

## Public Health importance of insects

Insect (Flies and Cockroaches)

Flies are a nuisance and a vector of diseases to both man and animals. Disease risk of adult flies lies in their feeding habit. Flies can only ingest fluid, they dissolve solid food by ejecting saliva on it. The saliva often contain bacteria and other micro-organisms from a previous meal, hence it will contaminate food.

Flies transmit diseases through the following means:

(1) Mechanically- Pathogens are transmitted through the mouth parts and feets e.g eggs of parasite worms, dysenteric amoebae, *Salmonella typhi* and *Vibrio cholerae* are disseminated through this.

(2) Vomitus and Excreta- By regurgitation and defecation

Ingestion of whole insect- whole flies contains micro-organisms, eggs of trematodes, cestoda

### Control of flies-

(1) Eliminate breeding sites

(2) Control fly entry to building-screen windows and doors

(3) Control of Flies inside Building- By the use of electrocuters and approved insecticides and use of baffle light traps

(4) Myiasis- Fly larvae destroy the skin. - Flies associated with Myiasis are

*Lucilia sericata*, *Hypoderma bovi*, *Dermatobia hominis*, *Oestrus ovis*

### Types of Myiasis

(1) Cutaneous myiasis

(2) Myiasis of cavities (nasopharyngeal cavity), skull sinuses, eyes (e.g *Chrysomyis*) auditory canal

*Sarcophaga* and *Callitrogea*

(3) Tissue myiasis:

- *Oestrus ovis*
- *Hypoderma bovis*
- *Dermatobia hominis*

Cockroaches- These destroy and contaminate food contaminate water and spread disease causing agents like Salmonella, Clostridia and Staphylococci which may lead to food poisoning

Ham Skipper (*Piophilidae*)

- Eggs are laid on the exposed surface of meat
- Larvae damage the meat by eating part and creating holes in it
- The adult can carry Clostridium botulinum spores to contaminate food
- Ham Beetle (*Necrobia rufipes*)
- Adult beetle lay large number of eggs on meat surface
- Larvae so produced feed on the meat
- Larder Beetle (*Dermestes lardarius*) lay eggs on meat, particularly dried meat products

### **Chemical control of insect**

The chemicals (insecticides) come in form of fogs, mists, sprays, powders and bait. Choice is determined by the area to be treated.

#### 1. Non- Residual Insecticides

- (a) Pyrethrins –This has a good knock down effect and safe. Available as spray e.g bioallethrin
- (b) Allethrin- This can be used to control crawling insects- deltamethin

