

MBKA Beekeeping Course 2017

Session 1 notes

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Honey Bees' Lifecycle Slide

- Wasps** Many species. Carniverous; Paper nest; Colonies die in Autumn, Only Q hibernates, adults get sweet substance from larvae when feeding them aphids, etc. this stops in late summer hence maximum wasp population all then craving sweet things.
- Solitary bees** Many species. Individual bee lays an egg in a hole in ground or rock and supplies sufficient food then leaves. Typically nest in "villages" but are not social.
- Bumble bees** About 24 species in UK but only 6 are common. Nest in holes in ground, typically old mouse nests, colony contains up to 100 or 200 bees in summer but dies in Autumn, Q hibernates and starts from scratch in Spring. First generation of bees are small, getting progressively larger as colony strength means more adults to feed the larvae. Excellent pollinators. Forage independently, wandering from flower to flower, unlike the honey bees' collective decision making. Collect nectar but only sufficient for a few bees/days.
- Honey Bees** Vegetarian, social, 30,000 – 50,000 bees in height of season, reducing to 10,000 in winter, therefore convert nectar into honey for storage and collect in quantities we can harvest.
- The Colony** consists of: **Slide**
- wax comb
 - 1 queen
 - 0 – 2,000 drones
 - 10,000 – 50,000 adult workers
 - brood - by which we mean all eggs, larvae (in open cells) and pupae (in sealed cells)
 - pollen stores
 - nectar/honey stores
- Brood** **3 slides**
- Q lays egg in clean, empty cell.
A larva hatches after 3 days.
Workers feed the larva with a little royal jelly (from their glands) at first, then "bee bread" a mixture of pollen and honey.
Larva lies in a "C" shape and grows to fill the cell in 6 days

Cell is then capped

Pupation involves several moults over 12 days

Adult cuts away capping from inside and emerges 21 days after egg was laid.

So, 3 days as egg, (double it) 6 days as open larva, (double it) 12 days as sealed pupa = 3 weeks total.

This has many implications. eg: when looking in a hive you can estimate the relative quantity of eggs, larva and pupae. If the ratio is 1:2:4 then the colony is in equilibrium. If more eggs then egg laying rate is increasing (and hence colony is expanding - eg: Spring), if more pupae, then the opposite (eg: Autumn or Q has stopped laying for some reason).

Worker development Slide

V. important for beekeepers to know and understand the lifecycle of the various castes, especially brood development times.

Adult worker Slide Role generally depends on age, although this can be varied according to the colony's requirements.

3 weeks in hive doing these jobs in turn as the necessary glands develop:

- cleaning cells
- feeding larvae and queen
- processing honey
- producing and manipulating wax
- temperature regulation (ventilation or heat generation)
- guard duties

Then forager for as little as 3 weeks in summer and die out in the field. Do their wings wear out? I think of it as a work capacity rather than a lifespan.

Practical implication: Prolonged poor weather in summer means less foraging, so fewer bees dying but no fewer hatching hence potential overcrowding (which is a trigger for swarming).

Winter bees Slide Have to be more adaptable. Live for up to 6 months, little foraging, towards the end of their life they have to revert to the duties of a very young bee and produce food for new brood.

Domino Statements exercise

Drone

Slide

Larger cells are made by the colony when drones are required (ie: Spring). Q. measures cell size and if large then she lays an unfertilised egg. 3 days as egg, 7d as larva, 14d as pupa = 24d.

Domed capping. The longer pupation is relevant to the varroa reproductive cycle which happens mostly inside the sealed cell, hence varroa prefer drone brood to worker brood.

Adult drone may migrate between colonies, feeds itself but has little useful purpose within the colony and they are ejected in Autumn. Sole objective is to mate with a queen in flight. Dies immediately if successful.

Queen

Slide

Q. cups often present, only when they contain an egg or are extended to form Q. cells does this indicate a queen is being raised which means the colony is likely to swarm.

Fed royal jelly only and lots of it.

Develops faster than worker: $3 + 5 + 8 = 16d$.

Slide When hatched the new Q. seeks out and kills any other queens, sometimes while they are still in their cell. Goes on one or more mating flights between 4 days and 3 weeks. Mates with several (10 – 15) drones (to ensure genetic diversity). Stores sperm for the rest of her life (3-4 years) and fertilises each egg as she lays it. Hence genetic characteristics of a colony can vary as one drone's sperm tends to be used for several weeks/months, then another, etc. Lays up to 2,000 eggs per day. Fed by worker bees – higher energy food than nectar.

Superorganism Slide

It is helpful to consider the colony as a single organism. An individual honey bee can't survive more than a few hours outside the colony. They are like the cells of a mammal, adapted for a specific purpose. Together they maintain a core temperature. The queen laying brood and the death of individual bees is analogous to the creation and dying of cells in a mammal. Swarming is the reproduction or multiplication of the organism.

