Section 1
COLONY EXAMINATION
A. apiary location, identification, congestion

APIARY LOCATION:
Apiary location for the beginner and established, bee keeper should always be carefully selected whether a residence or outyard.

Apiary Location Dos:

DO keep apiary where bees have a source of nectar and pollen within a short distance.
- It is recommended that the source be within 3 miles and optimally less than 1 away.

Do have a fresh water source a short distance away
- It is recommended that the source be within ¼ mile of the hives.
- It dose not need to be a pure source
- Bees use water to dilute honey, regulate hive temperature, liquefy crystallized honey, and raise brood.

Do have the hives in the open where they can get plenty of sunshine.
- Studies show that bees are less irritable and easier to handle in these conditions.
- Shade from trees retards the flight of workers and the beekeeper's sight in working hives.
- A Southern or Easterly exposure gives colonies maximum sunshine throughout the day.

Do have natural wind protection
- Avoid locations that are windy, to exposed, or where flooding is a concern.
- Hills, buildings, bush, evergreens work well.

Do provide dry ground and good air drainage.
- Avoid heavily shaded woods or in a damp bottom land-excess moisture and shade retard flight and encourage disease heavily shaded woods or in a damp bottom land-excess moisture and shade retard flight and encourage disease.

Do select a location for your bee's protection
- Place away from traffic, constant noise, animals, kids, and vandals path
- Placing colonies near a dwelling or frequently visited area discourages vandalism.
- Screening the bees from view is a good protection
- Keep bees from areas that routinely use pesticide applications.

Do select an area for accessibility (perhaps the most important factor in the apiary)
- Avoid locations where carrying equipment and heavy supers is difficult
- Select locations where access in inclement weather is not a problem

Do use care in selection outyard (away from your home) locations
- Avoid overstocking bees by checking the number of hives in the area
- Use the above criteria as beekeepers tend to neglect out-apiaries.

APIARY IDENTIFICATION

RCW 15.60.021
Registration of hives.

(1) Each person owning one or more hives with bees, brokers renting hives, and apiarists resident in other states who operate hives in Washington shall register with the director by April 1st each year.

(2) The registration application shall include:

(a) The name, address, and phone number of the apiarist or broker;

(b) The number of colonies of bees to be owned, brokered, or operated in Washington that year;

(c) A registration fee as prescribed in rule by the director, with the advice of the apiary advisory committee; and

(d) Any other information required by the department by rule.

(3) The director shall issue to each apiarist or broker registered with the department an apiarist identification number.

[2000 c 100 § 3; 1994 c 178 § 6; 1993 c 89 § 11; 1988 c 4 § 9; 1977 ex.s. c 362 § 5; 1961 c 11 § 15.60.050. Prior: 1933 ex.s. c 59 § 6; RRS § 3170-6. Formerly RCW 15.60.050.]

[WAC 1.02.040]

IDENTIFICATION

Each person owning or having bees in their possession shall identify their apiary (ies) by placing a sign so it is visible to passersby. Sing lettering shall be a minimum of 2inches in height and shall include the name (first, middle, and last name may be used), assigned apiarist id number and telephone number.

The lettering shall be in a color which contrasts with the color of the sign.

Signs shall be placed as to make them conspicuous to anyone approaching the apiary location.

In lieu of signs, the apiary (ies) may be identified by displaying the assigned apiarist ID number and telephone number in at least 2inch characters on the side and top of some hives in each apiary. The lettering shall be in a color contrasting with the hive color, and shall be conspicuous to anyone approaching the apiary location.

Apiaries located at the bee keeper's residence are exempt from these marking requirements.

[Staturtory Authority: chapter 15.0 RCW.93.19.08 (order 5014) 1.02.040, filed 12/2/97, effective 1/2/98]

COLONY CONGESTION

Number of hives per acre

Professional/Outyard beekeepers:
The minimum recommended density is one colony/acre. Hive densities of 2-4 colonies/acre may prove beneficial in many areas. Early research concerning blueberry pollination by honey bees has demonstrated a positive correlation in field production in tests using up to 10 hives/acre.

Colony Density for outyard pollination is an issue that must be resolved by the grower.

Residential beekeepers:
Keep no more than **4 hives per ¼ acre of land.** Do not keep more colonies in the backyard than the forage in the area can support or more than you have time to care for adequately.

NOTE: Rules of thumb for urban beekeeping:
• Keep only gentle colonies and employ good swarm management techniques.
• Keep no more than four hives on a property of 1⁄4 acre or less.
• All hives within 20 feet of a property line should have a solid fence or vegetative barrier 5 feet or more in height between the hives and the property line.
• All hives within 30 feet of a public sidewalk or roadway should have a solid fence or dense vegetative barrier or be elevated so as to direct the flight path of the bees well above traffic and pedestrians. • An adequate supply of water should be provided by the property owner or beekeeper from March 1 to October 31.

Drifting www.beecare.com
is the phenomenon of field bees entering the wrong hive in their apiary when they return from foraging. Drifting is unusual in small apiaries, and occurs more commonly in apiaries containing many hives. Younger honeybees are more likely to drift, and honeybees from smaller colonies also tend to drift more into hives with larger colonies.

When honeybees drift to other hives, they are usually accepted, since they are carrying a load of honey and pollen. If they continue to drift to the same hive, they will become part of the colony, weakening their original hive population. Occasionally, a foreign honeybee that drifts into another hive is rejected by the guard bees, either not being allowed to enter or stung to death in the ensuing fight.

Drifting can be minimized by spacing the hives farther apart (three feet or more) or by staggering the position of the hives, instead of having a long, straight row of hives. Drifting is especially likely in areas where prevailing winds blow more sideways across the hives instead of straight on, especially if the wind is typically brisk. In this case, drifting can be minimized by providing a wind break close to the hives, such as a snow fence or thick shrubbery. The use of a landing ramp also helps minimize drifting, especially for older field bees.

It is possible to over populate a location with too many bee hives. No city bee yard should have more than four hives on less than one acre of land. An acre is 200 feet by 200 feet. Many city lots are much smaller than an acre. Hives that are too close to each other do not allow the beekeeper much room to manipulate a hive.

Colony Overpopulation/ Swarm Prevention

[information from Honey Bees & Beekeeping Keith S. Delaplane]

Suggestions:

- Adding a second brood box when 7 of 10 frames are filled with brood and food
- Spring Re-Queening:

  Young queens produce high levels of pheromone: this discourages queen cell construction and swarming.
- Reversing Supers:

  If you use two hive bodies, you can discourage swarming using this method. In early fall the cluster has moved from the bottom to the top super and are reluctant to move back down. As brood production and nectar hoarding increase, a congested brood nest in the upper hive body results. Reversing supers by putting the bottom hive body on top of the full hive body in the spring time is one of the most important springtime tasks for preventing overpopulation/swarming.
- Dividing colonies

  A mid-spring time task done to increase colony numbers, replace winter losses, and control swarming. This is also known as making splits.

  RECOMMENDED WAY TO SPLIT:

  Hives with plenty of honey, expanding brood area, and large in number are prime for swarming. Splitting can prevent this. Buy a new caged queen for each split. Take an empty hive body on a bottom board. Have on hand ten frames of drawn –out empty combs. Find the queen in the parent hive and set her aside on her comb. Find two combs with plenty of brood of all stages and transfer them and all adhering bees into the center of the empty hive body (this will be the center of the brood nest of the new hive). Put one comb of empty cells on each side of the two brood combs (for egg laying space). Take from the parent colony two combs heavy with honey and pollen, and more bees transferring them to either side of the empty combs. Shake a few more bees from the parent hive into the split for population and to make up for lost numbers from drifting back into the parent colony. Then add four empty combs on the outside of the split to make ten in total. Keep the queen in the parent hive. Add new queen to the split.
- Equalizing Colonies

  Hives aren't naturally uniform. Some have more bees and brood than others. Specific management steps even out hive population is called equalizing. There are two approaches equalizing adult populations and equalizing brood. These should be done in tandem for best results.

  Equalizing adult populations is done by switching hive location of a strong hive with the location of a weaker hive. Trade places on a warm day when foragers are out of the hive. Foraging bees return to the site of the original hive and, especially if they' returning with nectar or pollen, they are welcomed in the "new" colony with little o no fighting. The weaker hive immediately gains a large number of adults at the expense of the stronger hive. They are now more uniform. Do this only in times of nectar flow or intense syrup feeding, never during a dearth of food.

  Equalizing brood population by recording the number of brood frames in each hive. Redistribute brood among colonies to reduce variation. Foreign brood are always accepted by bees. Take no more than 1 or 2 frames and do not give a new hive more than it can handle. If the adult population is low the additional brood may chill and die. This is why you should equalize both adult and brood in tandem.

  (equalizing helps with robbing as well)

B. Opening the Colony for examination

Basics for beginners Working the bees

- Comfortable clothing of tightly woven cloth- light colored for day/dark for night
- Use a good smoker and keep it burning (use fuel that will not discolor or add flavor to the honey or can easily fall out and cause fire.
  Use 3 puffs in the front entrance and all cracks, as well as the top. Wait no more than 3 minutes.
- Have smoker on hand even if you choose to use less intrusive methods such as lightly spraying sugar Syrup with mint oil (or other type of oil used to mask pheromones)
- Tools such as hive tool, hive brush, and optional equipment should be handy

How does one systematically assess a honey bee colony?

