



Dr. Bhasa Science

Sponsored by
The Science Foundation College
Uganda East Africa
Senior one to senior six

+256 778 633682 0753 143413

Based on, Best for Science

digitalteachers.co.ug



Nuture your dreams

P5 Integrated Science

term 1

THEME: Science in Human Activities and Occupations

Topic 1/4: Keeping Poultry and Bees

Poultry



These are domestic animals that are kept for eggs and meat.

Examples of poultry are chicken, ducks, turkeys and geese.

Importance of poultry

- (i) Provide meat and eggs that are of high nutritive value to the human diet.
- (ii) They are a source of income when sold wholly or after selling the eggs.
- (iii) Some poultry add beauty to places and therefore are kept for environmental purposes e.g. pigeon. Parrots.
- (iv) They provide market for industrial products like feeds, drugs etc.
- (v) They are used for various traditional functions and ceremonies.
- (vi) Poultry products serve as raw materials for industries e.g. feathers are used in feeling pillows and sofa sets.
- (vii) Some poultry especially the chicken provide entertainment in the old game with which fighting practiced in Asia.

The table below shows poultry products

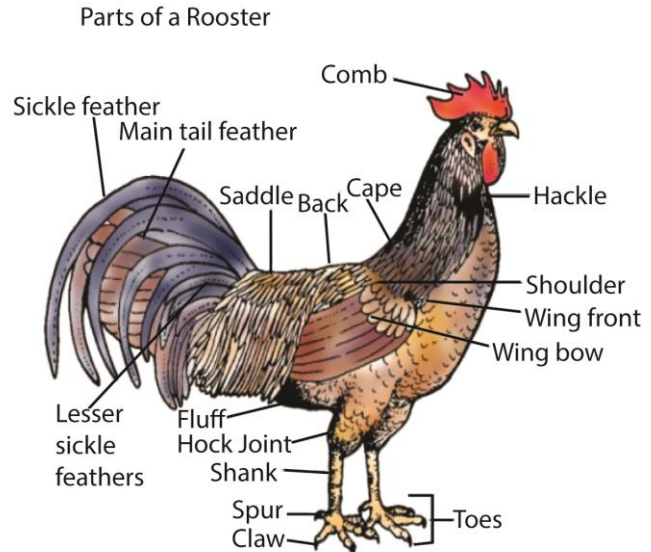
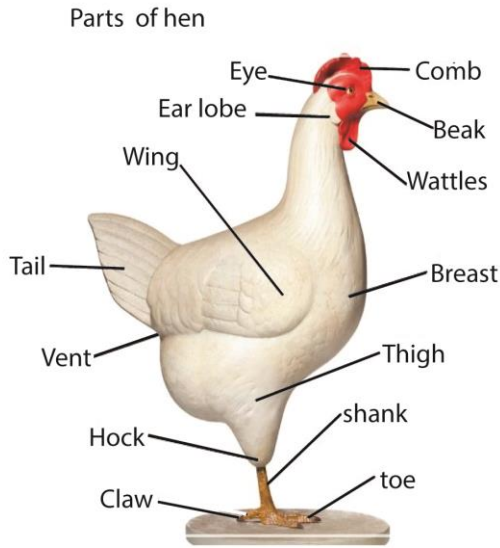
Animal type	Product
chicken (layers)	eggs
chicken (broilers)	meat
ducks	eggs and meat
turkey	eggs and meat
geese	eggs and meat

Exercise 1

Name the for different poultry birds kept at home

External feature of chicken





Differences between Male and female chicken

Feature	Hen (Female)	Rooster (Male)
Size	Smaller body	Larger body
Feathers	Less colorful, shorter tail	More colorful, long tail feathers
Comb & Wattles	Small	Large and prominent
Legs	No spurs	Spurs present
Egg laying	Lays eggs	Does not lay eggs

Exercise 2

State one difference between a hen and cock.

Differences between Local and exotic chicken

- (i) **Local chickens** are hardy, slow-growing, and produce fewer eggs but are tasty and disease-resistant.
- (ii) **Exotic chickens** grow faster, produce more eggs and meat, but need more care, feed, and protection.

