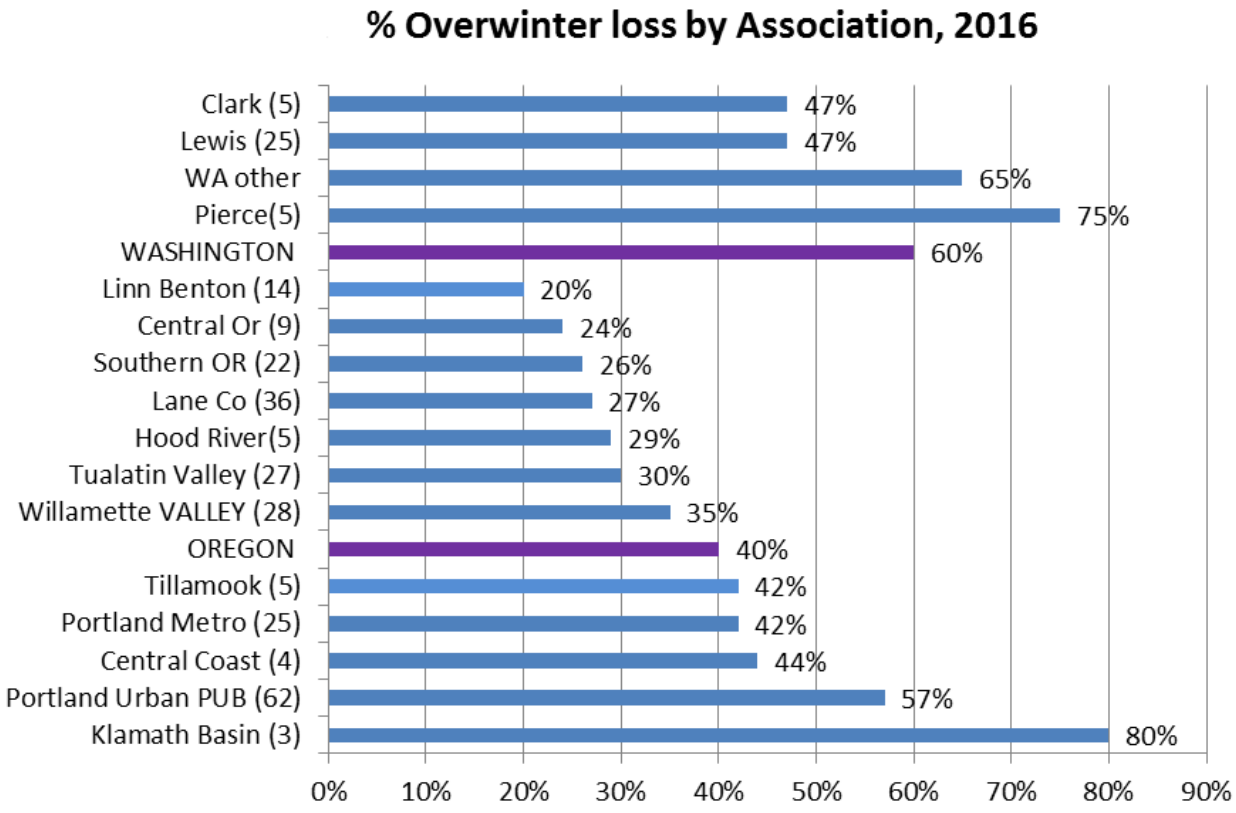
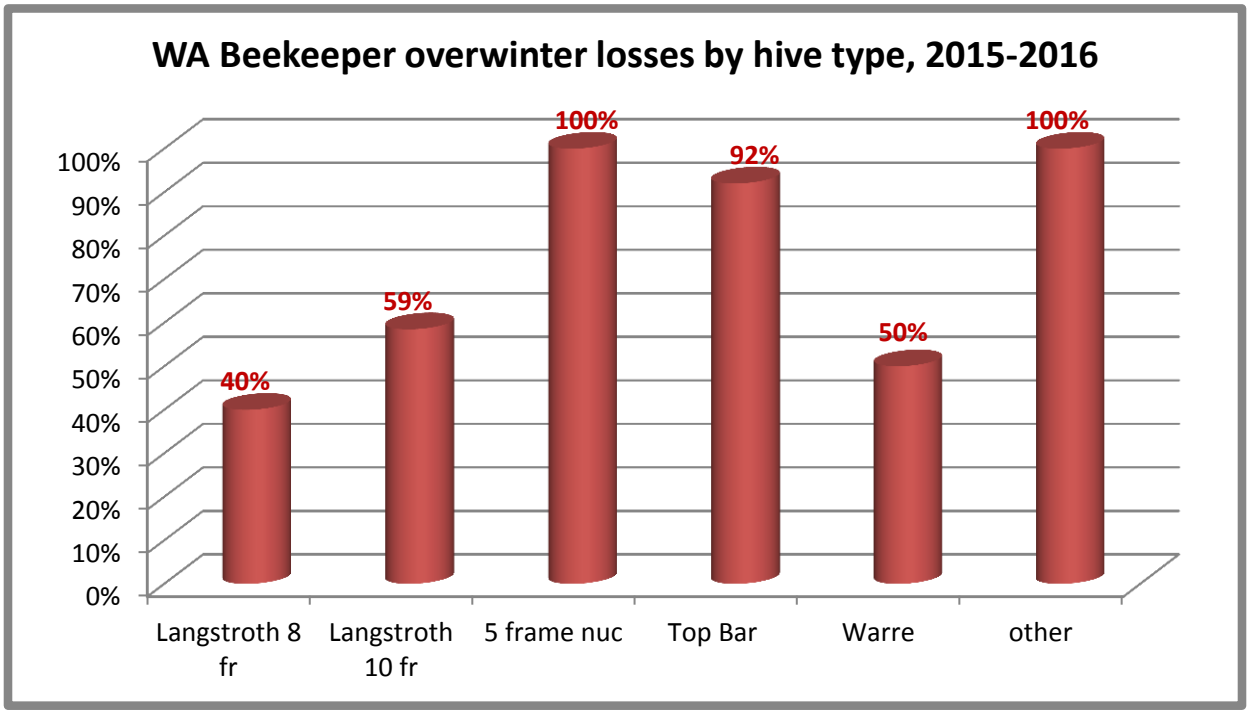
Clark Co Bee Loss Report 2016 Dewey Caron and Jenai Fitzpatrick