To systematically assess a colony requires about 45-60 minutes and is best accomplished as a two person team – one observer and one recorder. The basic steps are as follows.

1. Lightly smoke the entrance and the top bars. Use additional light puffs of smoke as required.
2. Starting on one side, remove a frame and assess for health and strength as described below. It is recommended to do the strength assessment for the frame first and then move on to the health assessment.
3. When finished the first frame, put it aside and continue the assessment for each frame in sequence.
4. After completing the top box (if a 2 brood box hive), replace the first frame and remove the top box and put it off to the side.
5. Repeat steps 1-4 for the bottom box.
6. Reassemble hive when finished.
7. All results should be recorded on predesigned and preprinted data sheets. Handheld computer databases can also be used as long as an assistant is available to do this task.

Since most of this is quite familiar included are some information sites for studying additional information

- http://www.citybees.com/BeekeepingManagement-YearlyOverview.html

- http://www.beemaster.com/site/honeybee/inspection.html

The following are hive inspection sheets for record keeping and to aid in your examination of the colony (ies)

- http://www.sfbee.org/pdfs/hiveinsp.pdf - hive inspection sheet from PSBA

Check amount of brood and queen laying pattern

Healthy brood/Queen laying pattern

Quick Check List for Healthy Brood:

- Few empty cells
- Convex in appearance
- Some drone brood near margins
- Not scattered in pattern
- No holes in capped brood cells
- Pollen and Nectar stores near top of the frames
- Covers ¾ of frame
- 4xs more the pupae as eggs
- Brood in lower area
- no drones in worker cells
- larvae glistening white
- Capped are brown or tan
- 2xs pupae as larvae
- Uniform pattern
- No dead larvae or pupae
- football or rainbow brood pattern

By early March, a normal colony with a good queen should have several frames of brood. The exact number will depend upon the amount of honey they have, the amount of pollen they have and of course the size of the cluster. As the frames are being moved, note the pattern of the brood. Dr. Roger Morse (1990, *ABC and XYZ of Bee Culture*, 84) suggested that the best way to evaluate a queen is to observe the pattern of eggs, larvae and pupae on a frame in the brood nest. "A queen with a good brood pattern has brood of the same age adjacent, that is, eggs should be next to eggs, larvae next to larvae of the same age, and pupae next to each other in the same manner." Dr. Morse (1983, *A Year in the Bee Yard*, 58) further explains that every cell in the brood nest will not be filled with eggs, larvae or pupae but preferably 90 percent or more should be filled. "Cells may be empty for a variety of reasons, but when empty cells appear in large numbers, the colony should be checked first for disease and then for starvation. If these are ruled out, the blame is put on the queen and she is replaced. Queens can fail for a great variety of reasons, including disease, improper mating, old age, poor nutrition, physical handicaps, and so on, and it is often difficult or even impossible to determine which of these is the problem."

Healthy Brood

A healthy brood pattern has very few empty cells; and the cappings are uniformly brown or tan in color, with a decidedly convex appearance. Because of developmental time, the ratio should be four times as many pupae as eggs and twice as many as larvae; drone brood is usually in patches around the margins of brood nest. A good queen lays a uniform brood pattern according to the strength of the colony, whereas a failing queen usually scatters her brood and sometimes lays drone eggs in worker cells.

The general appearance of the brood pattern is regular with no dead larvae or pupae (Photos 1 and 2).
Each cap is slightly raised or convex, without any holes. Caps are uniformly brown, tan or cream.
Larvae are glistening and pearly white, with an orange gut line running along their back. Healthy pupae under the caps are at first white but as they develop into adults, their colour darkens. The eyes begin to color first. Also look for honey on the top, pollen beneath the honey, and capped cells on the bottom 2/3rds of the frame. It is typical for a frame to have a rainbow shape of stored nectar, pollen and brood. Usually the brood will be toward the lower part of the rainbow, and next to the brood will be pollen, then the nectar will be stored on the outer or upper part of the rainbow shape. Pollen in a cell is usually orange or yellow in color but can be many different colors depending on the flower source. It can sometimes look like dry powder in a cell, but sometimes it sees moist.

It is also a good idea, as each brood frame is moved, to check the condition of the comb. If the comb is bad and contains a lot of drone cells, it should be removed. If the comb to be removed contains more than a few cells of brood, it should be moved to the outside of the cluster. It can then be exchanged with a frame of foundation or drawn comb after the brood emerges.

Combs with lots of scattered brood, combs with uncapped or partially capped cells, and combs with perforated, sunken cappings should always prompt a thorough inspection. Look for any unusual cell caps and brood, especially larvae that are off-colour or abnormally positioned in the cell. If you wear glasses to read, wear them while looking for bee brood diseases and pests.

Quick Glossary Reference for Brood

egg – Each egg is attached to the cell bottom and looks like a tiny grain of rice. When first laid, the egg stands straight up on end (Figure 4). However, during the 3-day development period the egg begins to bend over. On the third day, the egg hatches into a tiny grub and the larval stage begins.

brood - eggs, larvae and pupae found in the cells of the combs in the broodnest.

larvae - curled white grubs found in open cells of brood combs. At first, they look like a very small letter 'C', positioned at the base of the cell. They grow to almost fill the cell (Photo 1). After the cell is capped, the larvae lie on their backs, each on the lower wall of its cell.

pupae – the intermediate stage in the development of the bee from larva to adult. During this stage, the larva gradually changes to the adult.

caps - caps placed by the bees to seal cells containing pupae or honey. The caps over brood cells are usually cream, light brown to brown, or tan.

brood pattern - a good brood pattern occurs when nearly all the cells in a given area of comb contain brood. A poor or irregular brood pattern has a scattered arrangement in which there is a considerable mixture of empty, open and capped cells.

scale - dried, decomposed remains of a larva or pupa.

tongues - the tongue, formed during the pupae stage of the bee's life-cycle, does not decompose when infected with American foulbrood. It protrudes upwards from the scale towards the roof of the cell.

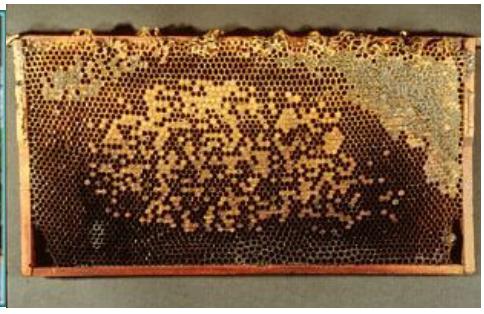
BROOD PICTURES

Healthy larva, white & curled at base of Their sell

Healthy capped brood note regular brood pattern, even appearance, convex caps

Nice brood pattern

Healthy Rainbow/football pattern



Healthy brood pattern Irregular brood pattern

D. Brood diseases and colony pest identification

DISEASE

BEE HEALTH ASSESSMENT http://www.wildwoodlabs.com/downloads/Assessment.pdf
(Recommended resource – CAPA Honey Bee Diseases & Pests, www.capabees.ca/publications.htm)

American foulbrood (AFB)

●*Definition:*

The most damaging of the honey bee diseases. AFB is caused by the spore-forming bacterium *Paenibacillus larvae* (previously known as *Bacillus larvae*). Larvae are infected within 72 hours of hatching from the egg by ingesting brood food contaminated with spores. The pathogen kills just about the time the cell is being capped, or shortly thereafter. As the disease progresses, the cappings become discolored and sunken, and the brood pattern becomes peppered with uncapped cells and cells with perforated cappings, all mixed in with healthy cells.

• Count the number of infected cells on each frame
• Diagnosis
  o ropiness
  o color dark brown or black
  o smell sometimes described as sour or of a glue pot
  o position in cell, tongue protruding
  o perforated cappings and greasy appearance
  o raised tongue (if dies in early pupal stage)
  o Vita " AFB Diagnostic Kit (based on lateral flow ELISA technology)
  o The Holst milk test: The Holst milk test was designed to identify enzymes produced by B. larvae when speculating (Host 1946). A scale or toothpick smear is swirled gently into a tube containing 3-4 milliliters of 1 per cent powdered skim milk and incubated at body temperature. If the spores of B. larvae are present, the cloudy suspension will clear in 10-20 minutes. Scales from EFB or sacbrood are negative in this test." Test kits are available from several of the bee suppliers. Free testing is available at Beltsville Lab:

●Some References
www.vita-europe.com/products/afb_leaflet.htm
www.csl.gov.uk/science/organ/environ/bee/rnd/lateralflow.cfm
www.pir.sa.gov.au/pages/agriculture/livestock/bees/lcbexx.htm:sectID=1090&tempID=11
Honey Bee Diseases & Pests 2nd Edition Revises/ Canadian Association of Professional apiculturists

● Preventative Treatment
Apiary hygience, early detection and prompt remedial action are needed. Monitoring colonies and the beekeeper's ability to identify early signs of the disease are essential.

Organic:
Using steam distilled essential oils of lemongrass, cinnamon, peppermint and powerdered forms of burber and goldenseal have been used with great success in the prevention of AFB. This treatment has 2 to 4 drops of oil(s) placed on a cotton ball and placed on the bottom board. Treatment can also be added to pollen patties.