#### 2. Residual insecticides

(1) Organochlorines- chloromated ethane - DDT – Dichlorodiphenyl trichloroethane

Cyclodienes- Chlordanes, aldrin, dieldrin, endrin and tozaphene

e.g. – Hexachloro cyclohexane, benzene hexachloride (BHC), lindane

(2) Organophosphates

- Coumaphos, diazinon, dichlorvos, malathion

Carbamates- carbaryl and propoxur

3. Formamidines (contraindicated in horses and cat) e.g amitraz

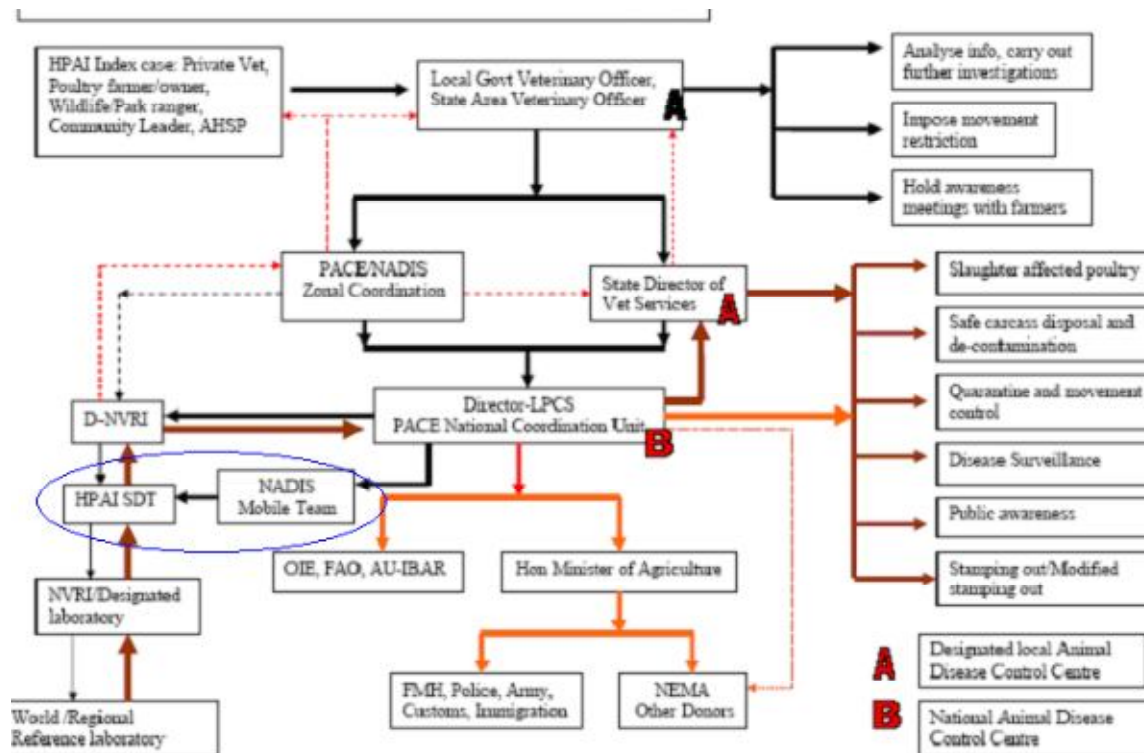
4. Citrus extract

### **Public Health and Economic Importance of Birds**

- (1) Destroy or consumes foodstuff
- (2) Carriers of diseases affecting man and animals e.g. Avian influenza by migrating birds
- (3) Jeopardise safety in air craft

**Control**

- Proper husbandry techniques
- Trapping /shooting of large birds
- Aerial spraying of birds using chemical poison



## WASTE MANAGEMENT

**Objectives:** At the end of this course the students should be able to:

1. Define waste management, disposal and utilization.
2. Know the importance of waste management.
3. Understand the various methods of waste disposal.
4. Know the advantages and disadvantages of each method of disposal.
5. Get acquainted with the process of Biogas production, its composition and application.

### Definition of Terms.

- *Waste:* any material lacking direct value to the producer and so must be disposed of. The production of waste material is known as

the waste stream and includes the entire variety of refuse generated during domestic, industrial, construction and commercial processes.

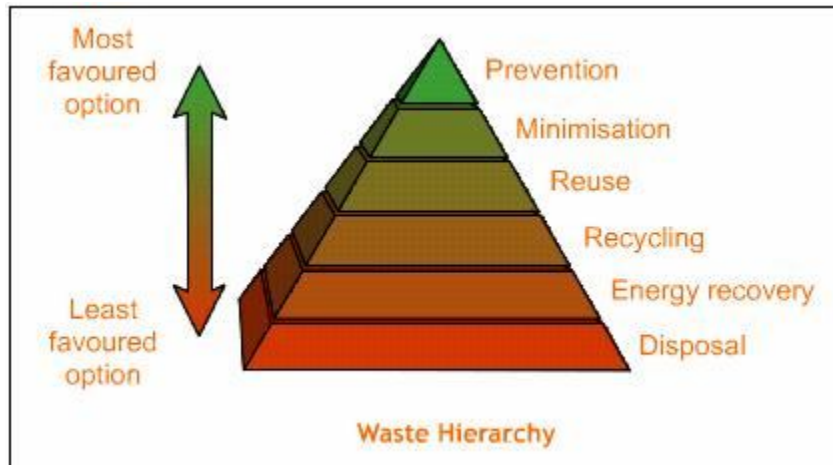
- *Waste management*: involves the collection, storage, transportation, processing, recycling or disposal of wastes and its monitoring. Waste management usually relates to materials produced by human and animal activities and is generally undertaken to reduce their effect on health environment or aesthetics. Waste management can involve solids, liquids, gaseous or radioactive substances with different methods and field of expertise in disposal management.
- *Waste disposal*: involves the collection of such in designated areas (disposal points) from where they are collected and transported for treatment or recycling. Waste disposal should be pollution free and must be done in an environmental friendly manner.
- *Waste utilization*: is the process of converting waste into useful products or resources e.g Biogas, Bioorganic fertilizers etc.

