

**Check Your Progress 2**

- Note:** a) Write your answer in about 50 words.  
b) Check your answers given at the end of this unit.

- 1) Describe about feed practices in aquaculture.

.....  
.....  
.....

---

### **3.4 MONITORING NUTRIENT BALANCE**

---

The contamination stack in wastewater is variable; it relies upon a few parameters. It is discovered that the waste amount released from a fish cultivate is specifically identified with temperature. The extent of supplements in the particulate division expanded with temperature. This relationship depends on the way that an expansion in temperature likewise expands the rate of digestion. In coordinated escalated aquaculture frameworks, the waste load, for example, nitrates and phosphates can be diminished if the framework angle is refined with different living beings, for example, plants utilized as biofilter, which can change over supplement releases into significant items. It can be concluded that the blend of fish culture with resulting phototrophic and herbivorous transformation expands supplement maintenance in the way of life framework (e.g., 20%– 42% encourage nitrogen to 29%– 45% bolster nitrogen). This relative little increment is because of the herbivores, as herbivorous transformation considerably diminishes the supplement maintenance

accomplished by phototrophic change by 60%– 85% bolster nitrogen and 50%– 90% sustain phosphorous.

Different aggravates that are available in aquaculture wastewater are waste, anti-toxins and a few hormones. The squander incorporates phosphorus (P) and nitrogen (N) based supplements, or suspended solids.

**Check Your Progress 3**

**Note:** a) Write your answer in about 50 words.  
b) Check your answers given at the end of this unit.

- 1) Explain the monitoring of nutrient balance in livestock and aquaculture management.

.....  
.....  
.....

---

**3.5 WATER UTILIZATION**

---

Water in the lake is kept at specific levels for ideal fish development. A lake water profundity of 1 meter is viewed as best for culture of tilapia, carps, and shrimps; conventional milkfish lakes can do with 40-60 cm of water. Lake water is not simply kept up at a specific profundity; its quality should likewise be kept high to guarantee ideal development. This is especially critical in semi-serious and escalated culture frameworks where a lot of metabolites are continuously discharged into the lake and where overabundance, unconsumed encourages add to the base load and serve to dirty the water. Lake water is constantly refreshed by the section of new water from the stream or water source while old water is depleted through the outlet/seepage entryway and through the waste channel into the ocean or stream.

Flow through the arrangement of water administration that permits the concurrent passage and exit of water into and out of the lake is fundamental in any high-thickness culture framework. This is affected by the arrangement of discrete gulfs and outlets for every one of the lakes, every channel managing the stream of water from the supply waterway to the lake and every outlet controlling the release of water out of the lake into the seepage trench. Both the supply and deplete doors are so outlined as to bring water into an empty water from the lower levels of the lake, where water quality has a tendency to get poorer quicker because of the amassing of squanders and their ensuing deterioration.

The normal renewal of lake water, is influenced by the utilization of pumps which draw water from the source even at low tide. Despite the fact that there is no rigid lead with regards to the rate of water change important for medium-to high thickness aquaculture, semi-concentrated culture frameworks generally change water at the rate of 10% day by day for a proportional aggregate substitution of water each ten days or three times each month.

Concentrated lakes/tanks for the most part need to accommodate air circulation to counteract anoxia that may prompt mass mortalities. Oxygen exhaustion in high-thickness lakes comes about not just from the quicker rate of usage of

oxygen break up for respiratory exercises; it is likewise caused by the quick rate of decay at the lake base by high-impact or oxygen-expending small scale creatures.

Paddlewheels or different kinds of aerators are hence given in the lakes to impact the implantation of more prominent amounts of oxygen into the water and anticipate shrimp mortalities. The aerators are typically worked at consistent/intermittent interims for certain settled lengths during the day.

Lake water is additionally consistently tested and estimations taken of fundamental/basic parameters especially oxygen, pH, and saltiness. This is critical to determine the requirement for restorative/healing activity for monitoring the water quality.