Laboratory and field trials have been conducted to evaluate effectiveness of essential oils from lemon grass, thyme, oregano and savory in preventing and controlling infections of American Foulbrood (AFB) in *Apis mellifera ligustica* colonies. LD_{50} values for oral acute toxicity tests on adult bees were calculated verifying that the essences were non toxic. Calderone et al. (6) evaluated botanical compounds for *in vitro* control of *Paenibacillus larvae, Ascosphaera apis, and Paenibacillus alei.* Floris and Carta (10) also demonstrated that cinnamon *oil (Cinnamomum zeylanicum)* was effective on colonies of honeybees infected with American Foulbrood disease. http://rnoel.50megs.com/ALIPPI4.HTM

It is thought that extensive feeding of sugar to bees makes them more susceptible to American Foul Brood and other bee disease. It is known that American Foul Brood is more prevalent in the north than in the south. More sugar is fed to bees in the north while in the south the bees can gather nectar most of the year which makes feeding sugar syrup unnecessary

Non-organic:

Use ***Terramycin only as a preventative***. Generally, hobbyist beekeepers in states with good inspection programs do not need to use drugs for management of AFB. However, if you keep bees in an area where AFB is known to be a problem, you should use Oxytetracycline hydrochloride -**Terramycin** (TM) as a prophylactic. That means treating healthy colonies with no evidence of disease. I recommend that you use TM as a dust or as a syrup additive in the spring. Follow the label directions. This means that you must treat your colonies so that the bees consume the entire dose of antibiotic at least 45 days prior to adding supers to your hives for marketable honey. Treat again in the fall after you remove your honey supers. This will protect your bees during the time when robbing is most likely to occur.

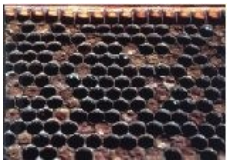
Many beekeepers use TM patties because they require less work. Unfortunately, the patties are often intentionally or unintentionally left on the colonies throughout the summer. This is a violation of the label and increases the chance that your honey will have antibiotic residues. If you use patties, you must comply with the 45-day rule *in the spring*

Do not use antibiotic therapy on any colony with AFB scales or symptoms of active AFB. Antibiotics may alleviate AFB symptoms, but the disease persists in a latent phase in the form of highly resistant spores that remain viable for many decades. When antibiotic treatment is withdrawn, symptoms eventually reappear. In addition, if a colony with latent AFB becomes weakened as a result of some other condition, such as parasitic mites, bees from other colonies will likely rob it. The robber bees will likely carry the infection back to their colony. The lack of symptoms will also lull you into a false sense of security. Inevitably, you will move combs from the infected colony to healthy colonies, thereby spreading the problem

● Treatment
Unlike the other brood diseases, AFB will almost always go on to kill the colony. If other bees rob a weakened or dying colony infected with AFB, or if combs from an AFB colony are distributed to other colonies, the disease will spread. Therefore, it is critical that you take the right action when you identify it in your colonies. The best response to a case of active AFB is to destroy the colony using an approved pesticide and to burn the equipment, especially the frames, combs, wax and honey. Be sure to kill the colony when the bees are not flying. Check with your local fire department to determine burning regulations in your area. You may save the hive bodies, bottom boards and outer covers if they are in good condition by scraping them clean with a sharp hive tool, then scorching all interior surfaces, including the narrow surfaces of the tops and bottoms of the hive bodies, to a depth of 1/16th inch with a weed burner or propane torch.
●AFB PICTURES http://www.masterbeekeeper.org/B_files/disease1.htm


The AFB Rope test. The 'rope' will be elastic, sometimes. But not all AFB will rope.


A dried down scale with the pupal tongue standing upright. Not all scales have this.


Numerous scales in a comb.This comb should be burned

● Other:
Notes on Bee pests—control—quarantine CHAPTER 15.06 RCW page 3 (15.06.015)

<u>European foulbrood (EFB)</u>

● Definition
European Foulbrood is caused by the *bacterium Melissococcus pluton*. It is most common in the spring and to a lesser extent, in the fall, but can appear at anytime. Larvae become infected within one to two days after hatching from the egg when they consume brood food bearing the infective organism. Infected larvae

first turn a light yellow, then brown. They usually die in the coiled stage and may be found lying flat in the cell or twisted up against the side of the cell wall. As the level of infection increases, the brood pattern becomes characterized by an increasing number of uncapped and partially capped cells. Capped cells may also contain infected larvae. The cappings are often concave or sunken into the surface of the comb. The infected larvae have a granular to watery consistency. The diseased larvae may rope out as much as two cm, but the rope is not elastic. Black, rubbery scales may be formed as the diseased individual dries out. These scales are relatively easy to remove from the cell.

• Count the number of infected cells on each frame
• Diagnosis
    o twisted larva
    o earlier stage than AFB
    o color and smell
    o not ropy
    o Vita " EFB Diagnostic Kit (based on lateral flow ELISA technology)

● Treatment

Non-organic:

Treatment with an approved antibiotic is therapeutic, but requires that you take the infected colony out of production in order to comply with label requirements.

Organic/natural:

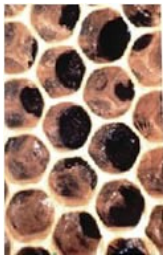
See AFB

Requeening with a different stock of bees may end the problem. The reason for the effectiveness of this method is not entirely clear. It may be that most stocks are somewhat resistant to EFB; or, it may be that the break in the brood rearing that occurs with requeening enables the nest cleaning bees to remove the diseased larvae that would otherwise serve to perpetuate the infection. In either case, requeening is often effective.

● Some References

www.vita-europe.com/products/efb_leaflet.htm

● EFB PICTURES http://www.masterbeekeeper.org/B_files/disease1.htm



European Foulbrood eventually causes complete meltdown of the larvae, often in the coiled stage

Chalkbrood (CB)

● Definition: Chalkbrood is caused by a fungus, *Ascosphaera apis*. The fungus infects larvae three to four days after egg hatch and is most commonly found in worker and drone brood. Before you see the fungal growth, you may notice that an otherwise healthy-looking larvae has lost its glistening sheen. The infected larva is quickly covered by a white, fibrous mycelium, which fills the entire cell. The fungal mass quickly dries to form a hard, shrunken mass called a mummy that is easily removed from cell. The shrunken head often remains visible as a light-brown protrusion. If different strains of the fungus invade a larva, they may form spore cysts, in which case the mummy will take on black and white mottling, or it may become entirely black. Mummies are often seen in large numbers at the entrance of a heavily infected colony. They may also be found in capped cells.

• Count the number of infected cells on each frame
• Diagnosis
    o white/gray/black wooly growth
    o Chalky mummie brood in cells, on bottom board, and at enterance

●Treatment

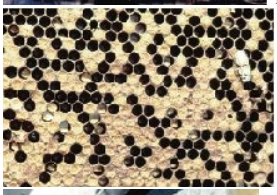
There are no approved medications for control of Chalkbrood. Fortunately, it is usually self-limiting; although some areas in the northeast are known to have serious problems with this disease. If you encounter a severe and persistent case of Chalkbrood in an area where the incidence of the disease is low, try requeening the colony to eliminate the

condition.

Organic/natural: Some products available have had reasonable success in treating chalkbrood and sacbrood bee pharmacy is one, essential oils, as well as the practice of leaving more honey for bees overwintering as honey has natural antibiotic properties needed to fight disease

●CB Pictures


The Chalkbrood fungus first consumes the larva, completely filling the cell with mycelia


You may see the tan 'heads' of dead larva still in their cells with Chalkbrood.


Once dried down, the 'mummies' are pulled out by the bees and disposed of outside the colony

Sacbrood (SAC)

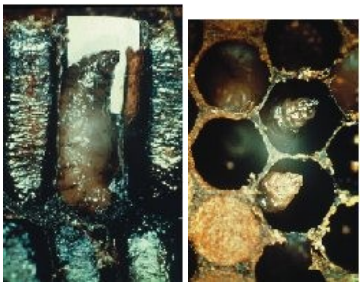
●Definition:

Sacbrood is caused by a virus named sacbrood virus - SBV. Typically, there are a number of uncapped or partially uncapped cells throughout the brood nest. These cells contain discolored larvae, usually gray to black, lying flat on the cell bottom with markedly darkened heads. The disease receives its name from the fact that the infected individual appears sac-like due to an accumulation of fluid between larval and pupal cuticles. If one exercises care, the SBV infected bee can be easily removed intact from the cell with forceps. If you puncture the sac, the watery contents will run out. In more severe cases, you may find dark, brittle scales on the bottoms of the cells. These scales are easily removed from the cell.

• Count the number of infected cells
• Diagnosis
  o open to partially capped cells
  o black tipped larvae/prepupa
  o tough outer skin
  o clear liquid contents
● Treatment

Like Chalkbrood, SBV is almost always self-limiting. There are no approved medications for control of SBV. If you have a persistent case of SBV, try requeening with a different stock of bees to eliminate the condition.

●SAC Pictures


Two views of Sacbrood. Note the darkened head

Varroa mite (VM)

●Definition:
an external parasite, which attacks both adult bees and developing larvae. The varroa mite can also serve as vectors of several viruses that can kill bees. It is reddish/brown in color and viewable with the naked eye. The mite will suck blood from adult and attach and kill brood.

