

# **Beekeeping Certificate III**

## **Participants Learning Guide**

### **RTE3155A Manipulate honeybee brood**



**Australian Government**  

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**Department of Agriculture,  
Fisheries and Forestry**



**Australian Honey Bee  
Industry Council**

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Judith Nettleingham and Bruce White assert their moral rights to be identified as the authors of this publication.

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## What this learning guide covers

This learning guide will help you meet the requirements of the unit of competency:

- *RTE3155A Manipulate honeybee brood*

You can undertake this unit by itself or in conjunction with other units of competency, such as:

- *RTE2157A Open and reassemble a beehive*
- *RTE3407A Identify and report unusual disease or plant pest signs*
- *RTE3415A Manage pests and disease within a honey bee colony.*

## Resources you will need for this unit

For this unit of competency, you should have:

- Participants Learning Guide (this booklet)
- Participants Assessment Workbook
- active hives and equipment
- replacement queen bee(s)
- if purchased interstate, a health certificate for the queen bee(s)
- tools and equipment:
  - personal protective equipment:
    - bee veil
    - gloves
    - overalls
    - safety goggles
    - steel capped boots
    - sunhats and sunscreen lotion.
  - bee smoker
  - fire extinguishing equipment

- hive tool
- spare boxes
- matches
- smoker fuel
- safety box for smoker
- newspaper to first start the smoker
- water to wash hands and put out smoker.

**The Participants Learning Guide** is designed to introduce the topics and to provide you with some practical and written activities which will allow you to develop both your knowledge and skills in each area.

**The Participant Assessment Worksheets** include activities that you will be completing as part of your formal assessment for this unit.

Please record as much detail as you can as your responses to these activities will form part of your assessment.

You will need to send the Participants Assessment Worksheets to your assessor. Check with your assessor to find out if they need you to submit this Participants Learning Guide as well.

## Introduction to this unit

In this unit, you will learn about:

- when and how honey bee brood should be manipulated to achieve desired result
- opening hives and removing and repositioning frames safely and with minimal damage or unintended disturbance to brood..

**Before you start this training you should be confident about your skills to:**

- handle bees
- handle materials and equipment
- use a bee smoker.
- work by yourself or in a small team
- clean up on completion of work.

**You should know about:**

- bee behaviour
- bee-handling techniques
- different types of manipulation that may be used to achieve desired result
- purposes for which brood may be manipulated
- safe work practices.

# 1. Prepare to manipulate brood combs

## What is brood?

'Brood' is the eggs, larvae and pupae of the bee. All these stages of the bee's development can be found within a colony at the same time. How long the brood is at each stage of development depends on the caste of the bee. Brood is tended by worker bees.

## Why manipulating brood is important

Brood manipulation is practiced by successful commercial beekeepers to force the queen to increase the brood nest so that more worker bees are present in the colony. The more workers, the greater the potential honey yield or quantities of package bees to sell.

Regular brood examinations are an essential part of competent management and if done properly it will lead to better production and profit by:

- early detection of any particular disease problems thus reducing losses.
- swarm control before the swarm escapes.
- indicating the brood, honey and pollen stored in the brood nest
- the condition of the queen and the ability as an egg layer
- the temperament of the colony
- indication of brood rearing condition if the brood nest is reducing or expanding
- indication it may be possible to divide the hive
- to cull combs
- encouraging increased hive population.

If brood manipulation is practised at the wrong time of the year, or the brood is over-spread, serious damage can be done to the colony.

This learning guide will help you judge when and why to manipulate brood to achieve the best results.

Be aware of possible risks to yourself and others:

- bee stings

- dust
- airborne and soil micro-organisms
- fire
- holes in uneven surfaces
- noise
- incorrect manual lifting
- wildlife, including snakes and spiders
- domestic stock
- solar radiation.

**Activity**

What do you think are the most likely OHS hazards that might occur while you are manipulating brood?

What can you do to prevent this?