Exercise 3

State one difference between local and exotic breed chicken

Management of poultry chicken

Housing

Importance of housing in poultry production

- Protects bird from thieves
- Protects bird bad weather conditions
- Protects birds from predators
- Reduces egg loss
- Limit movement and spreading of diseases
- Enables accumulation and collection of manure easy
- Enables easy record keeping and management
- Reduces wastage of feeds

Characteristics of a good poultry house

- It should be water proof to avoid damp conditions in the house that can easily invite pathogens.
- It should have proper ventilation to control respiratory infections.
- It should have a concrete floor which is easy to clean.
- Should be rodent and wild bird proof to avoid spread of diseases.
- Should be located within outer of the owner for security
- House should be well sheltered from direct sunshine and strong winds.
- The place where the house is to be constructed should be well drained.
- Should be an accessible place so that birds and eggs are easily removed when necessary and taken to the market.
- Should have enough laying boxes in case of layers to reduce rises specifically egg eating.
- Should have enough litter in relation to the bird population.

Exercise 4

State any two features of poultry house

Feeding

The amount and proportions of nutrients in chicken feeds depend on age and purpose of chicken being kept

Quality and quantity of feeds for chicks

Quality and quantity of feeds for layers

Quality and quantity of feeds for broilers

Common Chicken Pests

Pest	Symptoms	Control & Treatment
Lice	Itching, feather loss, pale comb	Dust chickens with approved insect powder, clean housing
Mites	Restlessness, anemia, scaly legs	Apply acaricides, disinfect coop, treat affected birds
Ticks	Weakness, blood loss, paralysis	Remove ticks, use tick control sprays, keep housing clean
Fleas	Irritation, scratching, reduced egg laying	Use flea powder, clean bedding, treat environment

Common Chicken Diseases

Disease	Symptoms	Control & Treatment
Newcastle disease	Sneezing, coughing, twisted neck, high mortality	Vaccination, isolate sick birds, disinfect housing
Fowl pox	Wart-like lesions on comb, wattles, beak	Vaccination, supportive care, control mosquitoes
Coccidiosis	Bloody diarrhea, weakness, poor growth	Use anticoccidial drugs, keep litter dry, good hygiene
Avian influenza	Sudden death, respiratory distress, drop in egg production	Strict biosecurity, report outbreaks, cull infected flocks
Marek's disease	Paralysis, weight loss, tumors	Vaccination of chicks, no cure once infected
Fowl cholera	Swelling of face, diarrhea, sudden death	Antibiotics (vet prescribed), vaccination, sanitation
Infectious bronchitis	Coughing, sneezing, watery eyes, reduced egg quality	Vaccination, good ventilation, supportive care

Key Prevention Tips of chicken diseases

- Maintain **clean housing and dry litter**.
- Practice **biosecurity** (limit visitors, disinfect equipment).
- Provide **balanced feed and clean water**.
- **Vaccinate** against major diseases (Newcastle, Marek's, Fowl pox).
- Regularly check for **parasites** and treat promptly.

Exercise 5

(a) Name two chicken pests and two chicken diseases

Vaccination

Vaccination is the process of giving a **vaccine** to a person or animal in order to **protect them from specific** diseases.

Importance of Chicken Vaccination

- Prevents **major killer diseases** like Newcastle, Marek's, and Infectious Bronchitis.
- Reduces **mortality and economic losses**.
- Improves **egg production and growth rates**.
- Builds **immunity** in the flock.
- Ensures **safe poultry products** for human consumption.

Common Vaccines for Chickens

Disease	Type of Vaccine	Age of Administration
Newcastle disease	Live or inactivated	Day-old chicks, then boosters
Marek's disease	Live vaccine	At hatchery (day-old chicks)
Infectious bronchitis	Live vaccine	Early life, with boosters
Fowl pox	Live vaccine (wing stab)	6–10 weeks
Coccidiosis	Live vaccine	Early chicks (in feed or water)
Gumboro (IBD)	Live vaccine	2–3 weeks old
Avian influenza	Inactivated vaccine	As per veterinary guidance

Methods of Vaccination

- **Eye drop** – for Newcastle and Infectious Bronchitis.
- **Drinking water** – for Gumboro and Coccidiosis.

- **Injection** – for Marek’s and Avian Influenza.
- **Wing stab** – for Fowl pox.

Good Practices

- Follow the **vaccination schedule** strictly.
- Use **clean equipment** and fresh vaccines.
- Store vaccines in a **cool place (refrigerated)**.
- Vaccinate **healthy birds only**.
- Keep records of vaccination dates.