Overwintering losses of small scale Washington and Oregon backyard beekeepers was elevated in 2015-2016, compared with the previous season. During the 2015-2016 overwintering period, 52 WA beekeepers supplied information on winter losses and several managements related to bee health with an electronic honey bee survey instrument www.pnwhoneybeesurvey.com.

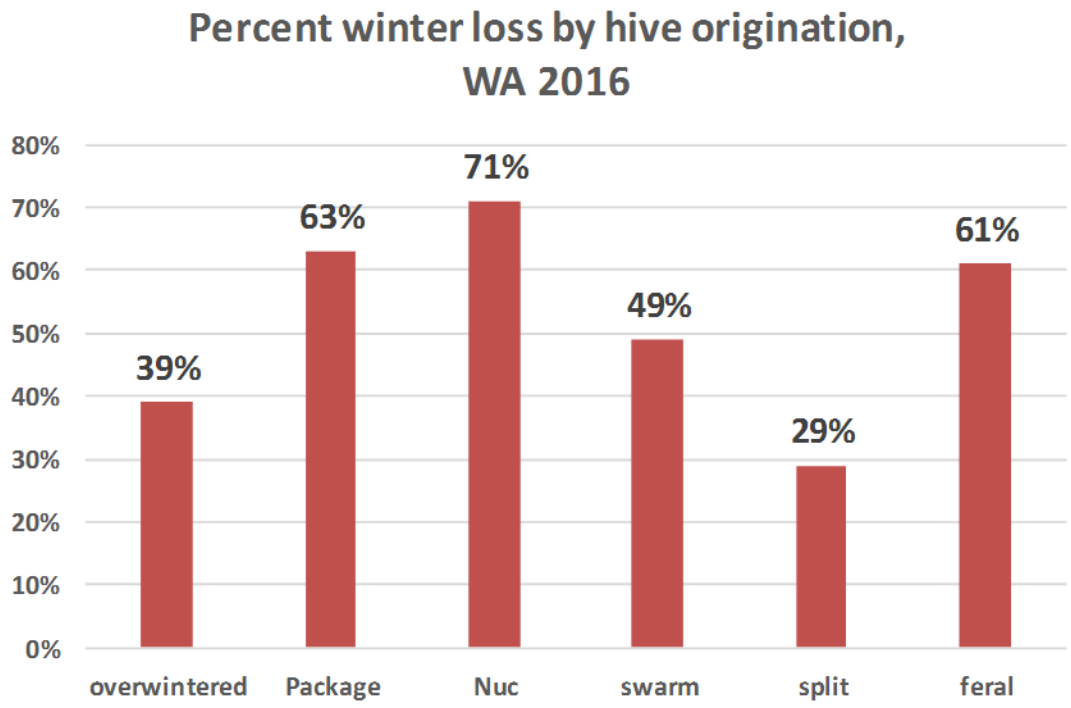
The Clark Co member response was only 5 individuals (compared with 13 the year before). Figure 1 shows the total OR and WA response (number right of association name) and percent overwinter losses by Association. **The 5 Clark County beekeepers reported loss of 47%; overall Washington loss was 60%**



The vast majority of respondents to the 2015-2016 survey were new beekeepers. 50% of the 52 Washington respondents had 1 to 3 years of experience; 20% had 8 or more years of experience with 54 being the longest. Of a total number of colonies, 48% of those returning a survey kept 1, 2 or 3 colonies; 1 and 3 colonies were the most numerous with 9 respondents each reporting that colony number. 13.5% had 8 or more colonies with the highest number 20. Four of five Clark Co respondents reported having a mentor for their first years in beekeeping; 60% of the 52 WA beekeepers had an experienced mentor available.