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## 2. Manipulate brood

### Opening the hive

First puff smoke at the entrance under the lid.

Remove the supers if necessary.

Puff smoke over the frames to expose the brood nest.

### Timing

The best time is a warm sunny day when the majority of the foragers are in the field. Days of gusty winds and rain are not the time to open colonies to examine the brood nest.

### Activity

Ask your supervisor or advisor what time of the year they manipulate brood and their reasons.

Make a note of their responses.

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### Quantity of brood

There is a ratio between the quantity of brood and the adult population. Provided the hive is healthy, brood manipulation can be beneficial to the colony.

As a guide, a single hive should have at least 4 -5 frames of brood in the spring.

A two-deck hive with or without a queen excluder should have at least 6-9 frames of brood in the spring

Colonies in winter will have 1-2 frames of brood. In the Tablelands areas, at some times there may not be any brood.

Colonies expanding out of winter when breeding conditions are good could have all their frames covered with bees with brood present. This could lead to starvation if the weather turns wet or cold and the bees can't forage.

### **Brood cycle**

There should be a reasonable uniform spread of the brood ages in the hive.

The normal cycle for brood in days is:

|               | <b>Egg</b> | <b>Larva</b> | <b>Pupa</b> | <b>Total</b> |
|---------------|------------|--------------|-------------|--------------|
| <b>Worker</b> | 3          | 8            | 10          | 21           |
| <b>Drone</b>  | 3          | 11           | 10          | 24           |
| <b>Queen</b>  | 3          | 7            | 6           | 16           |

**Queens may go 'off the lay' for the following reasons:**

- disturbance due to migration
- swarming
- change in nectar or pollen flow
- weather that stops flight of workers
- antibiotic treatment
- failing queen.

### **Removing the combs**

- Puff smoke over the frames
- Remove the frame using the hive tool, second from the wall on the side of the box you are standing.

### **Holding the comb**

Always hold the comb by its lugs and suspend it as near vertical as possible.

Hold it at eye level so you can examine the bees.

You can also tilt the frame for a better view.

Look at both sides.

If you wish to examine the brood, you must shake the bees off at the entrance or back into the hive first.

Once the examination of the first comb is complete, it is best to place it into an empty box beside the hive.

You can then remove and examine all the frames by removing the wall comb and placing it back into the brood box.

Then work across the box, replacing the frames back into the brood box in the same order.

Once finished, take the first frame you removed and if bees are on it, shake the bees at the hive entrance so they are not squashed when the frame is returned to the brood nest and place the frame into its original position

Replacing combs in the same order is a habit that all beekeepers should acquire as this ensures the security of the colony the bees want.

### **Frames replaced in a new sequence or removed**

However, with knowledge, beekeepers can interfere and adjust the brood nest to make the hive more productive, or increase the number of hives for the following reasons:

#### **Swarm control**

If a colony becomes over-populated, it is likely to swarm thus losing half the colony's field bees.

You can control this by removing four frames of brood and bees and replacing the brood frames with comb foundation. This is only ever done in the swarming season in warm weather.

Place the foundation between frames of brood so you have the wall comb, frame of foundation and so on until you have used the four frames of foundation.

If swarm cells are present, they must be broken down at this time.

By doing this you have removed four frames of bees and brood and the hive is unlikely to swarm.

The frames of bees removed can be used to strengthen weaker hives or start new colonies. This is done by moving the removed bees and brood to a new site so the bees don't drift back to the original hives and then introducing a queen cell or laying queen.

Always check the health and condition of bees before combining them with others.

### Expanding the colony

Sometimes, after a heavy pollen or honey flow or if a queen is failing, brood nests can become constricted by frames full of honey or pollen, giving the queen very little room to lay.

Under these circumstances, the colony will expand quicker if the full combs of pollen and honey are removed during spring and summer. In warmer areas you would do this in early spring or on a winter honey flow that provided nectar and pollen, such as spotted gum.

The combs are replaced with drawn combs of worker brood and are placed on both sides of the original brood nest as the hive may be down in adult bee numbers.