**Check Your Progress 4**

**Note:** a) Write your answer in about 50 words.

b) Check your answers given at the end of this unit.

1) Describe how water utilization is done in aquaculture management.

.....  
.....  
.....

---

### **3.6 SOLID MANURE HANDLING AND LIQUID MANURE HANDLING**

---

The kind of equipment is utilized as a part of excrement taking care of framework relies upon the solids content. Domesticated animals compost is named a solid, semi-solid or liquid utilizing the accompanying criteria:

- Solid/Strong – The compost’s strong substance is more noteworthy than 20%. The utilization of sheet material further adds to the solids substance of the excrement. To create a strong fertilizer, the fluid must be depleted off and the excrement dried or bedding included. At this consistency, the strong fertilizer would then be able to be stacked.
- Semi-Solid (likewise alluded to as slurry) – Contains 5% to 20% solids.
- Liquid – Contains fewer than 5% solids. The extra fluid originates from washing and draining house squander water.

#### **3.6.2 Solid Manure Handling**

Manure from tie slow down or neck chain dairy tasks are regularly taken care of because of liberal measures of sheet material blended with the compost. These horse shelters regularly have a drain cleaner for gathering and after that either a transport or pump to exchange the compost outside to the capacity territory. Customary cleaning of the horse shelter is additionally vital to an effective fly control program. Other fly control measures incorporate expelling wet sustain amid fly reproducing season, discarding dead creatures and fetal membrane and keeping excrement putting away zones dim. You can likewise store excrement in encased structures, secure ventilation bays with screens and routinely splash with endorsed bug sprays.

Compost from most sorts of hamburger activities is taken care of and put away as a strong, for the most part on a chunk or on the ground. The compost and



bedding amasses in the stable until the point when it is occasionally evacuated. Front-end loaders are typically utilized to expel the compost from the stable and exchange it to the capacity region.

Pigs are for the most part housed in stables with a pen framework in light of cement floors. Hoard compost can be taken care of as a strong on account of the bedding blend (sawdust, wood shavings, and so forth.) yet business activities, by and large, utilize a fluid compost framework.

Fur cultivates by and large house fox and mink reproducers in outside pens with a wire base or inside little structures or horse shelters. In outside frameworks, the fertilizer falls through the work to the ground beneath. The excrement is then physically taken care of also, taken to the fertilizer stockpiling zones, which is for the most part outside. Excrement created in indoor frameworks is taken care of in a comparable manner. Since the amounts of fertilizer is little on hide ranches, it is proper for agriculturists to compost the excrement for spreading at a later date. In different circumstances, administrators who are not running blended endeavors may have other domesticated animals administrators handle their excrement for spreading on cultivate arrive.

### 3.6.3 Liquid Manure Handling

Manure frameworks with the expectation of complimentary slow down dairy horse shelters are typically intended for semi-strong or on the other hand fluid fertilizer. These frameworks don't include the utilization of any sheet material. Excrement is either gathered under slatted floors or with the utilization of scrubbers. It is then held in a pit under the floor or is exchanged to long haul capacity using transports, gravity stream pits or pumps. As of now, just a modest number of dairy ranches are utilizing free slow down offices in the territory.

**Table 3.1: Manure handling for different wastes**

Operation	Solids	Semi solid/liquid
Collection	Gutter Cleaners Front End Loaders	Slatted Floors Scrapers cable or hydraulic tractor
Transfer	Manure Wagons Open Tank Spreaders Dump Trucks Earth Moving Equipment Conveyors Pumps	Pumps submerged, open impeller piston pneumatic Augers Vacuum Tank Wagon Pipeline Gravity Continuous Flow Gutters Large Diameter Pipes
Storage	Stockpile Bunk Silo	In-Building Below Ground concrete (open/covered) earthen

		Above Ground concrete/glass lined steel
Treatment	Aerobic compost dry incinerate	Aerobic pre-storage partial total Anaerobic Solid/Liquid Separation
Utilize/disposal	Land Application Energy Production Bedding	Land Application Irrigation Energy Production

**Check Your Progress 5**

**Note:** a) Write your answer in about 50 words.

b) Check your answers given at the end of this unit.