Exercise 6

- What is vaccination
- Give two uses of vaccination
- State one method of vaccination
- How are vaccines stored

Ways of ensuring egg quality

- Keep nest clean. Maintaining clean nesting material will reduce microbial exposure when the egg is first laid.
- Collect eggs regularly at least daily and preferably twice a day to prevent breakage and possible contamination from fecal material and dirt.
- Clean dirty with water and dried immediately
- Store eggs in clean packaging materials.
- Storage conditions temperature 4 – 8⁰C and humidity 60 – 80%
- Feed layers on proper feed rations
- Sell first laid egg first
- Cushion the nest box to prevent egg breakage
- Sell/eat before spoiled
- Proper handling to prevent them from breaking.

Selection of eggs for hatching/incubation

1. Eggs selected should be fertilized therefore to ensure this a hen should stay with a cock for at least a week before laying at a ratio of 1 cock -12 hens.
2. Eggs of uniform size and shape should be selected for uniform distribution of heat during incubation.

3. Ensure that you select clean eggs.
4. Ensure that eggs selected have thick shells with no cracks to prevent breakage during turning and attack by microbes.
5. Eggs with abnormalities like meat and blood spots should not be selected.
6. Hands handling those eggs should be clean to avoid transmission of diseases.
7. Eggs should be from healthy birds [i.e. not from infected birds with coccidiosis, bacillary white diarrhea] which can easily be transmitted.

INCUBATION OF EGGS

This is the provision of warmth and optimal humidity to allow embryonic development of fertilized egg into a chick. The period varies between different birds.

Methods of incubation

There are two main methods of incubating eggs i.e.

Natural incubation

Artificial incubation

Exercise 7

Name two types of incubation methods you know

Natural incubation



This is where a broody hen seats on a clutch of eggs to provide conditions suitable for hatching to occur. Like humidity optimum temperature and adequate air supply.

In order to achieve the above conditions the hen does the following:-

1. It changes / turns her eggs using its beak so that all the sides of the egg get the same temperature.
2. The hen moves out quite often to allow the eggs cool down when the temperature rises and also to allow air circulate around the eggs.
3. The hen may sunbath and may get its chest wet so that when it goes back it can give the required humidity to the eggs.

Improvement of natural incubation

1. Make a good nest for the hen to guard against egg breaking.
2. Place the nest in a quiet corner at ground level for easy reach.
3. Provide plenty of clean water and enough food so that the hen does not spend much time looking for them
4. Protect the hen from parasites like mites and vermin by dusting the nest with doom or any other pesticides.
5. Dump the nest daily during drought to provide the required humidity.
6. Ensure that the hen is with the cock during and before laying time to ensure that the eggs laid are fertilized.
7. Remove oversized and undersized eggs or these with abnormalities before the hen starts incubating.

Artificial incubation

Under the modern machine called an incubator is used in the incubation of eggs.

Factors essential for incubation and proper hatching of eggs:

1. **Temperature:** this has to be effectively controlled between 32.2°C – 37.2°C . Higher temperatures can cause death of embryos especially from the 19th day of incubation onwards. Chicks hatched from high temperatures are smaller, lack alertness, have crooked toes, and necks. While low temperatures cause late and poor hatchability of eggs.
2. **Humidity:** chicken eggs require humidity of 60% during the first 18 days, then 70% later. Low humidity causes excessive loss of moisture from eggs resulting into small and hard chicks. High humidity may result into large chicks and may delay hatching.
3. **Air supply:** 21% oxygen is required in the incubator to allow adequate gas exchange between the embryo and out side
4. **Turning of eggs:** Eggs should be turned for the first 18 days of incubation once every 3hrs. After 18 days there must be no turning. This prevents embryos from sticking to one side
5. Egg must not have any defects like cracks and double yolks since such may not hatch
6. Providing a good nesting place to avoid breakage of eggs
7. Ensuring that the place of incubation is free from pests and vermin
8. Providing a balanced diet for the broody hen in natural incubation

Management in a hatchery

Hatchery sanitation is required to prevent infection in younger chicks. Diseases that can affect chicks in mismanagement hatcheries are new castle, Coccidiosis and other respiratory diseases. It's advisable to do the following:-

- i. Clean and fumigate the incubator / hatchery before setting in eggs.
- ii. Select clean eggs and fumigate them before incubation.
- iii. The hatchery should be located far away from any nearby poultry farm.
- iv. Have the incubator in a separate room where you meet people.
- v. Do not allow visitors in the hatchery except the hatchery attendant.
- vi. Vaccinate chicks against new castle immediately after hatching.