If the cause is a failing queen, she should be replaced at the same time as the frames are adjusted.

Frames can be manipulated to encourage hive expansion when the brood nest is normal. In spring, and summer when the weather is warm, it is possible to split the brood by placing one or two drawn worker combs between existing frames of brood in weaker colonies.

If a hive has eight frames covered with bees and five frames of brood, two drawn frames can be placed between frames with brood provided the bees in the hive can cover the existing five frames of brood and the two frames you inserted between the existing brood frames.

With strong colonies, it is possible to remove brood and bees to increase your hive numbers.

Select strong colonies and remove three frames of bees and brood replace these frames with either drawn worker comb or combs of foundation.

Place the frames between frames of brood. If bees still cover all the frames or the replacement combs at the edge of the expanded brood nest, then as the colony expands they will work the combs.

To make up the increase, the brood and bees are placed into a nucleus box and removed to a new location and given a queen cell or introduced a new queen.

**Activity**

Ask your supervisor or advisor under what circumstances they split brood using drawn combs, or foundation, or both and why.

Make a note of their responses.

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**Activity**

Ask your supervisor or advisor how they would increase hive numbers from their existing apiary.

Make a note of their responses.

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**Lifting brood to increase brood area**

When they want to increase numbers, some beekeepers will lift up brood frames to the super, often above an excluder, replacing the lifted combs with drawn combs or foundation spaced between existing brood.

At times, the bees may draw queen cells on the lifted brood. Check for this after four days and break down any queen cells so that the colony won't swarm.

## **Culled combs**

Brood combs quickly become dark in colour and the cell size decreases as each bee leaves a larval skin.

Most beekeepers replace two brood combs every year.

Select the dark combs and replace them with drawn new worker combs or foundation, placing the combs between existing brood combs, making sure that the bees cover the comb.

You should also cull combs if they contain too many drone cells or if they have broken wires or top bar lugs.

You can melt down the culled combs and recover the beeswax.

### **Activity**

Open a hive and ask your supervisor or advisor which combs they would cull and why.

Make a note of their responses.

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### **Rules associated with brood manipulation or examining the brood nest**

- Never transfer frames between colonies that show symptoms of any brood disease. If the disease is notifiable, contact your State Apiary section, and stop all work on the apiary.
- Careless handling can lead to the death of the colony queen.
- Avoid incorrect placement of combs or replacing too many combs.
- Spread of disease before any comb is placed into another colony the whole colony must not show any signs of brood disease of combs between colonies so if disease shows up you must be able to trace the combs movements.

- Manipulating combs during extremely cold or changeable weather can result in chilled brood. This occurs where the adult bees are not able to keep the brood at the required temperature of 35' C. The brood becomes chilled and dies.
- If combs of brood are left in direct sunlight on a hot day the brood can die of over-heating and combs that are starting to melt.
- Nosema, the adult bee disease, is a common condition in bee hives. When a hive is opened, this can be followed by a rise in the average nosema spore levels. Depending on the spore levels, many bees can die prematurely in the late winter and early spring, just when brood manipulation occurs. Try and only manipulate brood on warm sunny days and don't cause too much stress by over extending or splitting up the brood nest make sure bees cover all the brood combs.
- All combs with brood and the frames should be placed into the colony you want the queen to lay in.

## Final activities and assessment

Now that you have completed all the activities in this Learning Guide, take some time to practice manipulating brood under commonly encountered working conditions.

When you are ready, you can complete the assessment tasks that are listed in the Participants Assessment Workbook for this unit of competency.

## Useful references

*Bee Agskills: A Practical Guide to Farm Skills*, 2007, NSW Department of Primary Industries

*The Bee Book: Beekeeping in Australia*, 2nd edition, 2005, Peter Warhurst and Roger Goebel, Queensland Department of Primary Industries and Fisheries available from <https://www.publications.qld.gov.au/>, or phone 1800 801 123.