Swarming

Slide The natural reproduction of the colony and the mechanism by which the species can continue. Essentially half the bees leave with the queen to find a new nest site leaving half behind with the brood to raise a new queen and continue.

The main **trigger for swarming** is a lack of queen substance but this can happen for several reasons and there are other factors too. Queens can live for around 4 years but produce 50% less Q. substance each year so swarming becomes more likely with age. If a colony is crowded then the Q. substance cannot be passed around the hive as effectively and net effect is that each bee gets less.

So once triggered. **Scout bees** start to search for suitable nest sites several days before the swarm leaves and the workers **feed the queen less** so her egg laying rate reduces and she slims down ready for flight. Usually swarm on the **first fine day after the first Q. cell is sealed**. This could be just 5

days after it was an egg in a cup – hence weekly inspections during swarming season.

The bees **gorge on honey** just before take off so that they have fuel for a few days if necessary and can immediately start to build wax on arrival in new nest. It takes 6 times as much nectar to produce wax as it does to produce the same weight of honey.

The swarm **emerges** around midday. About half the adult bees, a mix of all ages. Large cloud of bees soon settle on a branch, usually within 100m of original nest. At this stage very docile – not defending a nest and full of honey so less able to sting. Scouts seek and report on potential nest sites. Reaching a consensus may take a few hours or up to a few days (especially if rain reduces scouting). This is the point at which a beekeeper can collect the swarm – literally put it in a box and carry off and put in a hive and hope they like it. After a few days hanging in a tree then the swarm may be less docile!

Back in the old nest there are usually several Q, cells. When the first hatches it may seek out and kill all the others, but alternatively she may fly off, as a virgin queen, with about half the remaining bees in what is called a **cast**. This is even worse news for the beekeeper than the prime swarm. It can happen several times but becomes less likely as the number of remaining bees reduces. But it is possible for a colony to issue several casts and be left with very few bees which have little chance of building up to a viable colony size to survive winter.

Stimuli

Slide. Most of the stimuli for the colony to act in a specific way are chemical – pheromones. Various pheromones are emitted by the Q, workers and brood.

Queen substance is one of the most important – workers in the queen's retinue lick this from her body and pass it around the hive. It suppresses the development of ovaries in the workers and the development of queen cells. It promotes cohesion, keeping the colony "content". They would know within an hour if Q is missing and start to act to prepare a new Q by feeding some young larvae more royal jelly and extending their cells into Q cells.

Each colony has a specific "scent" and bees from another colony will not be tolerated (unless they come with a load of nectar and are submissive). So combining colonies is not straightforward – it's not just the queens that will fight.

Vibrations are transmitted from bee to bee and through the comb. This is why bees often detach the bottom of some of the combs from the wooden frame. The waggle dance is the prime example. **Slide** Figure of eight pattern on the surface of the comb with a rapid buzzing waggle in the middle.

The direction of this waggle walk relative to vertical indicates direction of nectar source relative to the Sun, The duration of the buzz/waggle indicate distance. A taste of the nectar shows what to look for. One bee shaking another is used for recruitment to foraging duties or to a preferred site when swarm scouts are “debating” potential nest sites.

Quantity of food available influences behaviour in several ways. etc. How long it takes for a forager to be “unloaded” by a house be is a measure of whether more bees are required for that duty or more comb is required for storage and if so the forager will shake some dormant bees in a certain way. Another form of shaking will mean “we need more foragers” because there’s some good nectar available. Lots of nectar also means the queen is fed more and so lays more eggs, ie: there is some form of feedback loop to build up the colony size according to availability of food.

It’s dark inside the hive but **vision** is important outside. Use polarisation of light to orientate direction relative to the sun even when cloudy. See UV as some flowers are adapted to advertise in this way. Attracted to rapid movements, especially when on guard duty as this could indicate threat, eg: a robbing wasp approaches a hive in a different way to that which resident bees do. Therefore avoid rapid hand movements above an open hive or “swatting” an annoying bee within sight of the hive entrance.

Bees **orientate to a nest site** very accurately. First they fly around close looking at the entrance and moving away slowly getting visual fixes on position. Only move a hive less than 3 feet or more than 3 miles. Between these distances would result in foragers returning to the old site and becoming lost. If moving 3 miles or more then give some obvious distraction in front of the entrance for a day or two to make it clear something is different so the experienced foragers don’t just shoot out assuming they know where they are. Nest orientation is somehow reset on swarming.

Lunch

Keeping Bees – The Basics

Commitment: Animal husbandry – responsibility to the bees and to the public;
Time: ? like gardening!
inspections (weekly at some times of year), respond quickly to situations (eg. swarming),
planning – keep ahead of bees’ needs,
making equipment – basic woodworking useful,
continuous learning process – BKA meetings, reading, etc.,
Space: apiary, equipment storage, extraction.
Cost: hive - £180 - 250

suit - £50 - £100

smoker, hive tool, feeders, etc. - £50

Extraction equip is expensive so borrow from MBKA at first

Bees –swarm for free or £100 for nuc. or up to

£200 for full colony.