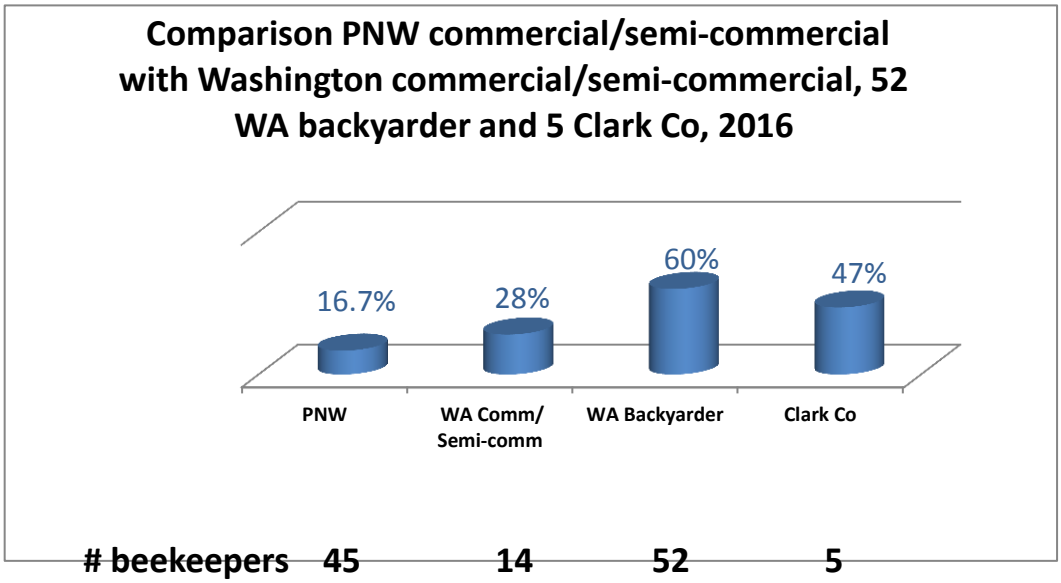
Loss by hive origination: We also asked survey respondents to characterize their loss by hive origination. The result is graphically presented below for the 52 WA beekeepers.



Overwintered colonies, as expected, had the best survival. Packages, nucs and feral hive transfers were less than 50% successful, swarms were just under 50% while splits did better than overwintered hives in survival. Last year 53% of splits did not survive, 40% of overwintered colonies, zero packages, 50% of swarms and 25% of ferals were lost.

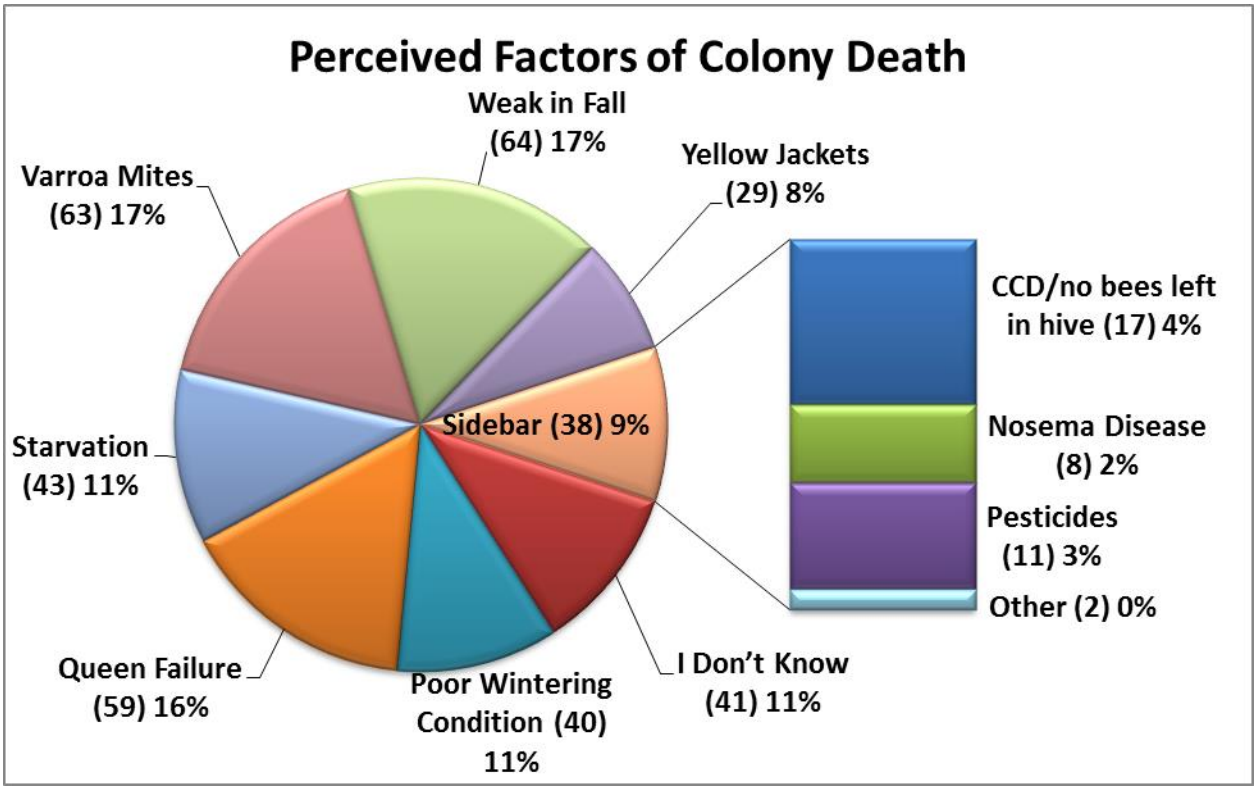
Comparison of backyarders and commercial/semi-commercial beekeepers

A different (paper) survey instrument was mailed to Pacific Northwest (PNW) semi-commercial (50-500 colonies) and commercial beekeepers (500+) asking about their overwintering losses. For the 3-state region, 45 PNW commercial and semi-commercial beekeepers (representing approximately 53% of the colonies of the 3 states) had a loss rate of 16.7%. Fourteen Washington commercial and semi-commercial beekeepers managing approximately 50% of the estimated total number of colonies in the state reported overwinter losses of 28%. Both Lewis and Clark Co backyarders had lower wintering losses compared to the overall Washington beekeeper response.