### **Importance of Waste Management**

1. It prevents /alleviates environmental pollution or degradation which may result due to wastes generated by human and animal activities.
2. To protect human, animal and environmental health.
3. To recover useful and valuable resources that is beneficial.
4. Waste management plants or industries can serve to provide job opportunities or employment.
5. For aesthetics.

### **Waste Hierarchy**

This refers to the "3RS " which are REDUCE, REUSE and RECYCLE which classify waste management strategies according to their desirability in terms of waste minimization. The aim of this is to extract the maximum practical benefits from products and to generate minimum amount of waste.



## Methods of Waste Disposal

1. **OPEN DUMPS:** This is an uncontrolled surface disposal of waste (Cart the waste away) from some uninhabited areas such as fields, unused acreage or in water ways. This form of disposal is being widely discouraged but is still the most practiced in Nigeria and other developing countries. A slight improvement on this is to burn the waste but this still contributes to air pollution in such environment.

### *Advantages*

- Inexpensive
- Convenient

### *Disadvantages*

- Disease organisms, rodents, flies, thrive in this environment hence constituting health hazards.
  - Can result in air pollution
  - Can cause ground water and run-off pollution
2. **SANITARY LANDFILL:** Disposing wastes in a landfill involves burying the waste and this remain a common practice in most countries. From public health point of view this was a major improvement on open dumping. Properly designed and well managed sanitary landfills are very hygienic while poorly managed ones can create a number of adverse environmental impact such as wind blow litter, attraction of vermins and generation of liquid leachate which can contaminate surface/ground water.

### *Technology*

A landfill is usually below ground level and is lined with an impervious material usually plastics to prevent leachates from escaping. It also contains a leachate removal system above. Once full it is capped with an impervious material such as clay cap to prevent the introduction of rain water that would increase the volume of leachate and breach the liner.

### *Advantages*

- When properly managed it is hygienic and safe
- Not expensive to run
- Filled land can be reused for other community purposes.

### *Disadvantages*

- Requires maintenance
- Needs proper planning, design and operations
- When poorly managed can lead to a lot of environmental impact such as odour problems, water pollution , green house effect, and may kill surface vegetation.

### 3. **INCINERATION:**

This is the burning of waste either solids, liquids, and is useful as an alternative heat source. The waste in incineration is burned in a controlled vessel where more complete combustion is achieved.

### *Advantages*

- Requires minimum land
- Can be operated in any weather.
- Produces stable odour free residue

### *Disadvantages*

- Expensive to build and operate
- High energy requirement
- Requires trained personnel
- Needs continuous maintenance

### 4. **COMPOSTING**

This is used in the production of compost manure. Waste materials which are organic in nature e.g. plant materials, animal manure and food scraps can be recycled using biological composting and digestion process to break down organic matter. In places where no better utilization of organic matter especially of animal origin is feasible, it can be composted to yield manure of reasonably good quality. Compost pits or bunkers can be made of bricks, coarse materials such as twig which are laid at the bottom for proper ventilation. Their alternate layers are laid up to 2 meters. The outside and top of the waste is protected by clean soil or grains.

Composting is a hygienic way of recycling nutrients of the organic by products of agricultural, urban and industrial activities. It is safe in storage and easily handled.

It is economical source of plant nutrients. Rather than cause environmental pollution properly composed organic material can be major asset in the enhancement of soil fertility, restoration of degraded solids and sequestration of carbon dioxide. Composting process for full carcass or significant quantities of waste takes several years is labour intensive and maybe inefficiently disposing hides and bones. Bones even chicken bones are notoriously difficult to compost.

