

Production of honey

The honey production is carried out in an apiary system where farmers have one to several beehives in a portion of the land or on a large scale basis covering a huge area with many beehives. The empty hives are placed high up on trees or suspended between poles and are occupied by passing swarms or stocked.

Siting of the Apiary.

In siting the apiary the following factors are considered:

- Availability of water — where water is not available in a 3 km radius, sugar solution or syrup is placed close to the hives in containers.
- Availability of flowers.
- A sheltered place – The bee hives should be protected from strong sun and wind.
- A place which is free from noise and other disturbances.
- Away from human beings and livestock. The apiary should be sited away from homesteads, pastures and busy roads.

Stocking the Hive; encouraging bees to enter an empty hive or actually putting them in it.

- (i) *Use of Swarm Net* —this is made by fixing a strong wire ring to a bamboo pole. A piece of mosquito netting is sewn onto the ring. Such a net is used for catching a swarm high up on a tree or telephone poles.



The bees which have been caught up by darkness or cold weather during swarming form a nesting swarm by hanging from a tree branch. These can be trapped using a swarm net when inactive and unlikely to sting. Trapped bees are

then transferred to a hive.

(ii) *Use of a Catcher Box* - A catcher box is a small hive which is movable. It is kept where it is likely to attract bees. In it, there are old combs and wax to attract bees. A week after bees have occupied it, they are transferred to the main hive.

Placing a hive in a permanent place and waiting for swarming bees to occupy it. Some old combs, wax and sheep sorrel are placed near and in the hive to attract the swarming bees.

In transferring bees from the net or box after catching them, it is important to know that on a sloping surface, they always move upward. The hive is placed at a higher position than the box containing the swarm and the two are connected by a sloping board.

A few puffs of smoke towards the swarm makes bees move towards the hive on their own. Alternatively the roof of the hive is opened and the swarm shaken into the hive. This is followed by returning the roof to cover the hive.

A honeybee starts the honey making process by visiting a flower and gathering some of its nectar and pollen which is carried into beehives. The nectar is regurgitated into the hexagonal cells where enzymatic reactions convert the nectar into honey. The pollen is used as every day food by the bees. Once honey is ready (capped honey cells) it is harvested by the beekeepers.

Feeding Bees

Bees feed on nectar and pollen from flowers. When flowers are not available, they are fed on sugar made into syrup with water at a ratio of 1:1 by volume. The jar containing syrup is placed about ten meters from the hive and should be cleaned regularly to avoid fermentation of sugar.

Reasons for Feeding Bees

- To maintain the colony. Well-fed bees do not have the tendency to swarm or leave the hive.
- To encourage multiplication. A well fed queen breeds regularly.
- To supplement what bees get from flowers. This is done during dry seasons when flowers are fewer.

Pests and Diseases Control

Pests and disease control is important for farmers to have profitable enterprises.

TYPE	RISK	CONTROL
Wax Moth	They make tunnels in the	Remove and burn all infected

	combs and contaminate honey with their excreta.	combs. Old combs or wax left after harvesting honey should immediately be melted
Bee Louse	This is a parasite of bees. The larvae are hatched in the wax and spoil the Combs. The adult louse is found on the thorax of bees. Several can be seen on the queen.	Smoke out the hive using a smoker that has some creosote to control the pest.
Honey Badgers	These are small strong animals which spoil hives and eat honey	Hung hives with wires so that they swing when the badgers climb on them. This makes the badgers to fall therefore discouraging them.
Man	This is a serious pest. Bees make honey as their food but man steals it from them.	Education and enforcement of the law.

HONEY BEE DISEASES

NAME OF DISEASE	CAUSATIVE AGENT	SYMPTOMS	CONTROL/ TREATMENT
NOSEMA	PROTOZOA <i>Nosema apis</i> It develops within the cells of the epithelium of the mid-gut of adult bees Spreads by bees drifting and package bees	Adult bees of all ages are infected Affects the alimentary canal of the adult bees Infected bees have swollen abdomen. Bees are unable to fly but only crawl. Faeces in and around the hive due to inability to work.	Good management – sunny well drained apiary sites. Requeening and strengthening by giving additional capped or emerging brood, sometimes allows population increase and overcomes colony weakness. Treat with 0.1gms of fungillin or fumidil “B” once or twice per year. Routine feeding of Fumidil-B to colonies