Backyard losses have consistently been double the losses of larger-scale beekeepers, over 7 years of survey responses. The reasons why are complex but part of the difference may be due to commercial and semi-commercial beekeepers examining colonies more frequently and they examine them first thing in the spring as they take virtually all of their colonies to Almonds in February. They also are more likely to take losses in the fall and are more pro-active in varroa mite control management.

<u>Self-reported "reasons" for colony losses</u>: See the graphic below for the "reasons" backyard beekeeper respondents from Oregon and Washington provided as the reasons for their overwintering losses. Weak in fall, Varroa mites and queen failure were the top three selections. For the 5 Clark County beekeepers, weak in fall was the response of 2 individuals, with don't know, pesticides, queen failure, starvation, varroa mites and yellow jackets all indicted in one response.



There is no easy way to verify reason(s) for colony loss. Colonies in the same apiary may die for different reasons. **Doing the forensics is the first step in seeking to solve the heavy loss problem. More attention to colony strength and possibility of winter starvation will help reduce some of the losses. Control of varroa mites will also help reduce losses**. Our survey also asked about managements, mite controls and queens as can be read in the following pages.

Why do colonies die? There appears to be no single reason for loss and a good deal of variance in opinion as to what might be an acceptable loss level. We are dealing with living animals which are constantly exposed to many different challenges, both in the natural

environment and the beekeeper's apiary. Major factors are thought to be mites, pesticides, declining nutrition adequacy of the environment and diseases, especially viruses and Nosema. Management, both for what is not done as well as not performed in a timely fashion, remains a factor in our losses. What effects our alteration to the bee's natural environment and other environmental factors play in colony losses are not at all clear.

Langstroth wrote about the importance of taking losses in fall management saying if the beekeeper neglects such attention to his/her colonies that 45% loss levels may occur, depending upon variable environmental conditions. It can be argued that losses of 30, 40, 50% or more might be "normal." Older, more experienced beekeepers recall when loss levels were 15% or less. Honey production fluctuates each year but once again seem to be declining on average. Numbers of U.S. bee colonies have declined since the 1940s, returning to numbers for 100 years ago but worldwide numbers of bee colonies are steadily increasing.

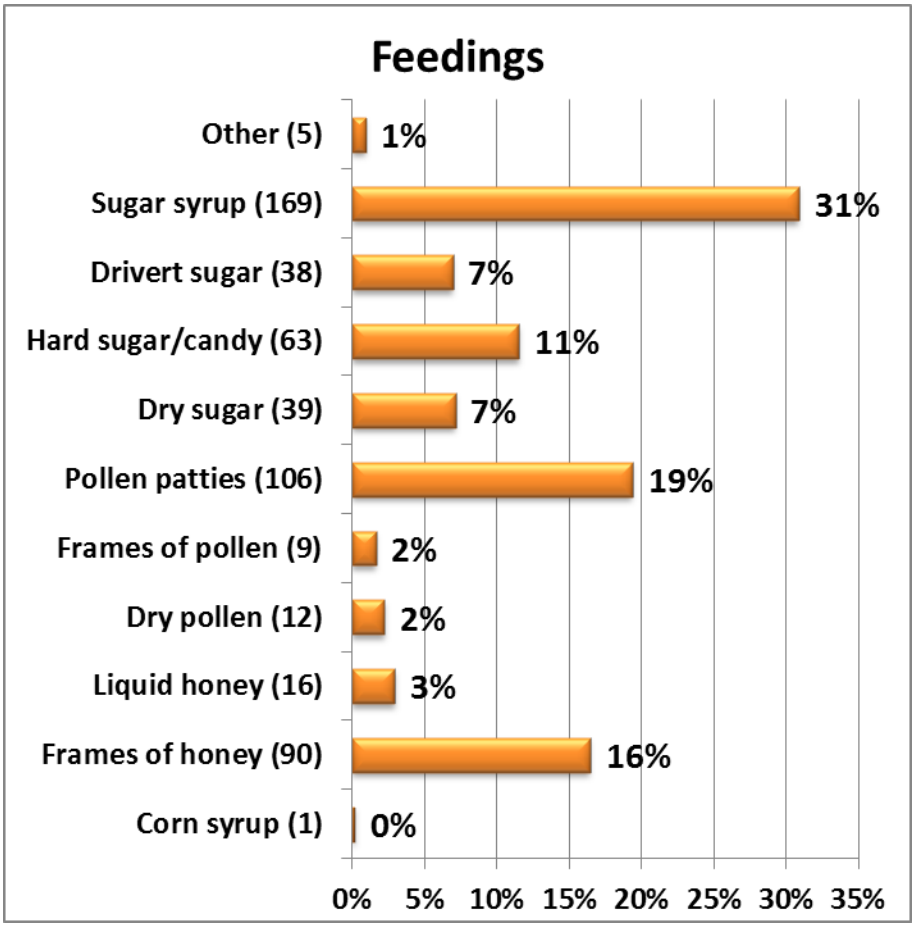
So there is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are excessive for all the issues facing honey bees in the current environment.