1) Describe solid manure handling.

.....  
 .....  
 .....

2) Explain liquid manure handling.

.....  
 .....  
 .....

**3.7 COMPOSTING AND ANAEROBIC LAGOON SYSTEM**

Composting the soil creature composts has a few focal points over applying new excrement to the dirt. In spite of the fact that the way toward treating the soil involves more work and capacity zones, the advantages to the dirt exceed these elements. The point of making manure is to deliver the dull, brittle substance called humus from materials that would some way or another be considered as ‘squander’ on the smallholder cultivate. Humus is found on woodland floors and is the aftereffect of regular procedures that separate plant and creature trash and is loaded with advantageous microorganisms and plant supplements. Fertilizing the soil is the way toward accelerating this separate of materials, which would somehow happen all the more gradually if the individual materials were added to the dirt specifically. Treating the soil empowers the way toward separating plant materials to be controlled and the fertilizer would then be able to be connected where required. The humus coming about because of treating the soil significantly adds to soil richness and product nourishment.

Compost can be made both with and without creature compost. Creature excrement is added to the manure heap so as to get the microorganisms and different living beings required for the disintegration procedure. In any case,

these can likewise be presented utilizing top soil or ant colony soil set up of excrement in the layers of the manure heap.

Benefits of composting manure system:

- It enhances the natural, concoction and physical properties of the dirt by empowering the development of gainful living beings, for example, worms, microscopic organisms, growths and different microorganisms. Treated the soil compost adds natural issue to the dirt. This is additionally the situation while applying crisp compost, however new fertilizer connected specifically to the dirt may cause a transitory awkwardness of supplements, which might be unsafe to trim development.
- Fresh compost is acidic. The way toward fertilizing the soil builds the pH (making it less acidic) bringing about a more ideal soil condition for plant development and expanding the accessibility of supplements.
- It diminishes misfortunes of nitrogen by making this key product supplement more steady and accessible over a more drawn out timeframe. This is additionally the case for the other plant supplements contained in the manure, for example, phosphorus, potassium, calcium, magnesium and micronutrients, which are discharged to the plants slowly. The advantages of treated the soil compost will in this manner keep going for in excess of one season.
- The procedure of treating the soil excrement, if completed accurately to achieve temperatures of 58 degrees centigrade will slaughter weed seeds contained in the creature composts. In the event that temperatures achieve 60 degrees centigrade, plant and creature pathogens are additionally lessened.
- It will likewise diminish the smell of crisp fertilizer, making it more pleasant to deal with.

---

### 3.8 EFFLUENT STORAGE

---

Having very much planned and built storeroom will spare you time and cash. The key is great arranging and working with the individuals. The advantages of an all-around planned capacity framework include:

- Significant serenity
- Expanded adaptability around watering
- Successful use of supplements and water
- Decreased danger of emanating rebelliousness
- Natural security

Following a few gatherings of ecological pros and disease transmission specialists, a WHO Scientific Group on Health Aspects of Use of Treated Wastewater for Agriculture and Aquaculture touched base at the microbiological quality guidelines for wastewater use in farming. These rules depended on the accord that the genuine hazard related with water system with treated wastewater is much lower than already thought and that prior principles and rules for emanating quality, for example, the WHO (1973) suggested principles, were prohibitive, especially in regard of bacterial pathogens.

The new rules are stricter than past models in regard of the necessity to lessen the quantities of helminth eggs (*Ascaris* and *Trichuris* species and hookworms) in effluents for Category A and B conditions to a level of not in excess of one for each liter. Likewise suggested by the rules is the desire that protozoans will be decreased to an indistinguishable level from helminth eggs. Albeit no bacterial pathogen constrains is forced for Category C conditions where cultivation laborers are the main uncovered populace, and that there is practically no confirmation demonstrating a hazard to such specialists from microscopic organisms, some level of diminishment in bacterial fixation is suggested for any profluent utilized circumstance.

