



## Lesson Plan

### Lesson 1:

Introduction about what happened in the hive during winter and what we have done.

We are checking now how the hive is doing, check feed and identify the queen and check if we find any eggs, larva, pollen, honey storage and fresh brood.

Talk about the bee-keepers equipment and how to use it.

Check of the quality of the hive if there is any damage.

Top up sugar syrup if required

1. Late autumn we took the last honey out of the hive and left only some for winter feed and fed sugar fondant to top up the honey stores and checked regularly if more fondant is needed.
2. Why fondant in winter and sugar syrup in spring? The sugar syrup can freeze even although there is a higher temperature in the hive and the fanning of the wings won't get the moisture out of the syrup.

### What happens to the hive during the winter?

1. The Bees will hibernate but still come out in a mild winter when the sun is out and temperature is above around 8-10 degrees.
2. A strong hive will form a cluster in the centre of the hive and keeps the temperature in the core of the cluster at between 13-35 degrees.
3. Queen stops laying eggs.
4. Drones get kicked out of the hive as they only "eat & mate". They don't sting, can't collect nectar, can't feed the larva so they are pretty useless in winter.
5. Population of the hive in the winter is around 20,000-30,000 compare to 60,000-80,000 in the summer.



## Lesson 2:

Spring – what is happening in the hive?

1. Kids will do the full inspection of the hive and explain what they are looking for. (Queen, eggs, capped and uncapped brood, drone cells, queen cells if there are any and if so destroy them to prevent them to produce a new Queen and swarm.
2. Check feed if temperature is still low and bees not been able to leave hive and forage.

## Question & Answers:

3. What is royal jelly and what is it for? Royal jelly is a “chemical brew” made from pollen and secreted from glands on the top of young nurse bees’ heads, also helps them become 42 per cent larger and weigh 60 per cent more than the rest. It’s full of nutrition and part of the queen’s diet. This mix makes the queen bee a queen bee. All the other larva is fed with honey and pollen only. The royal jelly is a white milky substance where the larva is “swimming” in.
4. Nectar is needed for food and provides an important energy source whilst pollen gives vital protein and fats.
5. How do the bees build the comb? They need to consume 8 ounce of honey to create 1 ounce of wax.
6. The glands of worker bees convert the sugar contents of honey into wax, which oozes through the bee's small pores to produce tiny flakes of wax on their abdomens. Workers chew these pieces of wax until they become soft and pliable, and then add the chewed wax to the honeycomb construction.

## Lesson 3:

1. Kids will do full inspection on their own
2. Quick reminder of the live cycle of the bee again  
Worker bee lives around 4-9 months in the winter but only around 6 weeks in summer do her hard work. Her cell is sealed after 8-9 days and she emerges after 21 days from the cell.  
Her job is to collect nectar, feed and care for the larva and feed the queen.



### Lesson 3 (cont'd):

Drone lives for 22 days in the summer and if not kicked out of the hive during the winter he lives around 59 days. The drone will emerge from the cell after 24 days and is mature to mate from his 37<sup>th</sup> day. The drone's only job is to mate with the queen.

The Queen lives up to 3-4 years. She emerges from her cell after 16 days and is mature and ready to mate at the 20<sup>th</sup> day. Her job is to lay eggs which she can do at round 1000-2000 per day.

- What happens if the queen is not performing?
- The queen can be killed by the workers and they will produce a new one. If they don't do so, the whole colony will die in a matter of weeks.

### Lesson 4:

1. Kids will do full inspection of the Hive.
2. Continue with lesson 3, start talking about too many queen cells and why swarms are happening in the spring time.

Swarms happen when new queens are produced, and they leave the hive to mate but can take a substantial amount of the hive population with them.

Reason for a new production of a queen can be that the "old" one is not performing, or the hive population is too big. In some cases, a queen can be killed by the colony.

Hive will need a "split" if population gets too big and to prevent a swarm or just to create a new colony.



### Lesson 5:

1. Kids will do full inspection of the Hive.
2. We talk about Hive record keeping and why it is important.  
Why do we keep records? – So that we can see what happened since our last inspection. Very helpful when more than 1 hives are present. This way we can identify early enough if something is going wrong and try and rectify it in time so the colony won't die.  
Also, it will give us a history of the hive performance and if hive got moved in the past we can see where it was performing best.
3. We will start going through the Hive record together.