• Indications
    - o adult mites on bees
    - o wings of infected bees/pupae are unhooked in appearance
    - o mites in capped cells (especially drone cells)
    - o mites on sticky board and/or screened bottom-board
• Number of mites per 100 bees
• Diagnosis
    - o alcohol wash technique
    - o Managing Varroa:

www.csl.gov.uk/science/organ/environ/bee/factsheets/managing_varroa.pdf
www.biosecurity.govt.nz/pests-diseases/animals/varroa/guidelines/control-ofvarroa-guide.pdf

    - o Varroa calculator:

www.csl.gov.uk/science/organ/environ/bee/diseases/varroa/varroacalculator.cfm

●**Treatment**
Preventative:

The larvae of natural bees spend less time in this capped over stage, resulting in a significant decrease in the number of varroa mites produced. In fact, very low levels of mites are tolerated by the bees and do not affect the health of the colony. Natural-size bees, unlike large bees, detect the presence of varroa mites in capped over cells and can be observed chewing off the wax cap and killing the mites. Colonies of natural-size bees are healthier in the absence of mites, which are vectors for many diseases. It's now possible to buy small cell foundation from US suppliers

Non Organic:
Only one compound is presently registered for the treatment of Varroa mites in the US, Fluvalinate (trade name: Apistan) In Washington a late summer application after honey supers are removed is recommended.

Organic/natural: "DOWDA METHOD"
Directional use of 10x powdered sugar to control varroa mites:
For best results, the hives should be placed on a 1/8-inch hardware cloth, (screened) bottom board, allowing mites to fall to the ground.
Items needed:

- Sifter of some type (tea strainer) or flour sifter works well.
- Bee Brush.
- Measuring Cup.
- Cardboard or poster board to insert or slide into the hive entrance to catch sugar and mites to determine mite level.

Place the insert into the hive before you use powdered sugar.
If the hives have two brood boxes, break hive down to the lower box, sift 1 cup of powdered sugar over the brood frames. Brush sugar off top bars to allow the sugar to fall down on the bees. Replace the other brood box and distribute powdered sugar in the same way. Wait 5 minutes or longer and pull the insert out and look for mites. Many mites on the insert equals a high mite level. If high mite level, the hive will require sugar again in a day or two. Some beekeepers do this bi-weekly during the spring for several weeks to elimi-nate the Varroa population, then once a month after that. You can sugar the hive more often if you wish to do so.
Do not leave insert in the hive, pull it out once you determine the mite level and use it on the next hive to be sugared. Dowda at dowdat@doacs.state.fl.us

Essential Oils- When varroa mites contact essential oils such as wintergreen, patchouli, tea tree oil, et al., mixed into oil or grease, they are killed on contact--usually within a few minutes.
Impaired reproduction via feeding syrups containing essential oils:
When varroa mites feed on larvae that contain essential oils, their reproduction is interrupted.
● Varroa Picture

Honey bee tracheal mite (HBTM)

●Definition:

They live and reproduce within the breathing tubes or "tracheae" of the bee. Diagnosis is mady by dissection of the adult bee and by use of microscopic examination. The result of infestation is reduced lifespan for bees.

• Indications
    - o field check for darkened tracheal tubes
    - o wandering/disoriented bees
    - o severe loss during winter
• Percent of bees infected
• Diagnosis
    - o microscopic examination of prothoracic tracheae of 50-100 bees

●Preventative treatment

Non-organic:

The only registered compound at this time for the treatment of tracheal mites in the US is menthol. Typically 50 grams of menthol crystals are placed in a porous bag over the top bars when temperatures of 0=70 degrees are present. Use in spring or fall when honey supers are on the hive.

Organic/Natural:

methods use mint oil and use the above in sever cases

Grease patties have been used by mixing sugar with hydrogenated vegetable shortening.

Nosema (NOS)-adult Disease

●Definition:

Nosema apis is a single-celled parasite of honey bees that causes a condition sometimes called "bee dysentery". Nosema only affects adult bees, where it interferes with the digestion of pollen. Bees with *Nosema apis* have diarrhea-like symptons, with sick bees leaving distinctive yellow stripes on the outside of the hive. Bees infected with *Nosema apis* collect less pollen and nectar for the colony and die at a younger age. If many bees in a colony are infected with *Nosema apis* the colony will be weakend and will probably die.

• Indications
    - o dysentery
    - o bloated abdomens
    - o trembling wings
    - o don't fly well

• Number of spores per bee
• Diagnosis

Nosema disease is difficult to diagnose without using laboratory equipment.
Decapitating a bee and pulling out the last abdominal segments usually will remove the intestinal tract intact. A healthy midgut is tan in color, with concentric constrictions. An infected midgut will become swollen, whitish and lose its visible constrictions. However, other causes dysentery, such as ingesting honeydew, fermented syrups; indigestible sugars in cola syrups, molasses and kitchen corn syrups; can result in similar intestinal changes.

- o microscopic examination of suspension of liquefied contents of 10 bee abdomens
- o www.wildwoodlabs.com/viewer.php?articleid=84

●**NOTE:** Dysentery can be a separate issue brought on by poor inter stores, pro-longed confinement.

●Preventative treatment:

Shelter from cold, and damp weather. Hives off the ground, tilted forward slightly, strong populations, strong queen, adequate stores.

● Treatment:

Non Organic:

Inhibiting the spores from reproducing in the ventriculus. Fumagillin is the antibiotic used for Nosema. It has no effect on the spores but is effective against growing stages.

Organic:

A number of beekeepers swear by feeding **HoneyBHealthy**® (a solution of emulsified lemongrass and spearmint oils) in syrup or including those oils in their syrup.

A natural treatment product 'Protofil', made of plant extractions, vitamins and microelements, was presented at the International Federation of Beekeepers' Association - Apimondia 2004 as a preventitive remedy.
Heat treatment in 49 C for 24 hours can be used to kill the spores on contaminated equipment.

Other disorders (OD)

Miscellaneous minor diseases of the adult honey bee appear to abound. A rickettsial disease has been identified and so has amoeba disease. Perhaps the newest class of diseases is that of spiroplasmas, small worm-like creatures present on flower surfaces. One species has been implicated in "May disease" in France, a formerly misunderstood spring die off of honey bees.

- Be alert for other signs and symptoms
  - poioning
  - viruses
  - half-moon
  - stone brood
  - see Honey Bee Disease & Pest Profiles for the Maritime Provinces of Canada
- Make notes, take pictures, collect samples
- Samples should be placed in freezer promptly to avoid overheating and decomposition
- Diagnosis
  - may be difficult or impossible depending on the nature of the sample and suspected cause
  - suitable diagnostic techniques and facilities may not be available

FOR MORE INFORMATION ON DISEASE/ PESTS
http://www.masterbeekeeper.org/B_files/disease2.htm
http://maarec.psu.edu/pest&disease/pppdIndex.html
Addition Information on Natural & Organic Bee Keeping to alleviate disease/pests
http://bee.airoot.com/storycms/index.cfm?cat=Story&recordID=622
http://www.beesource.com/pov/lusby/index.htm
Additional Books to Reference
Honey Bee Pests, Predators, and Diseases, edited by Dr. R.A. Morse, Comstock Publishers, Cornell University Press, 1978
Honey Bee Pathology, by Leslie Bailey, Academic Press, 1981, and/or
The Hive and Honey Bee, Dadant and Sons, Inc., Hamilton, IL 1975 (see references).

F. Adequate honey and pollen stores

Food requirement. A colony of honey bees requires nectar and pollen for normal growth. The food requirement of a hive is met in two ways, by the daily activities of foraging bees and from food stored in the combs.

A colony should never be allowed to have its stored food reserves drop below 10 pounds.

A colony unable to forage for even 2 or 3 days during poor weather can easily exhaust 10 pounds of honey in that short a time. Starvation could rapidly mean the death of that hive and the loss of its benefits for pollination.

A colony should have no less than 3 frames of honey at any given time

Storage:

A colony should produce 50 to 100 pounds of surplus honey each season for the beekeeper. The colony should also produce at least 60 pounds for itself to over-winter.

Never rob a colony of honey back to the brood chamber in the fall. The colony will die of starvation over the winter. Winter starvation is the most common cause of colony demise in Misouri. A hive must have two deep brood chambers (9-5/8-inch hive boxes) full of bees and honey (60 to 90 pounds) to overwinter.

G. Queen Age, pheromones and marking

Queen age

Queen quality

is important in influencing the brood production and productivity of the colonies. (Kaftanog lu et al., 1988; Laidlaw 1992) Although queens can live 4 to 5 years, fertile eggs production declines every year. Repacing older queens with young ones is one of the essential procedures to increase the productivity of the honeybee colonies. Colonies which have a one year old queen have been reported to have a greater colony population and produce 27-30% more honey yield than colonies which have old queens (Woyke, 1984; Genc, 1992; Inci, 1999) Young queens have stronger pheromone levels which are invaluable in regulating the hive.

Old queens

lay insufficient eggs to produce enough young workers for winter and overwinter colonies. The old worker bee population in colonies dies off in late winter or early spring. Due to the queen's age beekeepers lose a lot of colonies in winter and most of their colonies begin the spring season with weak colony population sizes. Queen age is as important as other characteristics for the colony productivity.

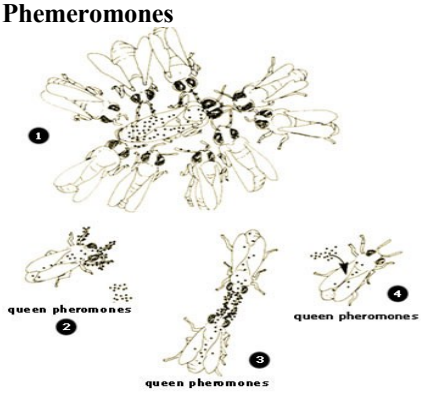
Marking The Queen

It is common practice to mark the queen with a small spot of paint on her back (thorax). A color code exists within the beekeeping industry to indicate the year the queen was introduced.