		Sudden fall in colony strength through shortening of life of individual bees.	being moved for pollination purposes would be useful in suppressing Nosema.
ACARINE	INTERNAL MITE <i>Acarapis woodi</i> (Minute mite which crawls into the bee's thoracic spiracles, choking off its supply of air and possibly secreting a toxin which paralysis the wing and flight muscles).	Adult bees of younger age. Discolouring of tracheal system of bees. Inability of bees to fly Wings held in abnormal position.	Treat by fumigating infected colonies with chlorobenzilate at 0.5g/colony. Prevent by practising high standards of Sanitary management.
VARROA	EXTERNAL MITE Mites normally seen on abdomen of workers and drones. They are dark brown and hairy measuring 1-1.5mm long.	Stunted growth of young workers and drones. Mortality rate 10-30%.	Use of acaricides e.g. phenothiazone and Paraformeldehyde + naphthalene at 100-150g/colony. Hive entrance should remain open during treatment.
BEE PARALYSIS OR BLACK BEE	VIRUS Acute Bee Paralysis Virus (A.B.P.V) Chronic Bee Paralysis Virus (C.B.P.V) Method of spread is unknown.	Black bee paralysis leading to crawling instead of flying. Shivering of bees. Diagnosis difficult.	None
DYSENTERY	Poor feed and associated with nosema infection Spread by drifting bees, but little or no spread except when nosema is directly involved.	Bees void faeces while in flight. If bees take food containing excess water, the bees are unable to fly, thus faeces are voided within the hive- spotting it.	Provide good feed – avoid poor food such as granulated honey or honey of high water content. Prevent nosema infection Use Fumidil-B

Handling Bees

Bees should not be frightened as doing so makes them wild and sting.

- Beehives should not be approached from the front.

- A smoker must be used properly. Two or three puffs are first blown round the hive. After a few minutes smoke out directly through the entrance holes.
- Bees should not be crushed during handling. This makes the whole colony excited.
- Movement towards the hive should be made quietly to avoid alerting them.
- If stung, the beekeeper should not run away or throw the combs down.
- A bee sting should not be rubbed. A sharp nail or a razorblade should be used to scrape it off. Pressing causes the poison bag of the sting to release more poison.
- In handling bees, always wear protective clothing. These are a veil, an overall, glove and gumboots.

Cost benefit analysis 20 log hives

Fixed costs of log hives apiary

Fixed Cost	Unit	Unit Price	No. of Units	Input Costs	Depreciation Cost/Year
Log hives	No.	1000	20	20,000	2000
Bee Suit (without gloves)	No.	3000	2	6,000	600
Pair of gloves	No.	380	2	760	76
Pair of Gumboots	No.	800	1	1,600	160
Bee brush	No.	190	1	190	19
Smoker	No.	850	1	850	85
Bucket	No.	200	20	4,000	15
Knife	No.	150	1	150	15
Total Fixed cost				33,550	3355

Variable costs for log hives apiary

ITEM/YEAR	1	2	3	4	5	6	7	8	9	10
Labour (Kshs.)	6300	6615	6946	7293	7658	8041	8443	8865	9308	9773
Transport Kshs.)	500	550	605	666	732	805	886	974	1072	1179
Incidentals	680	717	755		839	885	933	984	1038	1095

(Kshs.)				796						
TOTAL (Kshs.)	7480	7882	8306	8754	9229	9730	10261	10823	11418	12048

Total costs for log hives apiary

YEAR	1	2	3	4	5	6	7	8	9	10
Fixed Costs	3355	3355	3355	3355	3355	3355	3355	3355	3355	3355
Variable costs	7480	7882	8306	8754	9229	9730	10261	10823	11418	12048
Total Costs	10835	11237	11661	12109	12584	13085	13616	14178	14773	15403

Income from Sale of Crude Honey

Assumption:

- No. of harvests per year = 3
- Occupation rate = 80%
- Yield per hive per harvest = 10kg

Honey Yield:

$$20 \text{ hives} \times 0.8 \times 10\text{kg} \times 3 \text{ harvests/ year} = 480\text{kg}$$

Revenue:

$$480\text{kg} \times 500/\text{kg} = \text{Kshs}240,000 - (\text{total cost})$$

$$\text{Average Monthly income} = (\text{Kshs. } 240,000 - \text{Total cost})/12$$

From the analyses, 20 hives can give a rural farmer some reasonable income. But, with the intricacies of managing traditional log hives (e.g., placement of hives high on trees), and environmental concerns (number of trees to be felled so as to construct them), it will not be very easy for the farmers to manage them in such large numbers. It will be more viable to set up parallel apiaries with the modern hives. They are not only easier to manage, but also produce more than the traditional hives.