Pro-active Managements: Do you feed bee colonies in your care with sugar, honey or protein? Do you take extra measures for wintering preparation? Are we doing the sanitary practices we would in animal husbandry with our bees such as cleaning hive tools between inspecting different hives or do we confirm the donor colony is healthy when we take a frame from one colony to another? The survey asks some basic questions to allow comparison of loss rates from beekeepers who may feed vs those who don't or use one wintering or sanitation procedure comparing their loss rate to another individual who doesn't or does something different. Basically how do management practices affect colony losses? Remember these will be correlations, not causation, since we know bee losses are due to multiple factors. It is not valid to assume that if you do xyz, you won't have losses; the data mean that some people doing xyz don't report heavy losses. The survey data can help us think about what we are doing or perhaps should be doing in comparison with others.

The next three sections report Oregon and Washington Co beekeeper responses; too few responses were obtained from Clark Co for any meaningful analysis.

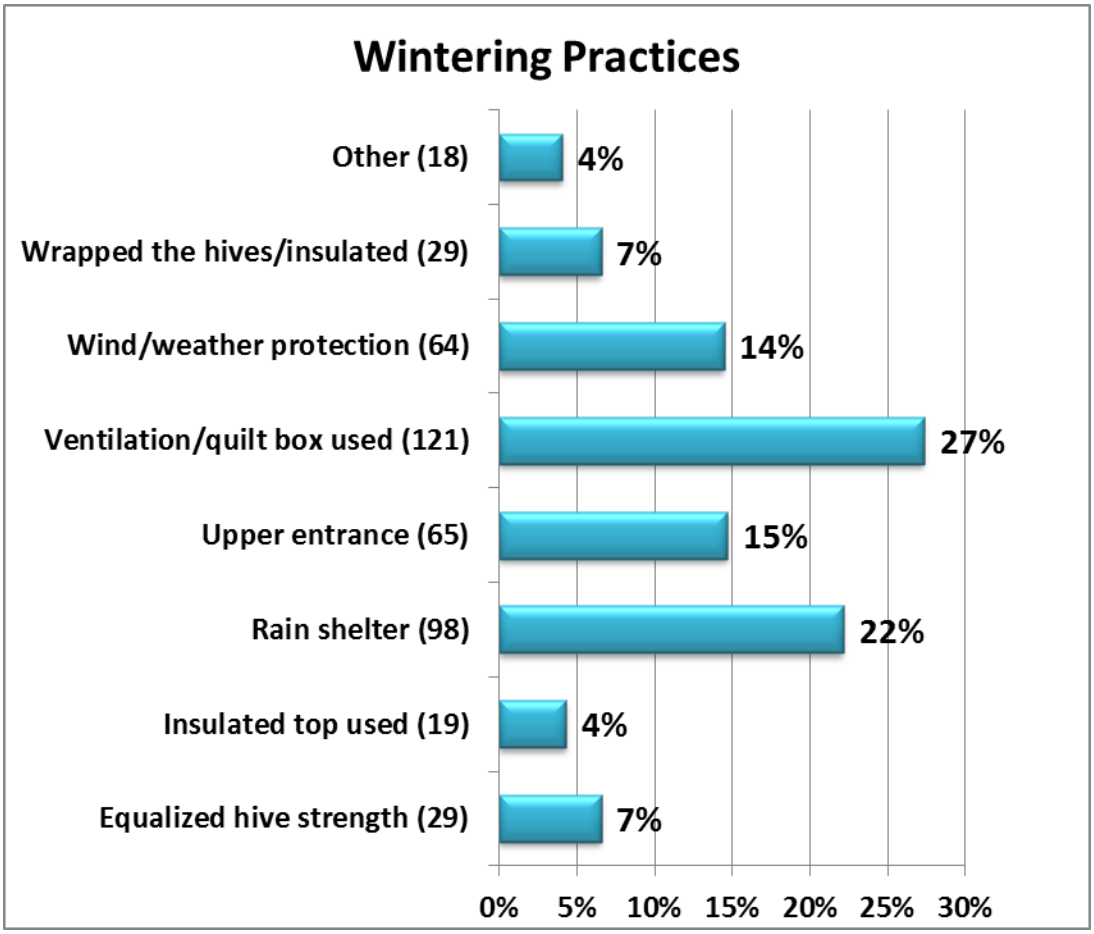
FEEDING

Feeding bees carbohydrate in form of hard sugar candy in winter, sugar syrup to stimulate in the spring or improve fall reserves or frames of honey, especially to bolster colonies with fewer stores were top choices of beekeepers (more than one selection could be checked). All beekeepers selected at least one alternative and most listed more than one.