International Queen Marking Code:

Color	Year ending
White or grey	1 or 6
Yellow	2 or 7
Red	3 or 8
Green	4 or 9
Blue	5 or 0

Phemeromones



1. The queen , with worker bees waiting around her to receive the pheromones she releases
2. A worker bee with the queen's pheromone on it
3. Worker bees distributing the pheromone by touching one another
4. The queen's pheromone will soon be translocated internally into the worker bees' bodies.

Types of Pheromone Many animal species communicate via pheromones. Releaser pheromones cause rapid, transient changes in behavior, whereas primer pheromones cause more long-term changes in both behavior and physiology. Hundreds of releaser pheromones are known; in contrast, very few primer pheromones have been identified, primarily because they are much more difficult to assay. More information on primer pheromones is needed because they play important roles in the regulation of behavior in many animal societies.

Primer Pheromones- Change the physiology of the recipient. http://www.life.uiuc.edu/robinson/research/Leoncini04.pdf

A major function of primer pheromones in is to help coordinate the timing of physiological and behavioral development. For example, pheromone secretions of the queen are partially responsible for the inhibition of worker ovary development and queen rearing behavior that underlies reproductive division of labor.

- Another pheromone is responsible for preventing worker bees from bearing offspring in a colony that still has developing young. Both larvae and pupae emit a "brood recognition" pheromone. This inhibits ovarian development in worker bees and helps nurse bees distinguish worker larvae from drone larvae and pupae.

Releaser Pheromones- Change the behavior of the recipient. Releaser pheromones have a short term effect and they trigger an almost immediate behavioral response from the receiving bee. Under certain conditions a pheromone can act as both a releaser and primer pheromone.

- Alarm pheromones are released when a bee stings another animal, and attract other bees to the location and causes the other bees to behave defensively, i.e. sting or charge.
- The other alarm is a repellent effect and it was proposed that it is used to deter potential enemies and robber bees.
- It is suggested that the second alarm pheromone is used by foragers to scent-mark recently visited and depleted foragers, which indeed are avoided by foraging bees.
- Drones produce a pheromone that attracts other flying drones to promote drone aggregations at sites suitable for mating with virgin queens.
- Helps nurse bees distinguish between eggs laid by the queen bee and eggs laid by a laying worker.
- An oily secretion of the queen's glands that is deposited on the comb as she walks across it. This inhibits queen cell construction (thereby inhibiting swarming), and it production diminishes as the queen ages.
- released by older forager bees to slow the maturing of nurse bees. This primer pheromone acts as a distributed regulator to keep the ratio of nurse bees to forager bees in the balance that is most beneficial to the hive.
- Used by worker bees and used for orientation.
- Other pheromones produced by most honeybees include rectal gland pheromone, tarsal pheromone, wax gland and comb pheromone, and tergite gland pheromone.

Queen Madibular Pheromone (QMP)

QMP, emitted by the queen , is one of the most important sets of pheromones in the bee hive. It affects social behavior, maintenance of the hive, swarming, mating behavior, and inhibition of ovary development in worker bees. The effects can be short and or long term.

TABLE 1.-Queen pheromones

Gland or Source and Chemical	Behavior reactions in colonies	Citations[1]
Mandibular: 9-oxodecenoic acid	Recognition of queen and reduction of egg laying by workers.	Butler (1964)
10-hydroxydecenoic deconic acid	Recognition of queen and reduction of egg laying by workers.	Butler (1964)
9-oxodec-trans-2-enoic acid	Mating attractant	Gary (1962)
Do	In combination with worker bees, scent gland holds swarming bees together.	Morse (1971)

1 Citations are not listed; consult Gary (1974).

TABLE 2.-Worker bee pheromones

Production Gland or Source	Chemical Compound	Behavior reaction in colony	Citations[1]
Nassanoff or scent	Geraniol	Fanning attractiant	Boch (1963)
Do	Nerolic acid	do	Boch (1964)
	Geranic acid	do	Boch (1964)
Do	Citral	do	Shearer (1966)
Do	All compounds of scent	Swarm attraction and stabilization	Morse (1971)
Sting	Iso-pentyl acetate	Colony alarm	Boch (1962)
Mandibular	2- heptanone	Alarm communications	Boch (1965)

1 Citations are not listed; consult Gary (1974) http://maarec.cas.psu.edu/bkcd/hbbiology/bee_behavior.htm

H. Propolis and bee space

Bee Space

The bee space is simply the crawl space needed by a bee to pass easily between two structures (7.5 mm +/- 1.5 mm for the western hive bee, less for the eastern hive bee). If the space between any two surfaces in the hive is too small for a bee to pass through easily, the bees willseal it with propolis. If the space is larger than a bee needs to pass through easily, the bees will construct comb in the area.

When the space between two surfaces in the hive is the right size, the bees will leave it free as a crawl space. if the bee space is considered and respected in the construction of a hive, a hive that allows for easy comb removal and replacement will result.

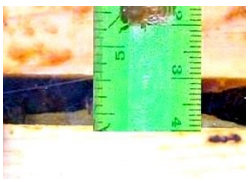
The Rev. Lorenzo Langstroth of Philadelphia was the first person to make use of the bee space in hive construction. He constructed the first modern hive in 1851, using moveable frames to contain the comb within the hive. The modern frame hive currently used for "high-tech" beekeeping is still sometimes referred to as the Langstroth hive.

http://www.bwrangler.com/lspa.htm :

Bee space is the distance bees reserve for their movement between combs. When bees encounter wider gaps, they use beeswax and build comb in that space. When smaller gaps are encountered, they fill them up with propolis. This bee space concept has made modern bee equipment possible. Before bee space was integrated in equipment design, all hive, with frames, became hopelessly glued and combed together if not worked frequently.

So, how wide is a bee space? Historically, it was placed somewhere between 1/4" and 3/8". Modern equipment is constructed with a bee space within that range. Modern equipment still gets glued together, although not hopelessly so.

While watching small cell bees through a plex cover, I noticed they would sometimes reduce the distance between the top bars above the broodnest. Apparently, the conventional bee space incorporated between the top bars wasn't what the bees preferred.

Propolis http://en.wikipedia.org/wiki/Propolis

is a resinous mixture that honey bees collect from tree buds, sap flows, or other botanical sources. It is used as a sealant for unwanted open spaces in the hive. Propolis is used for small gaps (approximately 6.35 millimeters (0.3 in) or less), while larger spaces are usually filled with beeswax. Its color varies depending on its botanical source, the most common being dark brown. Propolis is sticky at and above room temperature. At lower temperatures it becomes hard and very brittle.

For centuries, beekeepers assumed [1]that bees sealed the beehive with propolis to protect the colony from the elements, such as rain and cold winter drafts. However, 20th century research has revealed that bees not only survive, but also thrive, with increased ventilation during the winter months throughout most temperate regions of the world.

propolis as hive sealing

Honeybees frequently use propolis to reduce the size of the entrance for better defence.

Propolis is now believed to:

1. reinforce the structural stability of the hive
2. reduce vibration
3. make the hive more defensible by sealing alternate entrances
4. prevent diseases and parasites from entering the hive
5. prevent putrefaction within the hive. Bees usually carry waste out of and away from the hive. However if a small lizard or mouse, for example, found its way into the hive and died there, bees may be unable to carry it out through the hive entrance. In that case, they would attempt instead to seal the carcass in propolis, essentially mummifying it and making it odorless and harmless.

Composition The composition of propolis will vary from hive to hive, district to district, and from season to season. Normally it is dark brown in color, but it can be found in green, red, black and white hues, depending on the sources of resin found in the particular hive area. Honey bees are opportunists, and will gather what they need from available sources, and detailed analyses show that propolis chemical composition varies considerably from region to region, along with the vegetation. In northern temperate climates, for example, bees collect resins from trees, such as poplars and conifers (the biological role of resin in trees is to seal wounds and defend against bacteria, fungi and insects). Poplar resin is rich in flavonoids. "Typical" northern temperate propolis has approximately 50 constituents, primarily resins and vegetable balsams (50%), waxes (30%), essential oils (10%), and pollen (5%).

Human Usage Research shows that propolis offers antiseptic, antibiotic, anti-fungal, and even antiviral properties. It is often called "Russian Penicillin" in acknowledgement of the extensive research that has been done by the Soviets. One of the most valuable properties of all the natural bee hive products is that they exhibit true immunostimulating characteristics. Unlike many modern medical drugs, propolis does not depress the immune system, but instead boosts it. Propolis is collected by commercial beekeepers, either by scraping the substance from wooden hive parts, or by using specially constructed collection mats. The raw product undergoes secondary processing to remove beeswax and other impurities before being used in a variety of natural health care products (eg., lozenges, tinctures, ointments, toothpaste). One of the non-medicinal uses of propolis is as a varnish, and it has been suggested that the special properties of Stradivarius violins may be partly due to the type of propolis used, although the claim cannot be substantiated.

I. Temperament of the colony

There are many factors that help us determine the temperament of a colony…
Expect bees to be freely moving about, bees in all stages of development and a gentle hum.

Running
The behavior that you are looking for should more accurately be described as "non running", in other words calm and sedate progress without paying any attention to what the beekeeper is doing. By this I mean carrying on as if nothing at all had happened not even standing still and looking upward, just going about whatever business the individual bee had in mind before the hive was disturbed by the beekeeper opening it. This behavior applies equally to queens and worker bees, virgin queens may run about more than mated or mature ones.