So about £400 – £500 start-up costs

But then get perhaps 30 – 60lbs of honey per hive per year valued at over £5 per lb.

Recurrent costs very low, just sugar feed, any necessary varroa medication, wax replacement, annual BKA membership, books, etc.

Equipment: It's likely you will want more than one hive after your first year. If all goes well you can expect to be expanding to two or three hives within a couple of years so you might want to plan for this in terms of cost and space.

Clothing: Show Examples
One-piece suit or separate jacket and trousers (tucked in).
Veil only is not sufficient for most beekeeping activities – only good for occasional “visitors”.
Wellies or boots and gaiters.
Gloves – leather, “Marigold”, latex or none. Beware canvas cuffs
Bees crawl upwards and get feet caught in anything woolly, so skirts are not a good idea and trousers tucked into socks can result in stung ankles.
Dislike body odours or perfumes and deodorants, etc. and detect CO₂ in breath so often target face and cracks/joints in clothing around wrists and neck.
What to do if bee gets inside veil. Don't panic, there's only one. Move well away from hives before removing veil. Can probably squash it.
Check each other are **bee-free** before removing veil afterwards.
Don't get complacent – temperament varies.
Keep clothing clean to remove sting pheromone.

Explain distinction between **Colony; Hive; Swarm.**

Equip. purchase Free old WBC hives available.

20% off Sherrif clothing until end of Feb: Quote offer code: 20bcraft

WBKA convention – I am willing to arrange a bulk purchase of hives, frames, wax – everything you need except Beesuit.

Buz Eryri scheme

Getting bees: Slide. Hopefully a mentor will assist and advise you in how to obtain bees. Likely to be in June with only a few days notice. You must be ready, ie: hive and frames built, apiary location found, hive stand ready, got a suit, smoker and hive tool.

If you collect a swarm (we will explain later exactly what a swarm is) then the bees will be ready to build lots of wax (so they should cope with a hive full of foundation) and it'll be an experienced queen ready to lay lots of eggs as soon as there's comb to lay in. They may need some feeding to get them established and to help draw out the foundation. Swarming invigorates a colony, as does fresh comb, so it's likely they will build up strength quickly and, depending how early in the season you collected them, you might get a surplus of honey to harvest at the end of the season. It's unlikely, but not impossible, that they'll swarm again that year.

If you get a Nucleus – get it from a reputable source and be aware of NBU guidance on sale and purchase of nucleus colonies.

A nucleus will normally be on 5 frames, 2 or 3 with brood at all stages and two frames of stores of nectar and pollen. Ideally it will have a new queen, but you should check this with your supplier. If it's a new queen you would be very unlucky for them to swarm in the first year. If she's last year's then it is more likely. The colony should build up strength fairly gradually through the summer reaching full strength by the end of Autumn but is unlikely to provide a harvest in the first year.

If you collect it in a nuc. box: place the nuc box on the site your hive will occupy, facing the correct direction, open the door and let the bees orientate to this site for at least 24 hours. Then, move nuc box to one side, position your hive, remove 5 frames of foundation from the centre, move each of the 5 frames with bees on from the nuc. across to the hive, keeping the same order and orientation. Look at the brood and look for the queen as you transfer them. Shake or gently brush any remaining bees from the nuc box onto the open hive. Feed syrup unless there's a strong nectar flow. For this you need a contact or rapid feeder and a spare super box without frames. Close up. Check weekly to watch how the colony is drawing the foundation and how the brood nest is expanding. When there are about 9 frames drawn, add a queen excluder and a super with frames of foundation so they can start to draw wax above the brood nest and because the colony is likely to need the extra space for bees by that stage.

If you buy a full colony – get it from a reputable source with a known history. Old equipment should not be re-used without first sterilising with a flame torch. Do not re-use old wax comb.

Get locally adapted bees if possible. Some nucs should be available from MBKA members and possibly from the Association apiary but we cannot guarantee anything and are unlikely to be able to supply everyone. Let us know early if you'd like one and then tell us as soon as you are ready, ie: hive and frames built, apiary location found, hive stand ready, got a suit, smoker and hive tool.

How many colonies?

Several reasons why it's better to have at least two hives rather than trying to maintain a single. **Suggestions why?**

- To compare relative strengths of colonies to get an indication of weakness,
- Weakness of one colony, beekeeper's mistakes, or other "threatening" situations are not so critical as the situation can often be salvaged by "using" the other colony.
- To share or equalise stores,
- To boost or weaken a colony by adding or removing a frame of brood,
- To provide eggs to a queenless colony,
- To increase your rate of learning.

Many forms of swarm control result in the creation of a second colony. You may combine two weaker colonies before winter to create a stronger colony through winter and then split in spring/summer.