The WHO Scientific Group thought about the new way to deal with profluent quality would expand general wellbeing insurance for the huge quantities of individuals who were presently being tainted in regions where crops are eaten uncooked are being inundated in an unregulated, and frequently illicit, way with crude wastewater. It was felt that the prescribed rules if embraced would accomplish this change and set targets which are both innovatively and monetarily achievable. Nonetheless, the need to translate the rules deliberately and change them in the light of neighborhood epidemiological, sociocultural and natural elements was additionally called attention to.

Wastewater treatment forms accomplishing the prescribed microbiological quality reliably because of their natural plan qualities, as opposed to by elevated requirements operational control, are to be favored. Notwithstanding the microbiological quality prerequisites of treated effluents utilized as a part of horticulture, consideration should likewise be given to those quality parameters of significance in regard of groundwater tainting and of soil structure and harvest profitability.

**Check Your Progress 6**

- Note:** a) Write your answer in about 50 words.  
b) Check your answers given at the end of this unit.

1) Explain about composting and anaerobic lagoon system

.....  
.....  
.....

2) Describe the effluent storage in live stock

.....  
.....  
.....

---

**3.9 BIOGAS DISPOSAL**

---

Biogas refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Anaerobic assimilation is fundamentally a straightforward procedure completed in various advances that can utilize any

natural material as a substrate. It happens in stomach related frameworks, bogs, squander transfer destinations, septic tanks and the Arctic Tundra. People tend to influence the procedure as entangled as conceivable by endeavoring to enhance nature utilizing complex machines; however a basic approach is as yet conceivable.

Biogas is produced exclusively through the action of microorganisms, not at all like treating the soil in which parasites and different animals are likewise engaged with the debasement procedure of organic material.

It has a tendency to happen normally wherever high centralizations of wet natural issue aggregate, most usually in the base dregs of lakes and lakes, in swamps, peat marshes, digestive organs of creatures and in the anaerobic insides of waste transfer destinations.

Biogas is a blend of methane (otherwise called bog gas or petroleum gas), carbon dioxide and various follow components. Promotion can happen over a wide temperature go from 4 to in excess of 100 °C and an assortment of dampness substance from around 60% to over 99%. Ordinary anaerobic digesters are generally intended to work either in the vicinity of 35 and 40 degree Celsius or in the range in the vicinity of 52 and 57 degree Celsius. There are two purposes behind these high temperatures. To begin with, higher temperatures increment yield for a given digester limit, and second they increment the decimation of pathogens exhibit in crude excrement.

---

### **3.10 MANURE SEPARATION AND STORAGE**

---

Manure can be thought of as a blend of water, minerals, and natural segments. A portion of the minerals will be dissolved and break down in the water, while the rest will tend to settle to the base or buoy to the highest point of the excrement stockpiling. The thickness of the natural segments depends if they settle to the base of the capacity unit or stay in suspension. The measure of water, wellspring of compost, and excrement dealing with framework will decide the degree of these patterns. The absolute most critical factor influencing the propensity to isolate is the measure of water in the compost. With low dampness (strong) compost, next to no evident partition happens. As the dampness content increases the inclination for division additionally increases.

#### **3.10.1 Benefits of Separation**

Regardless of whether transportation separation and phosphorus application rates are not a worry utilizing solids division preceding capacity decreases the solids amassing in holding lakes and tidal ponds. This expands the time between muck expulsion tasks and amplifies the fluid stockpiling limit of the holding lake or tidal pond.

Another potential advantage is the diminishment in odours. Under the anaerobic conditions found in holding lakes and tidal ponds microorganisms deliver musty mixes. Lessening the measure of accessible fertilizer with solids partition has a tendency to diminish the generation of questionable odours.