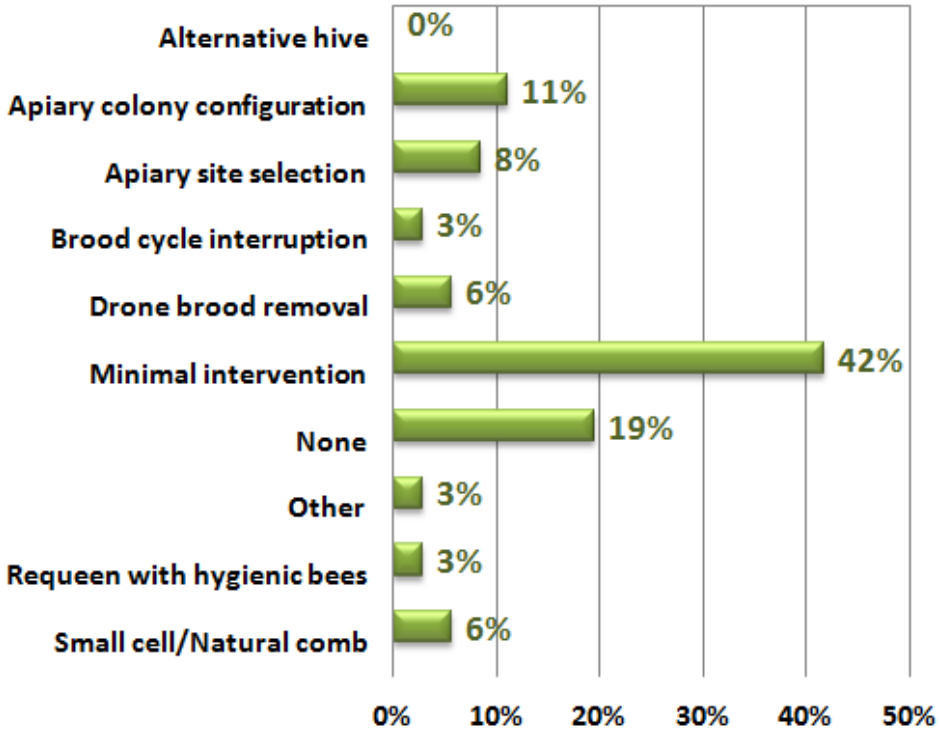
The three selections of sugar syrup, pollen patties and frames of honey were the same most popular choices last season, with a slightly lower percentage indicating hard sugar/candy. For Clark County frames of honey, sugar syrup and pollen patties were the three most commonly selected. Comparison of feeding management with overwinter losses did not reveal one as reducing loss over another although there was slight improvement of survival when one or more of these selections were performed over doing no feeding.

Wintering: Virtually all Washington and Oregon beekeepers indicated they did something to improve overwintering success. Clark Co beekeeper top selections were upper entrance and ventilation box at colony top. Rain shelter, upper entrance, ventilation or quilt box and wind/weather protection were the most common selections. The bar graph shows the response of the total data base. None of the practices improved survival but most are recommended as good practices to improve wintering successes.



Sanitation Practices: It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. Of several options **Minimal hive intervention (59%) was the most common option selected** – this was encouraging as less intervention means reduced opportunity to compromise bee sanitation efforts of the bees themselves; needless, excessive inspections/manipulations can potentially interfere with what the bees are doing to stay healthy. Following minimal hive intervention, the remaining selections were all 10% or less in frequency of selection. Apiary site selection and colony configuration within the apiary, although not commonly utilized by beekeepers, are important sanitation choices because giving colonies a distinctive "addresses" which has been shown to reduce drifting of adult bees and help to reduce incidence of disease and mites. Small cell/natural brood comb, along with the options of requeening with hygienic bees, drone brood removal and brood cycle interruption are all active management options designed to help reduce mite levels, and while

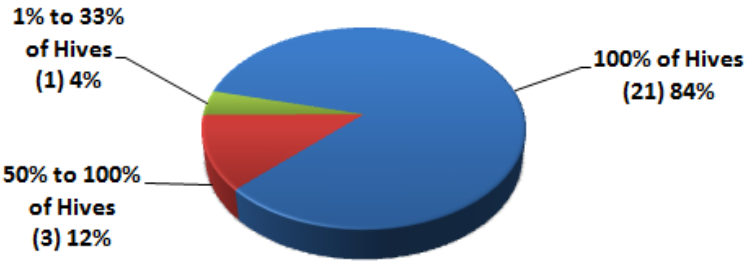
important, might not necessarily be considered sanitation - the question and options need to be modified prior to a subsequence survey season.

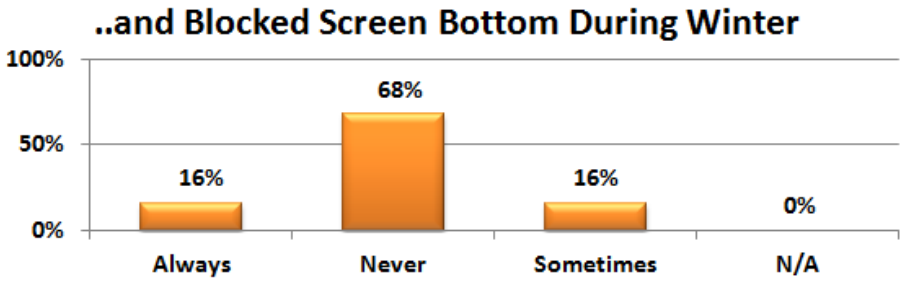


Things that improve winter success: Moisture kills bees, not cold, so it is recommended to locate hives out of the wind, in the sun, and provide some extra wind/weather protection. Leave screened bottom boards open and insure a top ventilation. Use screen tops with moisture collector such as burlap, straw, old towels, etc. Feed bees either sugar syrup or honey from other hives to insure enough food stores. Once fall rains start feed sugar as hard candy or dry to avoid adding additional moisture stress to colonies. It would seem prudent to review basic sanitation measures as anything we can do to help reduce sick bees and improve their health will help improve their survival.