We usually score this activity for recording on a scale of 0 - 10, 10 representing total disinterest by the bees and zero equating to running around "like headless chickens" (if such a metaphore is permissible when describing bees). You are looking for a score of 3 to 5.

Colony noise
The canary in the coal mine, which sways or drops dead in the presence of poisonous gas, alerts miners to get out. Research has learned to understand the collective buzzing of bees in their hives, which can provide a similar biological alert system. http://www.physorg.com/news92397117.html

- What does the hive sound like?
- When you first open the hive listen for the bees. If you are quiet and gentle in your movements and the hive is doing well, usually there is a humming buzz, but nothing more.
- If there is a problem the hive buzzes with a roar. Sometimes the roar means there is no queen.
- When you do something intrusive like a powdered sugar shake, the bees roar.

But bees evidently provide a lot more information than canaries. The researchers, who work for a UM spin-off technology company called Bee Alert Technology Inc., have found that the insects buzz differently when exposed to various poisonous chemicals. http://www.physorg.com/news92397117.html

“We found bees respond within 30 seconds or less to the presence of a toxic chemical,” said Research Professor Jerry Bromenshenk. “The military is interested in that for countering terrorism. But the real surprise was that the sounds bees produce can actually tell what chemical is hitting them.”

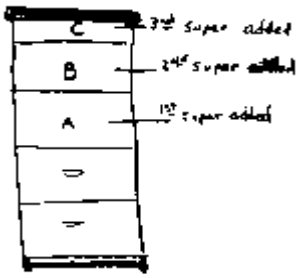
The insects also make different sounds when attacked by honeybee maladies such as varroa mites or foul brood. This may lead to applications that help beekeepers maintain healthy hives.

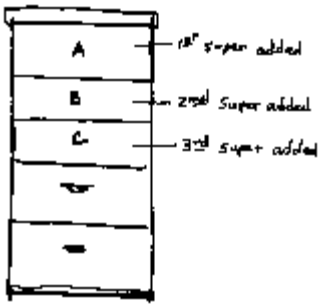
“We can tell not only whether the colony has mites or not,” Bromenshenk said, “but also the level of infestation they have. The sounds they make change with every stressor in characteristic ways.”

Activity within the hive

A two minute film from PBS http://www.youtube.com/watch?v=lE-8QuBDkkw

J. Supering with drawn or undrawn comb





Supering bees for the honey flow/nectar flow

Supering: adding supers (boxes for honey storage). These supers are added above the brood chamber either with or without a queen excluder.

Two types of supering are practiced by beekeepers -- top supering and bottom supering.

Top Supering:

Top supering is a common practice among many beekeepers. As a hive needs additional supers they are added one on top of another. Super (A) is placed on the hive. Super (B) is placed above super (A) as shown on the left. When it is time to add a third super we are calling (C), it is added above super (B). The bees will work their way up into the supers placed on the hive. This is the easiest and quickest way to add supers. If all supers are added at one time, the bees may fill frames near the middle of the stack and not fill outside frames. This is called the "chimney" effect.

***Bottom supering*:**

Bottom supering is always placing the new empty super just above the brood nest. This requires that the beekeeper remove supers that are filled with honey from the hive, place the empty honey super on the hive, and then replace all full or partly full supers back on the hive. Notice that the super labeled (A) was the first super placed on the hive. When the bees had filled it with honey and 3/4 of the frames were capped, a new super (B) was added below (A). When this super was nearly full and capped, super (C) the third super was added. **It is claimed that bees will move up into the empty new super faster because the honey in the upper supers draw them into the new honey super.** When adding new foundation to a hive you have helped the bees by putting this new super with foundation in the warmest place fore wax builders to work -- just above the brood chamber. Adding new foundation above all the supers as in top supering will result in comb not being completely drawn out.

Additional points about supering

A good working guide for adding supers is to examine a honey super on the hive to see if the bees are filling it with nectar. If 3/4 of the cells are being filled with nectar it is time to add a super.

It is better to super early rather than late. If supering with new foundation, use 10 frames to the honey super. If you leave too much of a space between frames of new foundation, the bees will build burr comb between the foundation such as when you place only 8 frames in a 10 frame honey super. Some beekeepers have used 9 instead of 10 frames of new foundation in a honey super successfully.

Bees can be encouraged into a new super with new foundation by adding two frames of drawn comb in the center of the honey super. Many beekeepers use only 8 or 9 frames (drawn frames of foundation) in honey supers. The bees will pull the cells further out from the comb to fill the space between frames. The result is: a) You get just as much honey from 8 frames as you would 10; b) you have fewer frames to extract; c) you have fewer frames to build and manage.

Supering Equiptment

A shallow honey super Weight when full of honey about 30 lbs. The dimensions of a shallow super are: 19-13/16" x 16-1/4" x 5-3/4" The shallow frame is 5-3/8" deep. One can use various types of foundation

in them: Honey production -- usually called brood foundation and can be wired or plain.
Cut Comb production – thin foundation used for comb honey production or sometimes called cut comb foundation.

A medium honey super -- Weight when full of honey about 40 lbs. These are normally used for honey production. Foundation can be wired or plain. New in the last 10+ years is plastic frames & foundation.

When to add supers

Once the frames in the first super have been drawn out and filled with brood, pollen and honey, you will need to increase the size of the brood nest by adding another super of frames and foundation. If you have started with undrawn frames of foundation, it will sometimes assist the bees in drawing the outside frame foundation by moving the frame over one place or so and replacing it with a drawn frame. Do not spread your brood out; the frame you are moving should not have brood on it.

Once your second brood super is drawn out and eighty to ninety percent full, and there is still a good honey flow on, you will need to add a honey super. Usually with nucs or packages you will not get a lot of surplus honey, the bees are using the nectar to build comb and strength. They need both brood chambers full to survive over winter.

When placing honey supers on the colony, most beekeepers like to use a Queen excluder to keep the Queen from laying brood in the honey super. If your honey super has undrawn foundation, it is not prudent to use a Queen excluder: the bees will often not go through the excluder to get to the foundation and may swarm instead. In this case, you would put the super on without an excluder. Once the bees are established in the super and are drawing the wax into comb, the frames can be checked to be sure the Queen isn't on the drawn foundation. If she is here she can be put down into the brood chamber and the excluder put in place. To assist in getting the foundation in this super drawn out, you may move the drawn comb to the outside against the super wall and the undrawn to the centre of the super where heat from the brood chamber is greatest, giving considerable help to the bees making the comb.

The rule of thumb for honey supering is that the bees should never be using all the comb available to them. When the super is one-half to two-thirds full, add another super. When the second super is half full and the first completely full, add a third super, etc. The honey crop may be removed when the frames are fully or two-thirds capped with wax.

Use of queen excluders:

In beekeeping the queen excluder is a selective barrier inside the beehive that allows worker bees but not the larger queens and drones to traverse the barrier. The queen excluder is either a sheet of perforated metal or plastic or a wire grid in a frame. The openings should be limited to 0.163 inch (4.14 mm). The intent of the queen excluder is to limit the queen's access to the honey supers. If the queen lays eggs in the honey supers and a brood develops it is difficult to harvest a clean honey product and it makes fall management more difficult.

Queen excluders must be removed in the fall otherwise the queen will not be able to move with the winter cluster and will die from exposure. The death of the queen in winter will doom the hive unless the beekeeper introduces a new queen in the spring. Retrieved from "http://en.wikipedia.org/wiki/Queen_excluder"

The beekeeper must examine hives during nectar flows to determine what the bees are doing with the nectar. If they are storing the honey below the queen excluder, the beekeeper must either remove the queen excluder or develop a plan to open up the brood chamber so the queen has room to lay eggs.

For building new hives:

Use a single deep brood chamber with a queen excluder above it. Then put our honey supers above the queen excluder. The ten deep frames in the brood chamber are adequate for a queen to produce a lot of brood but we prevent swarming by moving a frame of brood from the brood chamber every week or two and replace the removed frame with a frame of new foundation. By taking only one frame, we open up the

brood area for bees to build new cells and the queen has a place to lay eggs. If the bees are putting honey into the outside frames of this brood chamber, we remove them as well.

K. Bee sting treatment and anaphylactic shock

Safety first! Get away from the bee. Bees release a scent when in danger to attract other bees. If you're still around when reinforcements get there, they'll sting you.

Follow universal precautions and wear personal protective equipment if you have it.

Remove any stingers immediately! No need to scrape off bee stingers, just remove them. It's OK to pull stingers out with your fingers. The longer bee stingers are allowed to remain in the body, the more severe the reaction will be. Smoke the area to mask the pheromones which would signal other bees to sting as well. If the victim is allergic to bees, check to see if the victim is carrying an epinephrine auto-injector (EpiPen®). If so, help the victim use the device as directed. If the victim is supposed to carry one of these devices and does not have it, call 911 immediately! Do not wait for symptoms to appear.

Watch any victim closely for signs of anaphylaxis.

. itching
i redness
r hives (raised welts)
shortness of breath

Anaphylaxis

Anaphylaxis refers to a rapidly developing and serious allergic reaction that affects a number of different areas of the body at one time. Severe anaphylactic reactions can be fatal. Most people experience allergy symptoms only as a minor annoyance. However, a small number of people are susceptible to a reaction that can lead to shock or even death.