## 5. RECYCLING

This is an important aspect of an efficient waste management system. Recycling turns waste back into useful and valuable products. Many non biodegradable materials are recyclable such as plastics papers, glass etc.

### *Advantages*

- Conservation of natural resources.
- Reduction of waste.
- Creation of jobs which are free of health hazards
- Decrease emission of green house gases
- Helps to sustain the environment for the future generation

### **Other Methods**

**Burial:** This method is used for dead animals and other meat production wastes by producers and abattoirs. The effects on water and soil and the risks of pathogen transmission have not been fully studied.



**Rendering:** This is a process applied to materials derived from slaughter, packing, processing food preparations and dead animals. It includes cooking, removing the moisture and separating materials into sterile animal protein.

### **Biogas**

- Biogas is a combustible mixture of gases produced by microorganisms when livestock manure and other biological wastes are allowed to ferment in the absence of air or oxygen usually in an enclosed container.
- It is a methane rich flammable gas the result from the decomposition of organic waste material

### **Composition of Biogas**

Compound	Chemical	%
Methane	CH <sub>4</sub>	50-75
Carbon dioxide	CO <sub>2</sub>	25-50
Nitrogen	N <sub>2</sub>	0-10
Hydrogen	H <sub>2</sub>	0-1
Hydrogen Sulphide	H <sub>2</sub> S	0-3
Oxygen	O <sub>2</sub>	0-2

### **Why use biogas?**

- Main reason is to treat waste. These wastes are precious resources if used properly , but constitute major pollution when discharged into rivers and lakes.
- It removes pollution and mitigates global warming.
- Solves the most serious problems of energy supply in rural areas where people traditionally forage for fuel wood in the forest.
- Produces fuel for cooking, vehicles and is the cleanest biofuel available hence reducing respiratory problems and diseases.

- Can be used to generate electricity and heat. Hence prolong the active hours the day and enabling families to engage in social or self-improvement activities or earn extra income.
- Biogas also produces bio-slurry and bio-dregs rich in nutrients, minerals and this form excellent organic fertilizers for crops, fish and pigs.

### **Where does biogas come from?**

- Vegetation
- Farm and ranch animals
- Sewage from human waste treatment plants

### **Biogas production**

A biogas producing plant comprises of three components

- Digester- this is a tank where in fermentation occurs causing production of gas.
- Gasometer- A gas storage tank
- Pipes- for gas distribution at desired points.

The entire assembly has to be water and gas proof. The receptacle or inlets feed the digester with the waste and these undergo anaerobic fermentation. As a result biogas consisting of nearly 60% methane and 30% carbon dioxide and traces of H<sub>2</sub>S and CO are produced.