In creature constraintment frameworks where water from holding lakes and tidal ponds are utilized to flush fertilizer from the outbuildings, solids partition can bring about a superior quality reuse flush water.

The isolated excrement solids have a diminished dampness content and expanded supplement fixation both of which increment its incentive as a manure source. Furthermore, contingent upon the subsequent dampness content it turns into a potential manure fixing. Where the subsequent manure might be utilized as bedding or possibly showcased off ranch.

Compost partition is likewise prone to assume a basic part in planning excrement for change in into vitality. Distinctive vitality change advances will require the compost to have diverse physical and substance properties.

**Check Your Progress 7**

**Note:** a) Write your answer in about 50 words.  
b) Check your answers given at the end of this unit.

1) Explain about biogas disposal process.

.....  
.....  
.....

2) Describe the manure separation and storage in livestock.

.....  
.....  
.....

3) What are the benefits of manure separation?

.....  
.....  
.....

---

**3.11 LET US SUM UP**

---

In this unit we have studied about the following:

- Farm siting and construction
- Feed practices in aquaculture
- Monitoring the nutrient balance
- Water utilization
- Solid manure handling and liquid manure handling
- Composting and anaerobic lagoon system
- Effluent storage
- Biogas disposal
- Manure separation and storage

---

### 3.12 KEY WORDS

---

- Best management practices (BMP's)** : are defined as the management of activities to achieve an ongoing minimisation of the activities' environmental harm through cost-effective and continually assessed measures.
- Biogas** : refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste.

---

### 3.13 REFERENCES AND SUGGESTED FURTHER READINGS

---

- Arthur, J.R., Bondad-Reantaso, M.G., Campbell, M.L., Hewitt, C.L., Phillips, M.J., & Subasinghe, R.P. (2009). Understanding and applying risk analysis in aquaculture: A manual for decision-makers. Rome: Food and Agriculture Organization of the United Nations, 2009, p. 34.
- Colin, N. (2010). The History of Aquaculture. John Wiley & Sons. ISBN 978-0-470-95886-5.
- Erondu, E.S.&Anyanwu, P.E. (2005). Potential hazards and risks associated with the aquaculture industry. Afr J Biotechnol. Vol. 4,1622-1627.
- McClarney, W. (2013). Freshwater Aquaculture. Echo Point Books & Media, LLC. ISBN 978-1-62654-990-6.
- Myers, M.L. (2010). Review of occupational hazards associated with aquaculture. J Agromedicine. Vol. 15, 412-426.
- Myers, M.L. & Cole, H.P. (2009). Simple solutions for reduced fish farm hazards. J Agromedicine. Vol. 14, 150-156.
- Myers, M.L. (2011). Reducing hazards in the work environment. In Praeger Handbook of Environmental Health, R Friis, C Friis (Eds.) Vol. 4, Chapter 3, Santa Barbara, CA : Praeger
- Ottinger, M.; Clauss, K.; Kuenzer, C. (2016). "Aquaculture: Relevance, Distribution, Impacts and Spatial Assessments – A Review". Ocean & Coastal Management. 119: 244–266. doi:10.1016/j.ocecoaman.2015.10.015.
- Stickney, Robert R. (2009). Aquaculture: An Introductory Text. CABI. ISBN 978-1-84593-589-4.

---

### 3.14 ANSWERS TO CHECK YOUR PROGRESS

---

#### Answers to Check Your Progress 1

Your answers should include the following points:

1. - Proper site determination is a standout amongst the most vital elements that decide the accomplishment of the fish farming.