Anaphylaxis is often triggered by substances that are injected or ingested and thereby gain access into the blood stream. An explosive reaction involving the skin, lungs, nose, throat, and gastrointestinal tract can then result. Although severe cases of anaphylaxis can occur within seconds or minutes of exposure and be fatal if untreated, many reactions are milder and can be ended with prompt medical therapy.

If there is any concern that the victim may be developing anaphylaxis, call 911 immediately. Antihistamines, such as diphenhydramine (Benedryl®), can slow an anaphylactic reaction, but will not stop it.

NON-Allergic reaction

Non-allergic victims will almost always develop local reactions to bee stings. Redness, swelling, and pain are all common at the site of the bee sting. The pain will usually go away pretty quickly, but swelling may last for more than a day. It's common to develop some itching at the bee sting site.

TREATMENTS
Conventional wisdom says to scrape bee stingers away from the skin because pinching the venom sack could push extra venom into the victim. In fact, how fast you get the stinger out is much more important than how. Honey bees leave a stinger behind when they sting a victim. Wasps, yellow jackets, and hornets do not leave a stinger. These relatives of the honey bee can also cause an anaphylactic reaction.

For Swelling:
Use an ice pack to reduce swelling at the site.

For Itching:
Antihistamines or calamine lotion should help. A paste made of baking soda and water can have a similar effect. Topical hydrocortisone can also provide some symptomatic relief. Clean the area with soap and

water, then apply hydrocortisone cream to the site to decrease the severity of the reaction. Alternative treatments include a paste made of unseasoned meat tenderizer and water (the enzyme in meat tenderizer can break down bee venom) or a paste of baking soda and water.

Stung More than 10 times:

Take the victim to the emergency department if the victim was stung more than 10 times, or if there are bee stings in side the nose, mouth, or throat. Swelling from these stings can cause shortness of breath, even in non-allergic victims.

For Pain:

Taking an antihistamine such as Benadryl (diphenhydramine) in tablet form and/or nonprescription pain relievers such as ibuprofen or acetaminophen can also provide relief of symptoms. r tenderness at the site, try a bee-sting swab. Antihistamines or calamine lotion should help

Homeopathy:

A safe, effective treatment which has no adverse affects in users. Try

Apis mellifica**:** If a bite or bee sting causes puffy, tender swelling that is pink or red and hot to the touch, this remedy may be helpful. The area stings and burns, and cold applications bring relief. (If a person is allergic to insect venom, especially bee-stings, *Apis* may help to reduce the swelling of the passages, given as first aid while on the way to emergency medical care.)

Onion or vinegar:

Sometimes it is helpful to use what you have on hand. It is said onion or vinegar can work on bee stings

EpiPen® **:**

is an auto-injector that administers epinephrine—and epinephrine is the definitive emergency treatment for severe allergic reactions. These reactions, called anaphylaxis, can become fatal within minutes if untreated.

NOTE: you cannot buy an this product over the counter, it must be prescribed by a doctor.

Epi-pen

Venom extractor : 

L. Dead-out hive isolation and examination

Colony Collapse Disorder

Symptoms of CCD

1) In collapsed colonies
    a. The complete absence of adult bees in colonies, with no or little build up of dead bees in the colonies or in front of those colonies.
    b. The presence of capped brood in colonies.
    c. The presence of food stores, both honey and bee bread
        i. which is not immediately robbed by other bees
        ii. when attacked by hive pests such as wax moth and small hive beetle, the attack is noticeably delayed.
2) In cases where the colony appear to be actively collapsing
    a. An insufficient workforce to maintain the brood that is present
    b. The workforce seems to be made up of young adult bees
    c. The queen is present
    d. The cluster is reluctant to consume provided feed, such as sugar syrup and protein supplement

Recommendations:

As of March 1, 2007 MAAREC offers the following tentative recommendations for beekeepers noticing the symptoms of CCD:[41]

1. Do not combine collapsing colonies with strong colonies.
2. When a collapsed colony is found, store the equipment where you can use preventive measures to ensure that bees will not have access to it.
3. If AFB dispose of bees and quarantine hive boxes
4. Sterilize with affective measures such as scorching or steaming
5. If you feed your other bees sugar syrup, use Fumagillin.
6. If you are experiencing colony collapse and see a secondary infection, such as European Foulbrood, treat the colonies with Terramycin, not Tylan

Because CCD is not well-understood, the CCD Working Group has made the following recommendations in an attempt to give beekeepers some control options.

- Do not combine collapsing colonies with otherwise healthy ones - the cause of CCD has not been identified so it is possible that combining a sick colony with a healthy one will "contaminate" or "infect" the healthy colony
- If you find abandoned hive equipment and the cause of bee death is suspicious, store the equipment in a manner that prohibits other bees from accessing it. Do not let neighboring colonies rob out equipment that has hived collapsed colonies. Do not reuse the equipment if the colony displayed symptoms of CCD. Such equipment should be stored securely until CCD is understood better.
- Feeding bees fumagillin in sugar water in spring and fall should be considered by all beekeepers. Although nosema (*Nosema apis*) is not considered the causative agent of CCD, investigators have found *Nosema ceranae* in some bee colonies in the U.S. Both can be considered stressors that may promote CCD.
- If you ordinarily treat with an antibiotic to prevent/control American or European foulbrood, use Terramycin rather than Tylan. Tylan has been approved only recently for use in bee colonies and it does not have a long track record. Unless foulbrood resistant to Terramycin is encountered, one should use Terramycin because it has a longer history of use in bee colonies.
- Use an Integrated Pest Management (IPM) approach for varroa mite control in honey bee colonies. This approach can minimize the need for chemical use in bee colonies, lessening bee exposure to potentially-toxic chemicals. If varroa are a problem, use approved miticides rather than off-label home remedies.
- " Keep colonies strong by practicing best management practices. http://entomology.ifas.ufl.edu/pestalert/Colony_Collapse_Disorder.htm

Pesticides

The WSDA (Wa. St. Dept. of Agriculture) investigates bee kill incidents that are know or suspected to be related to pesticides (see Beekeeper Verified Report of Loss form WSDA Bee kill investigation.

Bee pests- control quarantine

15.60.015 Bee pests — Control — Quarantine.
[1993 c 89 § 4; 1988 c 4 § 2; 1977 ex.s. c 362 § 2; 1961 c 11 § 15.60.015. Prior: 1955 c 271 § 2.]
Repealed by 2000 c 100 § 8, effective June 30, 2001.

Some Highlights:
● The director, if a bee pest is a significant threat, may establish maximum allowable levels for movement, inspection, treatment, or mitigation.
● Have the right to inspect
● Apiarists must control regulated bees or they may be quarantined
● Quarantined hives must be marked by the director
● If apiarist is not known or found hives may be impounded

M. Catching or Preventing swarms

What is Swarming http://www.beemaster.com/site/honeybee/swarms.html

Swarming is a natural division of the hives population. When the number of workers exceeds the capacity of the hive, the workers will raise a second queen and she will travel to a new location with half of the colonies worker bees and Drones. Generally this occurs in the Spring or Summer months - 4 to 5 weeks after the queen begins laying eggs after Winter. Each hive can swarm several times a year. Often though, a new suitable location is not found before swarming is necessary and the swarm will find unusual places to temporarily stay. This can be on the bumper of a car, around a mailbox, in the lower branches of a tree or as shown in this photo, on the corner of a picnic table.

Signs of swarming include seeing excessive bees clinging to the outside of the box, either hanging from the bottom in a conical fashion - which is a very good sign of swarming or covering the front of the box in a scattered fashion, facing downwards and appearing to be overly active and jittery.

Catching Bees has gotten easier with pheromones that can be placed in swarm catching boxes.

Locating Swarms

For starters, lets assume you do not have a swarm yet, but you are looking. Two really great places to improve your chances of getting swarms are 1) advertise in a local news paper that you will remove swarms for free and 2) contact the local police department and advise them of that you are available to remove swarms if they receive calls concerning them in your area.

Swarms are very gentle because they are homeless and the queen is usually buried deep in the solid mass of bees. They are easily captured and usually accept anything that resembles a suitable home. But keep in mind the immediate needs of the swarm and also time needed to successfully move them to your chosen location.

Capturing and removing Swarms

You must make all effort to capture the swarm as soon as possible. Swarms found on branches, bumpers, etc., are just waiting for a better more permanent home to be found by the scout bees. Don't be surprised if you pull up to the yard where the swarm is located, just to find them flying off by the thousands. Trying to follow them once in flight is not an easy venture because often they will travel another mile to their new permanent home and they don't follow roads and signs like you'll have to.

They tend to stay low, often only a few feet above the ground. But sometimes they will be hanging on a tree branch where a ladder or rope is needed. Lets cover the steps of swarm capturing in some logical order. Remember, swarms are generally docile. This doesn't mean smack them with a stick or shove your hand inside to see if they are solid. It does mean that you can get away with out the full beekeeping garb that you may wear when the bees are having a bad day. I still like wearing my swimming goggles and leather gloves. First, get in close and do a general inspection of the bees. Look for any visible mites or even signs of battle or sickness. Healthy bees are active, even in a swarming cluster and although they seemed relaxed, they should be observant of your presence. If these bees seem to be healthy and worth keeping, then take all effort to handle them carefully - as not to damage the queen, who is likely buried deep inside the cluster. Note: read below if bees seem infected or ill.