Systems of rearing poultry

Free range system

- Oldest system and adopted only when adequate land is available
- Rearing of poultry by letting them loose on ground (Field) called as range
- A range should provide shelter, greens, feed, water, shade etc.
- Foraging is major source of feeding for birds; Shelter is usually provided by temporary roofing supported by ordinary poles



Advantage of free range system

It is cheap

Disadvantage

- It is easy for diseases to spread
- Poultry may be eaten by animal
- Poultry can easily be stolen

Deep Litter System

- Poultry birds are kept in large pens on floor, mainly for broilers
- Floor is covered with litters, such as straw, saw dust or leaves up to depth of 2-3 inches
- Bird density: 5-7 birds per square meter

Deep Litter System



Advantages

Birds have easy access to feeds and water

Easy collection of eggs

Provides good protection to bird

Immunization and treatment easily provided.

Disadvantages

It is expensive to begin

Easy spread of diseases

Battery / cage system poultry farming



This is an intensive system of poultry production where birds are kept in individual cages indoors of about 0.14m².

Feeders and drinkers are arranged at one side.

The wire making up the floor is slanted to allow eggs roll to one side for easy collection.

Food and water may be mechanically provided or using computerized system.

The floor beneath the cages is made of concrete slanting at one side for easy drainage and cleaning

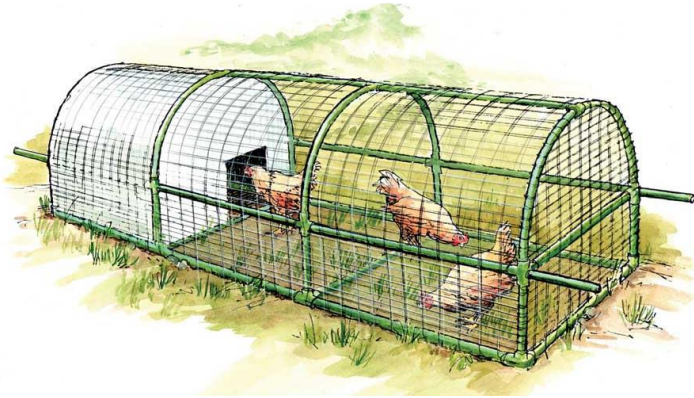
Advantages of cage poultry system

- Reduce chances of vices like cannibalism since birds are confined in individual cages.
- Feed and water contamination with droppings is reduced since water and feed troughs are located higher at one end.
- Clean eggs can be easily produced.
- It is easy to keep individual feeding and egg production records.
- Disease spread easily controlled since birds are confined.
- Bullying amongst birds is easily controlled since birds are under confinement.
- It requires less labor for management of large flocks.
- A large number of birds can be kept on a small piece of land
- Bird production is high since they spend less energy in movement.
- Culling out of birds is to carry out since they are in close observation

Disadvantages of cage poultry system

- It requires a high initial capital for installing cages and other equipment.
- Birds lack exercise which may affect their health
- It may require skilled labor to run the system
- There is a danger of concentrating parasites in the poultry unit
- Birds may not get vitamins like D from the environment

Fold system



A fold unit is the system whereby a **small portable house with a run attached is used** so that the birds can make use of the run during the day and the house at night. The fold unit is systematically moved daily over an area and therefore must be of size and weight which is easily moved.

Advantages

- It's easy to inspect birds and isolate sick ones.
- Manure is distributed evenly on the farm
- Birds are well protected against predators and thieves.
- The system can be used for commercial egg production.
- It's a more ideal system of raising breeding stock since birds are exposed to natural conditions that makes them hardy.
- Production is higher than the free range since birds spend less energy.

Disadvantages

- It may not be used easily on a ground which is not flat because the unit may be difficult to move.
- The system can accommodate a few birds so as to allow easy movement of the unit.
- The unit is quite expensive therefore may not be affordable to peasants.
- Birds' performance is affected by change in the environment.

