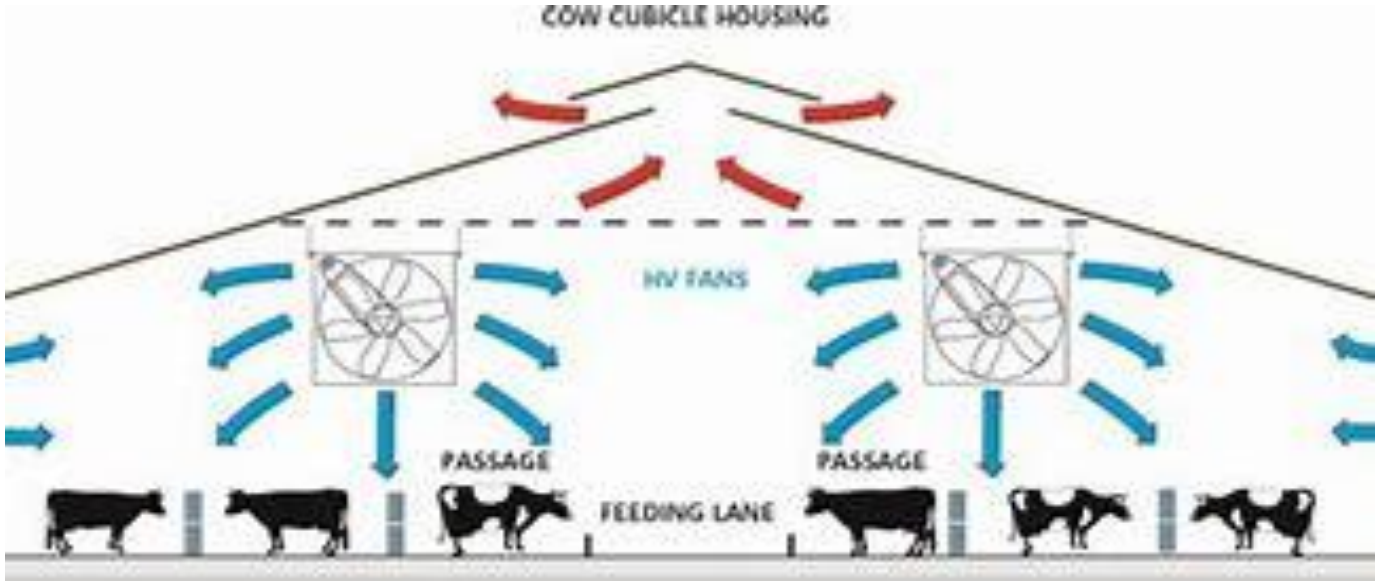
Environmental Hygiene

Ventilation in animal houses



VENTILATION

- **Ventilation in animal houses is required:**
  - ✓Removing stale air &
  - ✓To replace it by fresh air
- **Ventilation should be appropriate:**
  - ✓Very little ventilation or too much of it is injurious to the health of animals & their attendants
- **In improperly ventilated animal houses:**
  - ✓The stagnant air becomes warmer & more humid
  - ✓Condensation of water on the surface
  - ✓Bedding & floors makes them wet
  - ✓Animals become uncomfortable
  - ✓Leads to concentration of animals at places (uneven distribution of animals)
  - ✓Accumulation of excreta & expired air in pockets

VENTILATION

- **High humidity:**
  - ✓Lead to concentration of dust, particulate matter, ammonia, other gases
  - ✓Pathogenic microorganisms carried by animal facilitating exacerbation of respiratory & enteric diseases, mastitis & other illnesses
  - ✓High humidity with low temperature (during the winter months): favourable for the spread of various infections
  - ✓Gases from slurry pits or channels beneath the animals also expose the animals to intoxication

- **In over ventilated animal houses:**
  - ✓Accompanying draughts: during the winter months & cold climate of the hills
  - ✓Wasting of much of the valuable heat: many deaths due to chilling & lowering of the animals' resistance to pathogens
  - ✓Particularly so in case of new born & unprotected stock which becomes vulnerable to various diseases and deaths