**Livestock and Aquaculture  
Pollution**

- Water maintenance limit of the dirt and the dirt fruitfulness must be dealt with on the grounds
  - chose site ought to have satisfactory water supply round the year for lake filling and different employments.
  - Lake development must be founded on the topographic zone.
  - Farm siting depends upon three factors
  - Ecological factors: - Soil- Water- Topography
  - Biological factors
  - Social and economic factors:
- 2.
- Set up the site by evacuating undesirable things, for example, the trees, shrubberies, and shake
  - Development of drainage free and secure dyke by utilizing the mud center
  - Burrowing the lake and development of dyke over the mud center
  - Bay and outlet development
  - Lake dyke secured with soil and plant grass species
  - Lake ought to be fenced to maintain a strategic distance from burglary and section of savage creatures.
  - Preparation of sites
  - Dyke construction
  - Inlet and outlet construction
  - Fencing of ponds

**Answers to Check Your Progress 2**

Your answers should include the following points:

- 1.
- Fish/shrimp developed in semi-concentrated and escalated culture lakes
  - Wide assortment of encourage fixings is utilized to get ready supplemental/manufactured sustains.
  - easiest fish sustains are set up at the lake site utilizing locally accessible crude materials like rice or corn grain, copra dinner, and rice process sweepings as wellsprings of starches.
  - These are typically blended with creature protein like waste fish/ angle feast, shrimp heads, and snail meat. Supplemental nourishes for tilapia are readied utilizing 80% rice grain and 20% fish supper.
  - Commercial feed arrangements are additionally accessible now in an extensive variety of brand names, generally for semi-serious and concentrated shrimp culture.



- These business weight control plans comprise of various fixings like fish dinner, blood supper, bone meat, and shrimp head feast (to fill in as attractant for the shrimp), together with vitamin and mineral premix and starch sources like rice/corn grain or wheat.
- The unrefined protein (CP) substance of these shrimp bolsters is for the most part not lower than 30% to fulfill the high creature protein necessity of shrimps, really assessed to be around 40% amid the prior phases of development.
- Commercial feeds as a rule come in different details to coordinate the protein prerequisite of the way of life form.
- Starter sustains are normally given on the main month of culture, finisher feeds on the most recent month, and producer encourages in the middle.

### Answers to Check Your Progress 3

Your answers should include the following points:

1.
  - The contamination stack in wastewater is variable, it relies upon a few parameters.
  - It is discovered that the waste amount released from a fish cultivate is specifically identified with temperature.
  - Extent of supplements in the particulate division expanded with temperature.
  - This relationship depends on the way that an expansion in temperature likewise expands the rate of digestion.
  - In coordinated escalated aquaculture frameworks, the waste load, for example, nitrates and phosphates can be diminished if the framework angle is refined with different living beings, for example, plants utilized as biofilter, which can change over supplement releases into significant items.
  - It can be concluded that the blend of fish culture with resulting phototrophic and herbivorous transformation expands supplement maintenance in the way of life framework.
  - This relative little increment is because of the herbivores, as herbivorous transformation considerably diminishes the supplement maintenance accomplished by phototrophic change by 60%– 85% bolster nitrogen and 50%– 90% sustain phosphorous.
  - Different aggravates that are available in aquaculture wastewater are encourage inferred waste, anti-toxins and a few hormones.
  - The encourage inferred squander incorporates parts that are either broken up, for example, phosphorus (P) and nitrogen (N) based supplements, or that are in the strong stage, for example, suspended solids.
  - These solids can generally convey 7%– 32% of the aggregate nitrogen (TN) and 30%– 84% of the aggregate phosphorus (TP) in wastewater.

- The rest of transported out of the ranch in the broke down portion, since it is to a great extent impractical to expel them by molecule partition methods, which are normally utilized for aquaculture wastewater treatment.