Exercise 7

Name three systems of keeping chicken

Vices in poultry

A vice is a bad behavior practiced by birds e.g. egg eating feather pecking, cannibalism.

Causes of poultry vices

1. **Heredity:** some line of birds show more vices like cannibalism than others.
2. **overcrowding** in the poultry houses can cause vices like cannibalism as birds become more close to each other
3. Introduction of new birds in a flock with unique characters of the body and size may cause cannibalism and feather pecking.
4. Exposure of wounds and smell of blood can cause cannibalism
5. Lack of enough laying boxes which causes breakage of eggs and exposes eggs to the birds can easily result into egg eating.
6. Improper feeding of the birds that encourages mineral deficiency can lead to cannibalism
7. Bright light in the poultry house can stimulate feather and toe pecking.
8. Insufficient drinking and eating place may also lead to pecking as birds struggle to get near to feeds and water.
9. Irritation of the skin through direct sunlight and lice infection can result into cannibalism and pecking.
10. **Diseases** like gumboro can easily cause cloaca pecking since the droppings usually stick in that area.
11. Introduction of birds that are moulting (shedding feathers) in a flock can easily encourage cannibalism due to exposure of bare skin to other birds.

Control of poultry vices

1. The farmer should provide enough laying boxes that should be placed in easy to reach dark places.
2. The birds should be debeaked between 9 – 12 weeks in order to control egg eating.
3. Give the birds balanced feeds to reduce the laying of soft shelled eggs that easily break and cause egg eating.
4. Overcrowding of the birds in the poultry house should be avoided by reducing the stocking rate.
5. Greens to be fed to the birds should be hanged over their heads so that birds are kept busy.

6. Sick birds and weak ones should be isolated from the general flock to control cannibalism.
7. The farmer should remove all the slow moulting birds from the general flock since such birds encourage cannibalism.
8. The breeding stock should be selected from the birds that do not show any sign of vices.
9. The nests should be enough and must be well positioned to reduce accidents that can cause breaking of the eggs resulting into egg eating.
10. There should be enough feeds and water troughs for the birds.
11. Birds with lice infection and gumboro disease should be culled.
12. The farmer should treat external parasites and prevent diseases in the flock through vaccination.

Exercise 8

- (a) List two types of chicken vices
- (b) State two ways of controlling chicken vices

How to improve on the quality of their local breeds of chicken

- Maintain the coop.
- Protect the flock against disease.
- Invest in quality feed.

Bees keeping or Apiculture



Apis is a Latin word for bees. Honey bee is *Apis mellifera*

Terminology

Apiary/bee yard is a place where a number of bee colonies are kept

Bee keeping is the art and science of managing bees for honey, wax, and royal jelly production.

Apiarist is the bee keeper.

Bee baiting is the act of attracting bees to a hive by providing dummy larvae.

Brood is the early stages of bee larvae.

Brood comb is waxy comb from brood chamber of a hive containing brood

Caste is the type or member of the colony like drone, worker, queen

Colony is a group worker, queen and drones living together as a family

Importance of bees

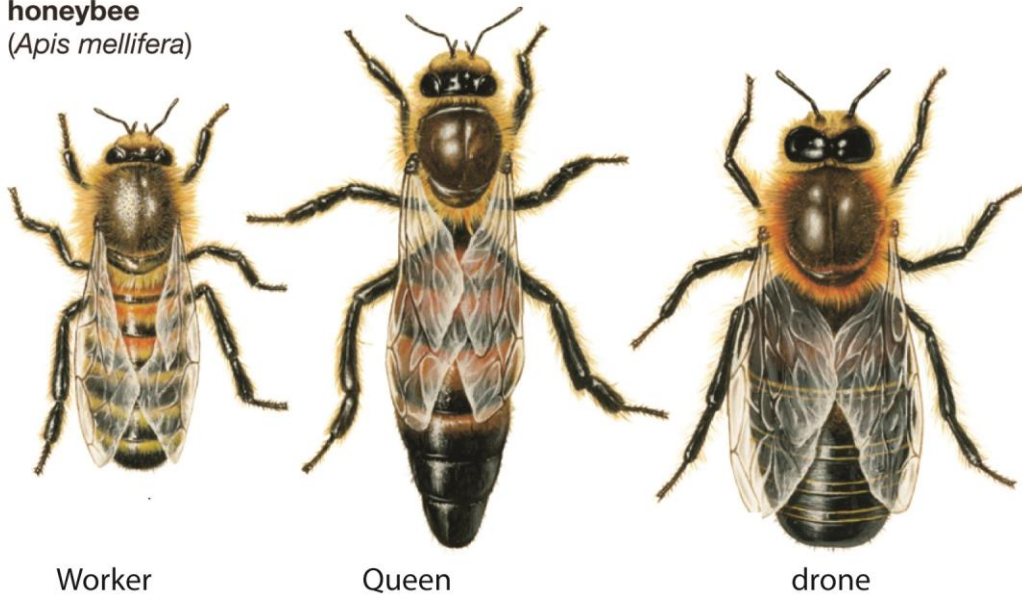
- Production of honey, pollen, wax and Propolis, royal jelly.
- Bees pollinate crop flowers
- Bee keeping provide employment
- Bee keeping is a source of income
- Bees provide products for treatment of human diseases (apitherapy)