VENTILATION

- Open ventilation of cattle yard
  - ✓Less problems & ample air flow promotes good growth of the coat
  - ✓Prevents accumulation of animal waste products in air
  - ✓Requirements for fattening piggery or brooder house for chicks are different

- While planning ventilation, main stress is given for avoiding draughts at ground level and open side of the yard to face towards the south

- The modern concept of ventilation aims
  - ✓The replacement of vitiated air by supplying fresh outdoor air
  - ✓Controlled in regards to its humidity, temperature & purity to provide a thermal environment that is comfortable & free from risk of infection

STANDARDS OF VENTILATION

- **The standards of ventilation:** based on the efficiency of ventilation in removing odour & obnoxious gases

- **The gases generated:**
  - ✓Carbon dioxide,
  - ✓Ammonia,
  - ✓Hydrogen sulphide,
  - ✓Methane,
  - ✓Carbon monoxide &
  - ✓Fumigation gases like formaldehyde, etc.

- The Threshold limit values (TLV) for animals are **lower than** that for man & deserve utmost attention

STANDARDS OF VENTILATION

Three standards are considered for ventilation:

- ***Cubic space:***
  - ✓The amount of carbon dioxide produced during respiration does not exceed more than 2 parts in 10,000 parts of air
  - ✓This would depend on the **type, age, & number of livestock housed therein**

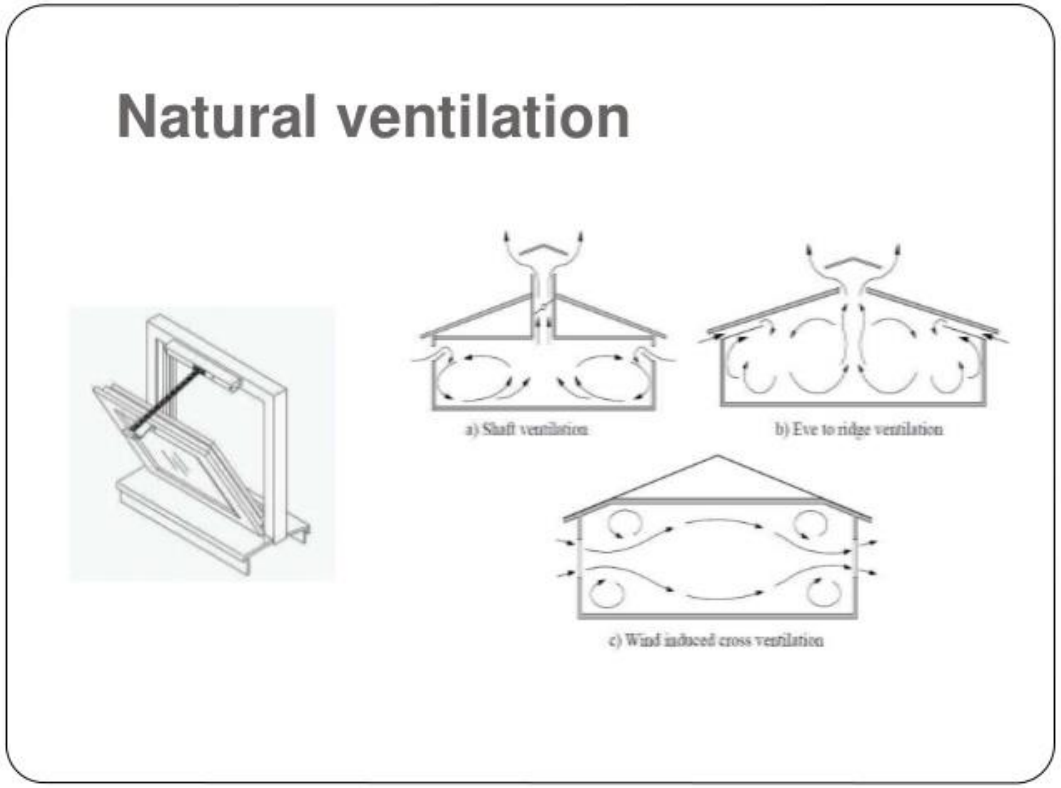
- ***Air change:***
  - ✓It is more important than cubic space requirement
  - ✓The cooling power of the air is to be maintained satisfactorily
  - ✓**The number of air changes/hour:** dividing the total hourly air supply to the house by the cubic capacity of the house