Screen Board Use: A passive mite trap is the Screen bottom board. They are not very effective for mite control but can be utilized in an integrated approach (IPM). Again using the response from **Lewis Co individuals, four (of 25 individuals) said they did not use them: 84% used them on all their hives.** Over 65% left them open over the winter period (never response) while only 16% said they blocked them. When use of screen bottoms was compared to non-use, there was a 5 pecentage point difference in improved survival overwinter for the 271 beekeeper respondents from Washingon and Oregon. This advantage was the same in our two

survey sectons where we asked about screen bottom board use. Losses when left open or closed were not different.



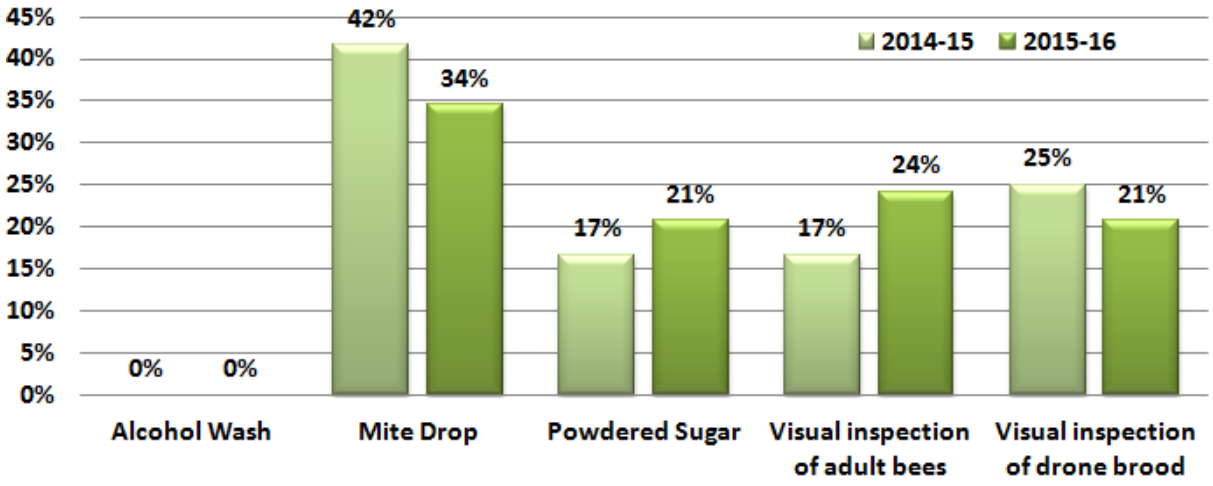


There is no good science to demonstrate if open or closed makes a difference in winter survival but some beekeepers "feel" bees do better with it closed overwinter. An open bottom, at least part of the year, can assist the bees in keeping their hive cleanerIt does appear there may be a slight advantage to use of screen bottoms (see www.pnwhoneybeesurvey.com report on screen bottom boards – under reports).

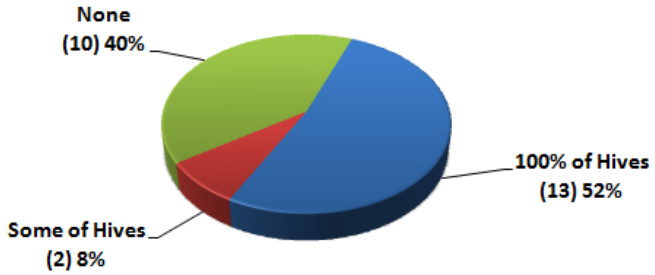
Mites, Mites, Mites

Many researchers and beekeepers believe mites are a major factor in high bee losses. They may be most damaging in their transmission of a complex of viruses. The viruses can reach epidemic proportions with heavy mite pressure, leading to weakened and stressed colonies. Larger-scale beekeepers in particular believe they need a very pro-active mite control program.

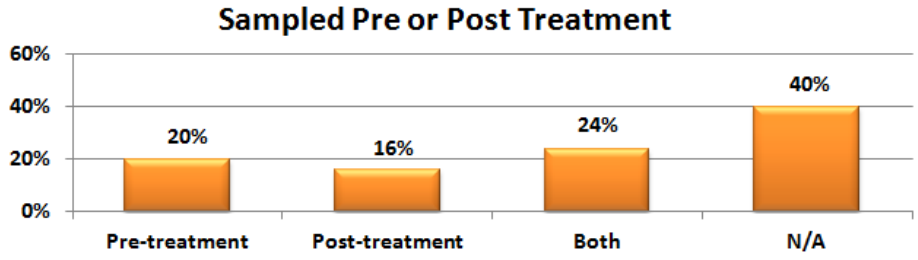
Mite monitoring management: It is important to KNOW YOUR MITE NUMBERS. Backyard beekeepers might actively choose to treat or not to treat a colony, but without regular pre-treatment sampling, and a post-treatment sampling, you don't know how your approach



worked. In order of popularity of use, Comparison of monitoring method used the past two season by Washington beekeepers shows use of Sticky boards down slightly from the previous year but nearly equal use of sugar shake and visual inspections. No alcohol washing was indicated. Preferred monitoring methods are sugar shake or alcohol wash; sticky boards can help indicate a potential problem but are not reliable as a basis for control decisions.