Exercise 9

- (a) What is apiculture
- (b) Give one use of bees to plants
- (c) State one disadvantage of bee to plants
- (d) Suggest two uses of bees to man

Members of a bee colony

honeybee
(*Apis mellifera*)



- (a) **Queen:** is the largest bee in the colony used for production of eggs (workers eggs are fertilized while drones' eggs are not)
- (b) **Drone:** is the male bee that mates with the queen
- (c) **Workers:** are the smallest and most numerous in the colony

Functions of workers

- Cell cleaning
- Brood, queen and drone feeding
- Build combs
- Collecting and processing nectar into honey
- Defend colony against intruders
- Regulating temperature
- Foraging: collecting pollen as a protein source, nectar as energy sources, water to dilute honey

Exercise 10

State one function for each of the following bees in a hive

- (a) Queen
- (b) Drone

(c) Worker bee

Swarming of bees

Swarming: is the movement of bees from one place to another looking for new bee hive.

Causes of swarming

- Overcrowding
- When there is no enough room to build enough honey store
- The temperature is too hot. With higher temperatures, more space is needed for each bee to maintain a cooler temperature.
- The hive does not have proper ventilation and drainage.
- Outbreak of pests like mites
- Sick and infertile queen
- Strong bad odor can chase away bees

Prevent & control swarming

- **Always give your bees plenty of room.** Bees need room to rear brood, store honey, nectar, and pollen, and produce beeswax. If in doubt, **add more room!** Too much room is better than not enough, but if you notice bees aren't moving into their new space, it may be too much. Start by adding one Western Honey Super at a time.
- **When bees are in the process of building up the colony and growing, they should get a good amount of sunlight and warmth.** Later on, during the honey flow periods, it may be necessary to shade the hives if you live in a very warm climate.
- **Give your colonies plenty of good ventilation in warmer weather.** Take out entrance reducers during hot periods and try staggering the supers so they are not flush on top of each other—this allows more air flow. A screened bottom board can also help airflow through the hive.
- **Maintain good air flow and drainage to the hive at all times.** Keep grass trimmed around the hive and place the hive in an area that gets good air flow. Placing your hive on a hive stand can also help the hive stay ventilated.
- **Use young queens if possible.** Older queens have a tendency to fail during times of high growth and egg laying.

Common Bee Diseases and Their Control

Disease/Pest	Cause	Symptoms	Control & Treatment
American foulbrood (AFB)	Bacteria (<i>Paenibacillus larvae</i>)	Sunken, dark brood cells; foul smell	Burn infected combs, disinfect equipment, use antibiotics under vet guidance
European foulbrood (EFB)	Bacteria (<i>Melissococcus plutonius</i>)	Twisted larvae, yellow/brown color	Replace queen, improve nutrition, antibiotics if severe
Chalkbrood	Fungus (<i>Ascosphaera apis</i>)	Mummified white/black larvae	Improve hive ventilation, remove infected combs
Nosema disease	Protozoan parasite (<i>Nosema apis</i> or <i>Nosema ceranae</i>)	Diarrhea, weak bees, reduced honey yield	Keep hives dry, use fumagillin (where allowed), good sanitation
Sacbrood virus	Viral infection	Larvae die before pupation, form "sac"	Remove infected combs, strengthen colony health
Varroa mites	Parasite (<i>Varroa destructor</i>)	Deformed wings, weak bees, visible mites	Use acaricides, screened bottom boards, drone brood removal
Tracheal mites	Parasite (<i>Acarapis woodi</i>)	K-wing posture, difficulty breathing	Treat with menthol crystals or formic acid, requeen colonies
Wax moths	Insect pest	Tunnels in comb, webbing, destroyed brood	Strong colonies resist, freeze infected combs, traps
Small hive beetle	Beetle pest	Slimy combs, fermented honey	Maintain strong colonies, traps, soil treatment around hives