#### **Answers to Check Your Progress 4**

Your answers should include the following points:

1.
  - Water in the lake is kept at specific levels for ideal fish development.
  - Lake water profundity of 1 meter is viewed as best for culture of tilapia, carps, and shrimps; conventional milkfish lakes can do with only 40-60 cm of water.
  - Lake water isn't simply kept up at a specific profundity.
  - To keep the crumbling of the lake condition, lake water is constantly refreshed by the section of new water from the stream or water source while old water is depleted through the outlet/seepage entryway and through the waste channel into the ocean or stream.
  - Flow through the arrangement of water administration that permits the concurrent passage and exit of water into and out of the lake is fundamental in any high-thickness culture framework.
  - Every channel managing the stream of water from the supply waterway to the lake and every outlet controlling the release of water out of the lake into the seepage trench.
  - The normal renewal of lake water, free of common tidal vacillations, is influenced conceivable by the utilization of pumps which to draw water from the source even at low tide.
  - Rate of water change important for medium-to high thickness aquaculture, semi-concentrated culture frameworks generally change water at the rate of 10% day by day for a proportional aggregate substitution of water each ten days or three times each month.
  - Concentrated lakes/tanks for the most part need to accommodate air circulation offices/hardware to counteract anoxia that may prompt mass mortalities.
  - Oxygen exhaustion in high-thickness lakes comes about not just from the quicker rate of usage of broke up oxygen for respiratory exercises.
  - Lake water is additionally consistently tested and estimations taken of fundamental/basic parameters especially broke down oxygen, pH, and saltiness.
  - This is critical to determine the requirement for restorative/healing activity to convey water quality to ideal levels and get great yields.

#### **Answers to Check Your Progress 5**

Your answers should include the following points:

1.
  - Manure from tie slow down or neck chain dairy tasks is regularly taken care of as a strong because of liberal measures of sheet material blended with the compost.

- These horse shelters regularly have a drain cleaner for gathering and after that either a transport or pump to exchange the compost outside to the capacity territory. -Customary cleaning of the horse shelter is additionally vital to an effective fly control program.
  - Compost from most sorts of hamburger activities is taken care of and put away as a strong, for the most part on a chunk or on the ground.
  - The compost and bedding amasses in the stable until the point when it is occasionally evacuated.
  - Front-end loaders are typically utilized to expel the compost from the stable and exchange it to the capacity region.
  - Pigs are for the most part housed in stables with a pen framework in light of cement floors.
  - Hoard compost can be taken care of as a strong on account of the bedding blend yet business activities, by and large, utilize a fluid compost framework.
  - Fur cultivates by and large house fox and mink reproducers in outside pens with a wire base or inside little structures or horse shelters.
  - The fertilizer falls through the work to the ground beneath.
  - The excrement is then physically took care of also, taken to the fertilizer stockpiling zones, which is for the most part outside.
  - Excrement created in indoor frameworks is taken care of in a comparable manner.
- 2.
- Manure frameworks with the expectation of complimentary slow down dairy horse shelters are typically intended for semi-strong or on the other hand fluid fertilizer.
  - These frameworks don't include the utilization of any sheet material.
  - Excrement is either gathered under slatted floors or with the utilization of scrubbers.
  - It is then held in a pit under the floor or is exchanged to long haul capacity using transports, gravity stream pits or pumps.
  - Refer Table 2

### Answers to Check Your Progress 6

Your answers should include the following points:

1.
  - Composting the soil creature composts has a few focal points over applying new excrement to the dirt.
  - In spite of the fact that the way toward treating the soil involves more work and capacity zones, the advantages to the dirt exceed these elements.
  - The point of making manure is to deliver the dull, brittle substance called humus from materials that would some way or another be considered as 'squander' on the smallholder cultivate.

- Humus is found on woodland floors and is the aftereffect of regular procedures that separate plant and creature trash and is loaded with advantageous microorganisms and plant supplements.
  - Fertilizing the soil is the way toward accelerating this separate of materials, which would somehow happen all the more gradually if the individual materials were added to the dirt specifically.
  - Treating the soil empowers the way toward separating plant materials to be controlled and the fertilizer would then be able to be connected where required.
  - The humus coming about because of treating the soil significantly adds to soil richness and product nourishment.
  - Compost can be made both with and without creature compost
  - Fresh compost is acidic.
  - Diminishes misfortunes of nitrogen by making this key product supplement more steady and accessible over a more drawn out timeframe.
  - The procedure of treating the soil excrement.
  - It will likewise diminish the smell of crisp fertilizer, making it more pleasant to deal with.
- 2.
- Having very much planned and built storeroom will spare you time and cash.
  - The key is great arranging and working with the opportune individuals.
  - The advantages of an all-around planned capacity framework
  - Significant serenity
  - Expanded adaptability around watering
  - Successful use of supplements and water
  - Decreased danger of emanating rebelliousness
  - Natural security
  - Refer table 3