### Lesson 6:

1. Kids will do full inspection of the Hive and identify any difference from last inspection and will do the hive record together.
2. Depending on how the colony and the weather is doing we start the installation of the super with Frames so the bees can start to store the honey.  
How do the bees “make” the honey from the nectar they collect from the flowers?  
Nectar — a sugary liquid — is extracted from flowers using a bee's long, tube-shaped tongue and stored in its extra stomach, or "crop." While sloshing around in the crop, the nectar mixes with enzymes that transform its chemical composition and pH, making it more suitable for long-term storage.

When a honeybee returns to the hive, it passes the nectar to another bee by regurgitating the liquid into the other bee's mouth. This regurgitation process is repeated until the partially digested nectar is finally deposited into a honeycomb.

Once in the comb, nectar is still a viscous liquid — nothing like the thick honey you use at the breakfast table. To get all that extra water out of their honey, bees set to work fanning the honeycomb with their wings in an effort to speed up the process of evaporation.



## Lesson 6 (cont'd):

When most of the water has evaporated from the honeycomb, the bee seals the comb with a secretion of liquid from its abdomen, which eventually hardens into beeswax. Away from air and water, honey can be stored indefinitely, providing bees with the perfect food source for cold winter months.

Some Facts about the amount of work a worker bee is doing for a jar of honey:

1. 1 bee visits between 50-100 flowers during a collection trip.
2. The average worker bee will produce around 1/12 teaspoon of honey in her lifetime.
3. A Hive of bees will have to fly around 90,000 miles to collect 1kg of honey.
4. A honey bee will fly up to 6 miles to collect nectar and can fly as fast as 15 mph.
5. The closer the flowers to forage the bigger the amount of honey they can produce.
6. Depending on the size of the hive and the length of the summer a hive can produce between 20-30 kg of honey.

## Lesson 7:

1. Kids will do full inspection of the hive and identify any difference from last visit and will do the hive record together
2. We will see if we can start to harvest the honey and explain when and how we do it. – once the comb is sealed and we gently shake and brush the bees off and place the frame in an empty super and replace the one in the hive with a new one.
3. This can be done depending on the weather every 7-10 days.
4. We will talk about some of the pests and diseases and what they can cause
  - Queenlessness – what happens if there is no queen in the hive?  
The colony will get disorganised and eventually die. This can be identified in not finding any brood and overproduction of new drones which will be shown how to identify a workers/drone or queen cell.
  - Small Hive Beetle – dark brown beetle about the size of a small fingernail and lays clusters of eggs which once hatched start to destroy the honeycomb and leave a slimy mess smelling of rotten oranges – can be treated with a beetle trap which is placed on the bottom of the hive.



Lesson 7 (cont'd):

- Pesticides – these can result in poisoning the bees which can result in death or they get disorientated and struggle to collect nectar and end up starving – collapse of the colony.
- Predators – like mice – a mouse guard should be applied.
- Predators – Asian hornet was brought in with imports from Asia to Europe and at the moment is found in areas of France. They have a wingspan of more than 7cm and can kill up to 50 honey bees every day.

Lesson 8 & 9:

1. Kids will do full inspection on their own and identify any changes.
2. Hive record is done together.
3. We will see if we can harvest any/any more honey and explain the extraction process from comb to jar.
4. Check the health and strength of the colony.

Lesson 10:

1. Kids will do a full inspection on their own and identify any changes
2. Hive record is done together
3. We will see if we can harvest any/any more honey
4. Check the health and strength of the colony
5. Start preparing for the winter in removing super frames and leaving enough honey as storage and start feeding sugar fondant which will be checked over the winter depending on the size of the colony and the temperature in a regular base
6. Getting the kids to give an overall of what they have learned over the season



### Q & A

1. Why do we need bees? / Do we need Bees? – Bees are the most important insects on the planet. With no bees there is no pollination of flowers/trees and any other plants and crops which will result in no food, no eco system no clothes etc.
2. How do the bees communicate? – They do their unique Waggle dance to find out where the nearest and best places are to collect nectar.
3. Some facts about bees:
  - 3.1. Their wings stroke 200 times per minute.
  - 3.2. The drone doesn't have a stinger.
  - 3.3. The queen bee won't die if she stings.
  - 3.4. Bees have 6 legs.
  - 3.5. Bees have 5 eyes.
  - 3.6. Unless a human is allergic it will take about 1,100 bee stings to be fatal.
  - 3.7. Each honey bee colony has a unique "odour" for members identification.
4. Is honey any good for us? – Honey is very helpful with colds and local honey can prevent or alleviate hay fever symptoms.

All lesson subjects can be changed depending on the weather if for example we have an early warm spell and we can harvest honey early etc we can swap other subjects.