Key Prevention Tips

- Maintain **strong, well-fed colonies**.
- Practice **hive hygiene**: clean tools, remove infected combs.
- Ensure **good ventilation** and dry conditions.
- Regularly **inspect hives** for early signs of pests/disease.
- Use **approved treatments** (antibiotics, acaricides) only when necessary.

Bee hives

Hives are houses for bees

The qualities of an ideal beehive

- Should have enough space to accommodate comfortably the bee colony
- Should be durable made of hard wood
- Should have enough entries
- Should be clean
- Wall surface should be smooth
- Free from cracks and gaps between joints
- Should provide a dark and warm atmosphere inside
- Should be leak proof.

Factors affecting the choice of beehive

- Availability of capital
- Environmental conditions in apiary
- Knowledge and skill of the farmer
- Level of production

Traditional hives (fixed comb hives)

These include

- Long hive: a tree is felled and cut into cylindrical or truncated conical shape.
- Basket hive: woven flexible stick in cylindrical or truncated conical shape
- Grass hive woven dry grass in cylindrical form
- Clay-pot hive
- Gourd hive

Advantage of traditional hive

- They are cheap to buy
- They are easy to make
- They are not easily attacked by ants
- The colony is not constantly disturbed by the bee keeper.

Disadvantages of traditional hives

- Combs with brood are easily damaged
- It is difficult to control swarming
- The colony cannot be easily inspected
- Poor quality honey harvested

Example 9

- Name two type of beehives
- Give one advantage and one disadvantage of each beehive named in (a)

Improved bee hives

There are three main types of modern hive in common use worldwide:

(a) The Langstroth hive is made of



- Bottom board: a wooden stand on which the hive rests
- Frames and foundation: wooden frames hold sheets of bees wax
- Queen body/brood chamber: a large wooden body for bees to rear brood and store honey for their own use.

Advantages of Langstroth hive

- Easy to use and move if needed
- Seeking advice and support is easy, as there are many resources available
- Parts and equipment are widely accessible and affordable since it's the most popular type of hive
- Great yield of honey with this type of hive

- Greater flexibility and control for beekeepers, who actively manage their hives throughout the nectar-flow season
- Very few bees are crushed during hive manipulation
- The queen and brood undisturbed during honey harvesting
- Difficult to steal

Disadvantages of Langstroth hive

- Expensive
- Require skill to make
- Require many equipment to extract honey

Reasons for fixing of a queen excluder in a beehive

- It helps to confine the queen to lay eggs only in the brood chamber leaving the supers only for honey storage
- It ensures clean honey in the supers free from brood
- Wax harvested is clean
- It allows **honey** harvesting without much disturbance to the queen and the brood
- It encourages the queen to lay more eggs thus increasing the bee population and honey production.

(b) The top bar beehive



Advantages of top bar hive

- The combs can easily be removed from the colony for inspection and replaced
- Honey combs can easily be harvested easily without disturbing the brood nest

- Honey quality is improved since pollen and brood combs are not included in harvest
- It is easy and quick to inspect
- Bees are more docile during inspection since a small opening is made
- Simple to construct and cheap
- If necessary a queen extruder can be fixed to separate the honey from the brood
- Can easily be fitted with movable colony divider to provide more for a bee colony to grow.

Factors to consider when sitting an apiary

- Accessibility to water because bees need water for honey.
- Nearness to flowering plants to provide pollen and nectar
- Direction of the sun. Beehive should be placed facing north-south to avoid direct light and heat.
- Beehive need quiet place.
- Beehive should be placed in places with no strong wind.
- Beehive should be placed a safe distance from homestead and animal places to protect people from bee bites
- Beehive should be place in a place less humid place to prevent fungal infection.
- A beehive should be accessible to the farmers to harvest honey.
- Security from thieves
- Beehives should be protected from fire and smoke.