- ***Floor space:***
  - ✓The floor space per animal is more important than the cubic space
  - ✓Heights in excess of 3 meters are ineffective from the point of view of ventilation as the products of respiration tend to accumulate at the lower levels

TYPES OF VENTILATION

- **Types of ventilation: two**
  - Natural
  - Mechanical

- **Natural ventilation:**
  - Simplest system of ventilation
  - Depends on three forces:
    - Wind
    - Diffusion
    - Inequality of temperature



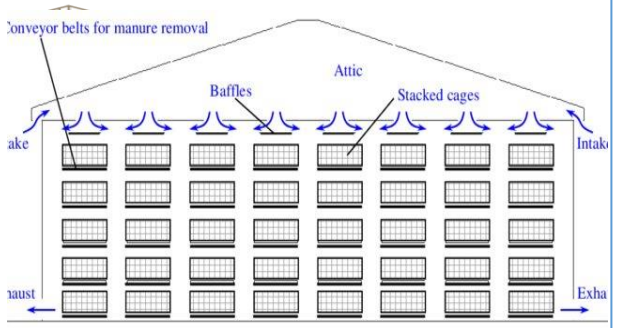
NATURAL VENTILATION

Broadly three types of natural ventilation are in use:

1. A fixed open ridge
   - with a protective cap: sufficient in climatic housing for cattle

2. A simple chimney type
   - Satisfactory for a limited area of controlled outlet ventilation
   - The throat can be controlled by a butter- fly value or hinged flap

1. Hopper- type windows
   - Fitted with gussets to prevent direct draughts serving as principal inlets
   - Small baffled openings left open during cold or windy weather



NATURAL VENTILATION

- **Automatic control of natural ventilation:** achieved by
  - ✓Regulating the open area with the help of automatic thermostatic means
  - ✓Linking the thermostat to a motor which progressively open or closes the ventilation flaps, inlets/outlets according to the temperature
  - ✓Breathing roof & upside down roof ventilation also provide good top ventilation
  - ✓Extraction of air form a limited number of ridge fans
  - ✓Entry of air through baffled inlets around the wall are the conventional methods for ventilating a livestock building

MECHANICAL VENTILATION

Mechanical or artificial ventilation can be effected by four means:

- **Exhaust ventilation:** Air is extracted to the outside from the inside by an exhaust fan operated electrically
- **Plenum ventilation:** Fresh air is blown into the room by centrifugal fans so as to create a positive pressure & replace the vitiated air proportionate
- **Balanced ventilation:** This is a combination of exhaust & plenum system of ventilation
- **Air conditioning:**
  - ✓ It is the simultaneous control of all factors affecting both physical & chemical conditions of atmosphere within a structure
  - ✓ These factors affecting both physical & humidity, air movement, distribution, dust bacteria, odour & toxic gases
  - ✓ Most of these affect the health & comfort of animals

MECHANICAL VENTILATION

A number of alternatives are also being developed as per need

1. Cross & end to end ventilation:
   - Animal house size: 12 m X 30 m
   - By fixing a number of fans in one of the side walls (opposite to the side wall providing air entry)

2. Ventilation of wide span building (14-22 m)
   - By diffusing the incoming air by means of a filter of glass- fibre or hessian
   - Peg board/slotted hard-board as 'diffusing' agents: prevent the clogging of the fine glass-fibre filters