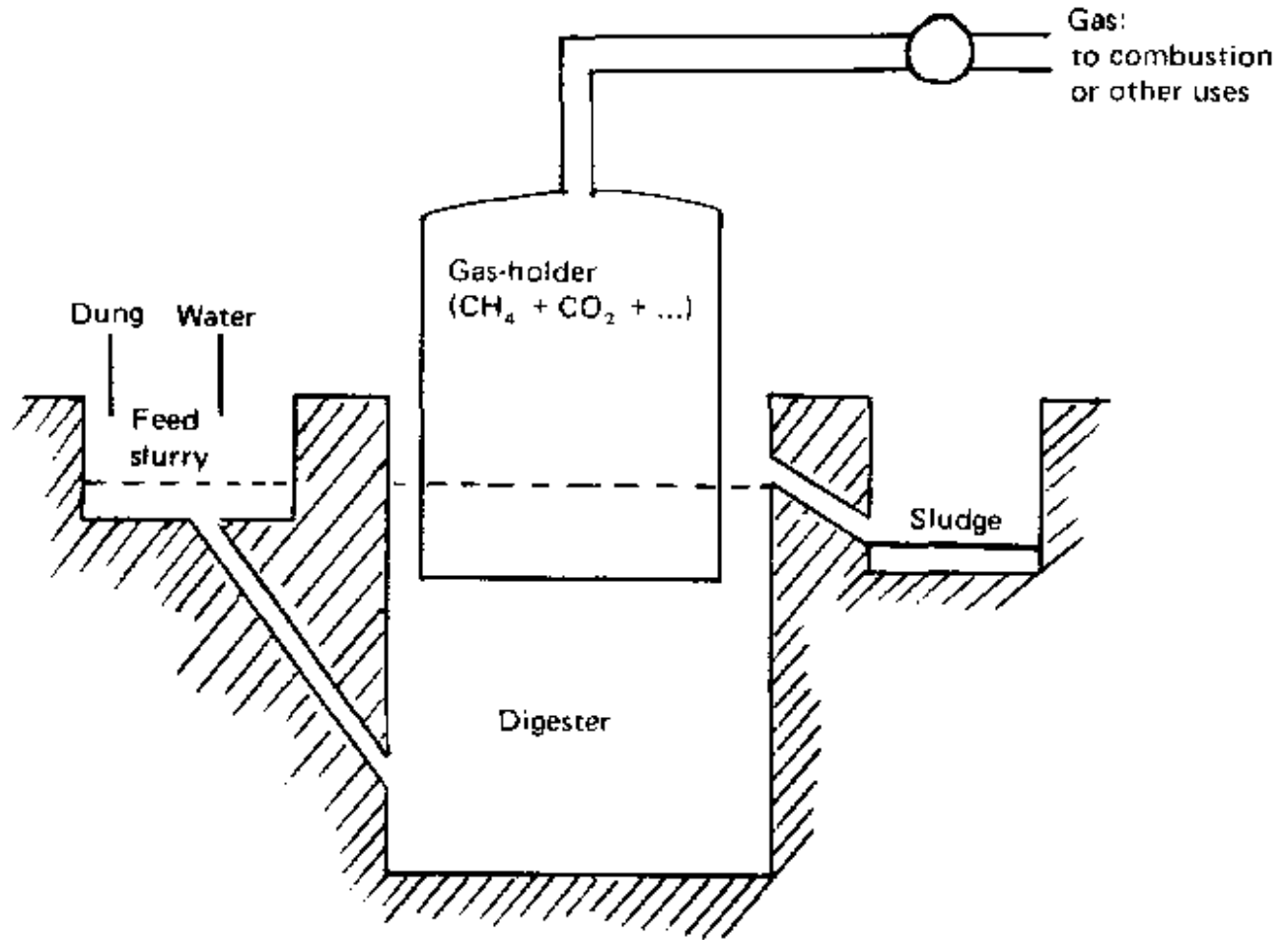


Diagram showing biogas production

## ENVIRONMENTAL POLLUTION

**Objectives:** At the end of this class students should be able to

Define environmental pollution

- Know the roles of Veterinarians in environmental health/protection
- Know the types of environmental pollution
- Understand the impact on human, animal, and plant health.
- Understand the impact of animal husbandry and use of agrochemicals on the environment.

Environmental pollution is any discharge of materials or energy into water, land or air that causes or may cause acute (short term) or chronic (long term) detriment to the Earth's ecological balance or that lowers the quality of life.

This can also be defined as the unfavourable alteration of our surroundings wholly or largely as a by product of man's activities, through direct or indirect effect of changes in energy patterns, radiation levels, chemical and physical constitution and abundance of microorganisms. These changes may affect man directly or through his supplies of water and agricultural and other biological products, his physical objects or possession or his opportunities for recreation and appreciation of nature.

Until recently in humanity's history, where pollution has existed, it has been primarily a local problem. The industrialization of society, the introduction of motorized vehicles and the explosion of human and animal population however has caused an exponential growth in the productions of goods and services. Coupled with this growth has been a tremendous increase in waste by products.

The indiscriminate discharge of untreated industrial and domestic wastes into waterways, the spewing of thousands of tons of particulate and air borne gases into the atmosphere, the "throw away" attitude towards solid wastes and the use of chemicals e.g. pesticides without considering potential consequences have resulted into environmental disasters which include the climatic change due to global warming, increase natural disasters, outbreak of diseases and zoonoses, etc.