After inspecting and accessing that the bees are worth capturing for your bee yard, take a general look around the area directly below the swarm and also check for any obstacles that could be in your way. Direct clearance below the cluster is ideal, but not always available. If possible though create a platform on which to place a cardboard box large enough to hold the cluster.

Place the box below the bees and either sharply shake downward the object, dislodging the bees in one sharp and purposeful shake. Tree branches really are ideal for this, but bees can land on anything. Sometimes you will need to scrape them off and into the box. Either way, getting the majority of the cluster is important.

I keep Nuc boxes handy. These are 5 framed super boxes that are idea for starting new colonies, breeding queens and also used to catch your own swarms. If you do catch your own swarms, you can often re-introduce them into the hive they came from by adding additional 10 frame hive supers on top of the colony. Remember, swarming is caused by over population and giving the colonies more room is a great way to prevent swarming. It's much cheaper to go upwards then to go outwards.

Catch the majority of the bees in the cardboard box. Remove a few frames from the nuc or 10 frame box and dump the bees gently into the hive. Carefully place the frames back into the hive box and cover with the inner cover and lid. Place the hive near the cluster and shake what ever other bees you can on to the ground near the hive.

At this point, it's a time game. You'll notice that the remainder of bees will slowly move their way into the hive. By nightfall, all the bees will be inside and you are ready to move the box back to your yard. Be sure to cover the entrance with a piece of wood that seals in the bees before moving and take precautions that the box cannot spill over or fall out of your vehicle. I always wrap everything tightly with duct tape until I get home.

PREVENTING SWARMS

- Reversing brood chambers
- Reorganizing the hive
- Splitting the hive
- http://www.thecountrybeeapiaries.com/prevent.html
- see page 4 of this study guide under colony congestion

Reversing brood chambers The primary reason a colony swarms is due to hive congestion. In the winter, the queen and her colony move upward in the hive. By spring, the colony is usually located in the top hive box, leaving the bottom boxes empty. Unless the queen, colony and brood are moved to the lower super, the colony will likely become congested in the top box of the hive.

When a colony is congested, it prepares to swarm by creating swarm cells for new queens. To prevent swarming, remove the swarm cells with a hive tool, then reverse the hives as described below.

Note: Reversal of hives should be performed in sunny weather when most of the bees in the hive are foraging for nectar and pollen. A solution of sugar syrup (2:1 mixture of sugar and water) can also be sprayed on the bees to weigh down their wings and keep them occupied. Using smoke triggers bees innate response to fire, causing them to gorge on honey.

To reverse brood chambers with empty comb, first remove the top super containing the queen and the colony, placing it on a spare bottom board. Then place all supers with dry comb above the super with the queen, the bees, and the brood.

Reorganizing the Hive When a queen's laying is impeded by brood cells and honey stores, the colony may respond by creating swarm cells in preparation for splitting the hive in 13 to 15 days, (which is why a hive should be checked every 10 to 12 days). To relieve this congestion:

- Smoke the bees or spray with sugar syrup.
- Reorganize the frames in the super by removing 2 or 3 frames of honey and pollen.
- Brush the bees off the frame and into the hive with a bee brush.
- Stagger the brood frames with empty comb frames in the center of the hive.
- Now the hive will be less congested and the queen will have space to lay eggs.

Another method to reduce congestion is to swap frames of honey and pollen from one hive with frames of brood from another hive. Bees will raise all brood as their own.

Note: Insert the frames gently to minimize the number of bees injured or killed. Be especially careful with the queen - killing her will set back colony production and egg-laying about three weeks. Know where your queen is at all times and ensure she remains in the hive. The frames of honey and pollen you remove can be kept for future use or placed in a hive that needs extra food.

Splitting a Hive It's possible to deliberately split an overpopulated hive. In June, a beekeeper can create a nuc-box, a small hive that holds 4 frames, and move the excess bees to it. Simply remove two brood frames and two honey and pollen frames from the crowded mother hive, placing them in a nuc-box. Replace the four empty slots in the mother hive with empty comb.

Do not brush the bees off the four frames as you move them to the nuc-box because they will create queen cells and rear the brood in the new hive. When the population of the nuc-box increases until it becomes crowded, move the colony into a super with six more frames of comb

N. Division of labor within the colony

The Matriarchy and Caste System

The Queen

The social structure of a bee hive is that of a matriarchal family headed by a queen. Almost 95% of the queens offspring are what are referred to as worker bees, with the remaining 5% developing into drones. The queen mates during one period of her life in a series of excursions called nuptial flights. She takes these flights shortly after emerging, and may mate with 7 to 17 male drones. It is estimated that the queen may receive up to 5,000,000 individual sperm during this short period of mating, all of which is stored in a pouch-like structure on her abdomen called the spermatheca. The queen accesses the sperm throughout her life, fertilizing eggs at a rate dictated by the needs of the hive.

The Workers

The worker bees make up the majority of the population and are all females, but with undeveloped, or static reproductive systems. The worker-females are altruistic, for they take care of the queen at the expense of their ability to reproduce, and perform virtually all of the tasks necessary for the support of the hive. These worker-females have a short lifespan of approximately 30 days, and during this time will go through different developmental stages which dictates their role in the hive, as well as giving the hive its hierarchal character. Worker bees may be classified as housekeepers, which are responsible for the upkeep of the hive, or as foragers whose role is to collect the nectar, pollen, and water necessary to sustain life.

The primary cause of death for a worker bee is burnout. That is, their wing muscles only have a certain amount of flight, generally 800 kilometers, and when this point has been reached they are incapable of fulfilling their role and taking care of themselves.

The basis for the division of labor within the hive is the age of the worker. The worker begins its life taking care of the storage cells of the hive, then moves on to brood care and food storage, and ends its life as a forager. The adaptive significance of this labor schedule is that it extends the life of the worker by establishing a system whereby the young worker bees spend the majority of their lives inside the hive where they live in the protected environments of their colony. Once they become foragers, they are susceptible to predation, bad weather, and wing burnout.

Drones

The drones are the only males produced by the queen. Although few in number, they serve a singular, but important, role as mates for the queen. The lifespan of the male drone is very short, for after mating their abdomens explode which results in rapid death. Drones only serve as mates for the queen, and are not involved in feeding the colony, or the upkeep of the hive. Thus, if resources are scarce, worker bees do not like to keep the seemingly lazy males around and will often force them from the hive or kill them directly. Further, since the drones spend a great deal of time outside of the hive they are more susceptible to predation or death. All this results in an average drone lifespan of less than 25 days. The drones will often begin mating flights eight days after emerging, and within twelve days they may perform up to five mating flights per day.

Progression of tasks for worker bees

Cell cleaning (Day 1-2)

Brood cells must be cleaned before the next use - cells will be inspected by the queen and if unsatisfactory will not be used. Worker bees in the cleaning phase will perform this cleaning.

Nurse bee (Day 3-11)

Nurse bees feed the worker larvae worker jelly secreted from the same glands that produce royal jelly.

Advanced Nurse Bees (Day 6-11)

Feed royal jelly to the queen larva and drones receive worker jelly for 1 to 3 days at which time they are moved to honey and pollen.

Wax production (Day 12-17)

Wax Bees - build cells from wax, repair old cells, and store nectar and pollen brought in by other workers. Early in the worker's career she will exude wax from the space between several of her abdominal segments. Four sets of wax glands, situated inside the last four ventral segments of the abdomen, produce wax for comb construction.

Worker activities

- Honey sealing-Mature honey, sufficiently dried, is sealed tightly with wax to prevent absorption of moisture from the air by workers deputized to do same.
- Drone feeding-Drones do not feed themselves; they are fed by workers.
- Queen attendants-The attendants or retinue groom and feed the queen. They also collect QMP (Queen Mandibular Pheromone) from the queen and share it with the bees around them who also share it spreading its effects through the hive.
- Honeycomb building-Workers will take wax from wax producing workers and build the comb with it.
- Pollen packing-Pollen brought into the hive for feeding the brood is also stored. It must be packed firmly into comb cells and mixed with a small amount of honey so that it will not spoil. Unlike honey, which does not support bacterial life, stored pollen will become rancid without proper care.
- Propolizing-The walls of the hive will be covered with a thin coating of propolis, a resinous substance obtained from plants. In combination with enzymes added by the worker this will have antibacterial and antifungal properties. Propolis is also used to close off excessive ventilation and entrances.
- Mortuary bees-Dead bees and failed larvae must be removed from the hive to prevent disease and allow cells to be reused. They will be carried some distance from the hive by mortuary bees.
- Fanning bees-Worker bees fan the hive, cooling it with evaporated water brought by water carriers. They direct airflow into the hive or out of the hive depending on need.

Guard Bees (Days 18 - 21)

protect the entrance of the hive from enemies

- Soldier bees -Soldiers hang around near the entrance and attack invaders. They work in concert with entrance guards.
- Entrance guard bees-These inspect incoming bees to ensure that they are bringing in food and have the correct hive odor. Other bees will be rejected or attacked with soldier bees.
- Outside guard bees-Outer guards may take short flights around the outside of the hive in response to disturbances.
- Water carriers-When the hive is in danger of overheating these bees will obtain water, usually from within a short distance from the hive and bring it back to spread on the backs of fanning bees. The worker bee has a crop separate from the nectar crop for this purpose.

Foraging bees (Days 22 - 42)

The forager and scout bees travel (up to 1.5 miles) to a nectar source, pollen source or to collect propolis.