### **Answers to Check Your Progress 7**

Your answers should include the following points:

1.
  - Biogas is created when microscopic organisms debase natural material without oxygen, in a procedure known as anaerobic processing.
  - Anaerobic assimilation is fundamentally a straightforward procedure completed in various advances that can utilize any natural material as a substrate.
  - It happens in stomach related frameworks, bogs, squander transfer destinations, septic tanks and the Arctic Tundra.

- Biogas is produced exclusively through the action of microorganisms, not at all like treating the soil in which parasites and different animals are likewise engaged with the debasement procedure of organic material.
  - It has a tendency to happen normally wherever high centralizations of wet natural issue aggregate, most usually in the base dregs of lakes and lakes, in swamps, peat marshes, digestive organs of creatures and in the anaerobic insides of waste transfer destinations.
  - Biogas is a blend of methane (otherwise called bog gas or petroleum gas), carbon dioxide and various follow components.
  - Promotion can happen over a wide temperature go from 4 to in excess of 100 °C and an assortment of dampness substance from around 60% to over 99%.
  - Ordinary anaerobic digesters are generally intended to work either in the vicinity of 35 and 40 degree Celsius or in the range in the vicinity of 52 and 57 degree Celsius.
  - There are two purposes behind these high temperatures. To begin with, higher temperatures increment yield for a given digester limit, and second they increment the decimation of pathogens exhibit in crude excrement.
- 2.
- Manure can be thought of as a blend of water, minerals, and natural segments.
  - A portion of the minerals will be solvent and break down in the water, while the rest will tend to settle to the base or buoy to the highest point of the excrement stockpiling.
  - The thickness of the natural segments will decide if they settle to the base of the capacity unit, stay in suspension, or shape a gliding outside.
  - The measure of water, wellspring of compost, and excrement dealing with framework will decide the degree of these patterns.
  - More on strong fluid detachment's part in compost storage.
  - The absolute most critical factor influencing the propensity to isolate is the measure of water in the compost.
  - With low dampness (strong) compost, next to no evident partition happens.
  - As the dampness content expands the inclination for division additionally increments.
  - While describing fertilizer's physical attributes it is regularly thought of just like a strong, semisolid, slurry, or fluid.
  - From a useful point of view partition is restricted to fluid, slurry, and once in a while semisolid compost.
- 3.
- Regardless of whether transportation separation and phosphorus application rates are not a worry utilizing solids division preceding

capacity decreases the solids amassing in holding lakes and tidal ponds.

- This expands the time between muck expulsion tasks and amplifies the fluid stockpiling limit of the holding lake or tidal pond.
- Another potential advantage is the diminishment in smells.
- Under the anaerobic conditions found in holding lakes and tidal ponds microorganisms deliver musty mixes.
- Lessening the measure of accessible fertilizer with solids partition has a tendency to diminish the generation of questionable smells.
- In creature constraintment frameworks where water from holding lakes and tidal ponds are utilized to flush fertilizer from the outbuildings, solids partition can bring about a superior quality reuse flush water.
- The isolated excrement solids have a diminished dampness content and expanded
- supplement fixation both of which increment its incentive as a manure source.
- Contingent upon the subsequent dampness content it turns into a potential manure fixing.
- Compost partition is likewise prone to assume a basic part in planning excrement for change in into vitality.
- Distinctive vitality change advances will require the compost to have diverse physical and substance properties.