Methods used to encourage bees to colonize a hive

- Baiting: different baits are used to attract bees to the hive such honey and lemon grass.
- Providing a good environment in and around the hive i.e. cool dark environment
- Planting flowering plants; bee prefer to inhabit hives close to the flowing plants
- Placing a hive near a source of water
- Control predators like birds
- Capturing and placing the queen in the hive
- Using of pheromones in the new hive to attract bees in the hive
- Capturing and transferring a swam into the hive.

Common predators

- **Honey badger** are strong animals that enter unsecured hives and cause a lot of destruction
- **Ant**
- **Wax moth** make tunnels in the honey combs destroying broods and contaminating honey with their excreta
- **Predatory bird** eat bees and honey
- **Bee's louse** lays eggs on the combs which hatch into larvae and damage the combs
- **Varroa mite (varroa destructor)** are external mite that attacks and feeds on the bees and brood. It transmits a virus that cause disease

Measures to protect bee-hive from predators

- Suspend hive on wire to guard off honey badgers
- Seal off cracks and crevices on the hive
- Spread wood ash around hive wire poles
- Fence the apiary to exclude predator
- Cut off any vegetation touching hives
- Dispose of any infected combs
- Capture and kill predators
- Use scarecrows for bird
- Suspend hives on wires to guard off honey badgers
- By use of scarecrows.

Honey bee diseases

- (a) **Varroosis** is a parasitic disease caused by varroa American foul brood, chalk brood and nosema.

Signs

- Reduced hive activity
- Bees with deformed wings
- Abnormal swarming
- Stunted abdomen

Control is by controlling the varroa mites

(b) American foul brood is a bacterial disease

Signs

Sunken perforated cell capping

Control

- Discard infected colony
- Infected frame should be burnt to avoid robber bees from carrying spores to other colonies
- Replace old black combs with new ones

Honey harvesting

Precautions taken during honey harvesting

- Harvest when the honey is ready i.e. smell of honey, when bees are more aggressive than usual
- Provide protective clothing: Wear a long-sleeved shirt, gloves, long pants, and closed-toe shoes to protect your skin.
- Do not harvest during rain because water dilutes the honey
- Use suitable smoker
- Remove dirt from honey
- Avoid propolis and too much pollen in honey

Steps in harvesting honey

1. Inspect honeybee colonies. Put on protective gear to protect yourself from potential stings.
2. Use a bee smoker to scare away bees.
3. Take out honey frames from the apiary.
4. Remove wax caps from the honeycomb cells.
5. Extract the honey.

Uses of honey

- Food
- Health benefits such as healing cough and wound

- Sweetening agent in pharmaceuticals and food
- Flavoring agent in pharmaceuticals and food.

Apiary management

- Provision of water during dry season
- Provision of security by fencing
- Provision of shade to the hive
- Provision of foraging plant to provide pollen and nectar to the bees
- Swarm control

Economic Importance of Bee Farming

- **Honey production and sales:** Honey is the most recognized product, with strong demand locally and internationally. It provides direct income for farmers.
- **Beeswax:** Used in candles, cosmetics, and polishes, offering an additional revenue stream.
- **Royal jelly & propolis:** Valued in medicine and health supplements for their antibacterial and immune-boosting properties.
- **Pollination services:** Bees improve crop yields (fruits, vegetables, coffee, etc.), increasing farm productivity and food security.
- **Employment creation:** Provides jobs in hive construction, honey processing, packaging, and marketing.
- **Export potential:** High-quality honey and wax can be sold in global markets, earning foreign exchange.

Advantages of Bee Farming as a Business

- **Low investment, high return:** Requires minimal land and startup capital compared to other livestock farming.
- **Quick profits:** Honey can be harvested within the first year.
- **Sustainability:** Environmentally friendly, supports biodiversity and ecosystem balance.
- **Diversification:** Farmers can combine beekeeping with crops or livestock to spread risk.

Challenges to Consider

- **Pests and diseases** (Varroa mites, foulbrood).
- **Climate change** affecting flowering seasons.
- **Pesticide use** in nearby farms harming bee colonies.
- **Market access** and need for quality standards in honey processing.

Thank You

Dr. Bbosa Science