Two of every five apiaries were not monitored for mites while half were monitored 100%. Pre-treatment monitoring (20%) and both pre- and post-treatment monitoring, was done by 24% of respondents.



Individuals who did monitor had an improved survival percentage when their losses when compared to individuals who said they did not monitor. **Pre-treatment can help with control decisions. It is also important to check for control effectiveness, once completed, by**

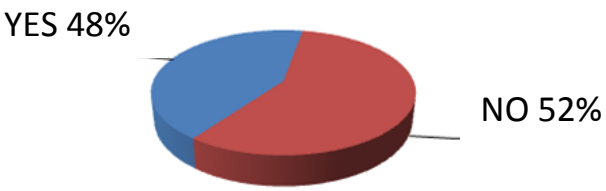
post-treatment monitoring. Sampling that has proven to be more effective are the sugar shake and the alcohol wasp.

See Tools for Varroa Monitoring www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of how best to do sugar shake or alcohol washing sampling. It also includes suggested mite levels based on the adult bee sampling. A colony is holding its own against mites if the mite sample is below 2% in spring (i.e. 2 mites/100 adult bees) and below 5% (no more than 5 mites to 100 adults) later in the year.

Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers). Visual sampling is not accurate: most mites are not on the adult bees, but in the brood. Even looking at drone brood is not effective; if done, look at what percentage of drone cells had mites. Post treatment monitoring should be done to check effectiveness of controls.

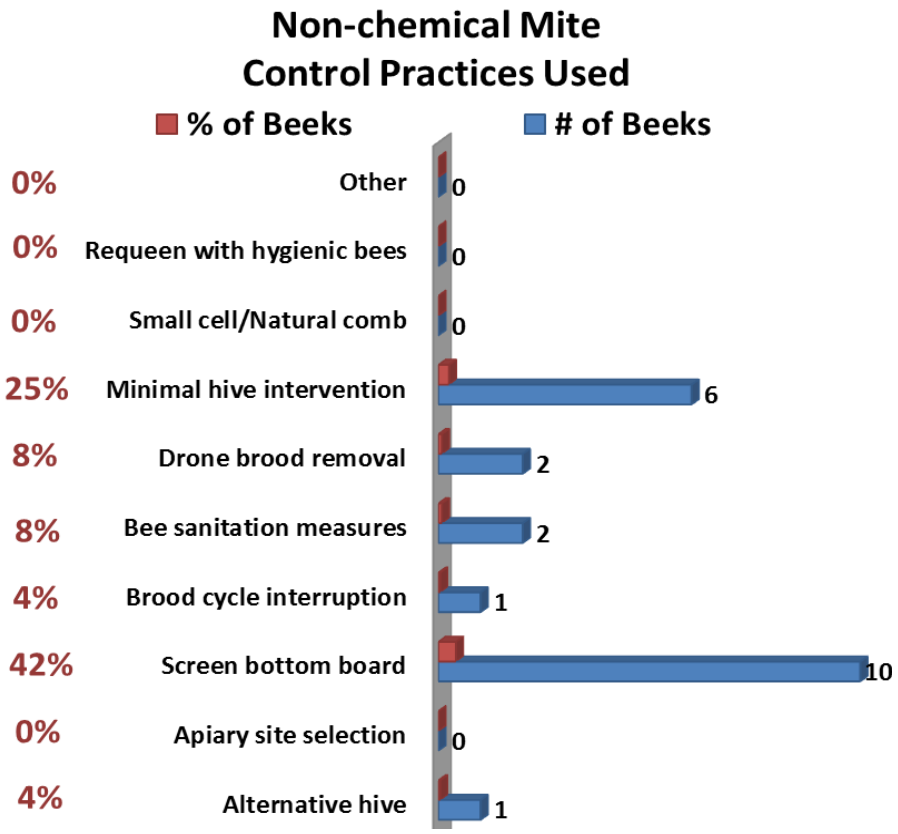
Use of medications and control treatments

We asked about general non-chemical mite treatments and also about use of chemicals for mite control. **Twenty three Washington individuals said they did employ a mite control (alternative or chemical) and their loss percentage was 66%; those who did use a treatment reported a 52% loss.** Non-treatment may be by default, a decision based on sampling results or beekeeper philosophy. Not all colonies need be treated as mite numbers can vary by location and year.



Non-Chemical Mite Control

Of nine non-chemical alternatives offered on the survey, 19 Washington respondents (37%) indicated they did not use any of the choices; they had a 62% winter loss. For the 33 respondents who checked at least one choice other than none (more than one selection was permitted), the loss rate was only 2 percentage points lower. U**se of screened bottom board was the most popular choice; winter loss level was slightly less at 55%. The next most common selection was minimal hive intervention; this choice had a 50% loss**. The highly

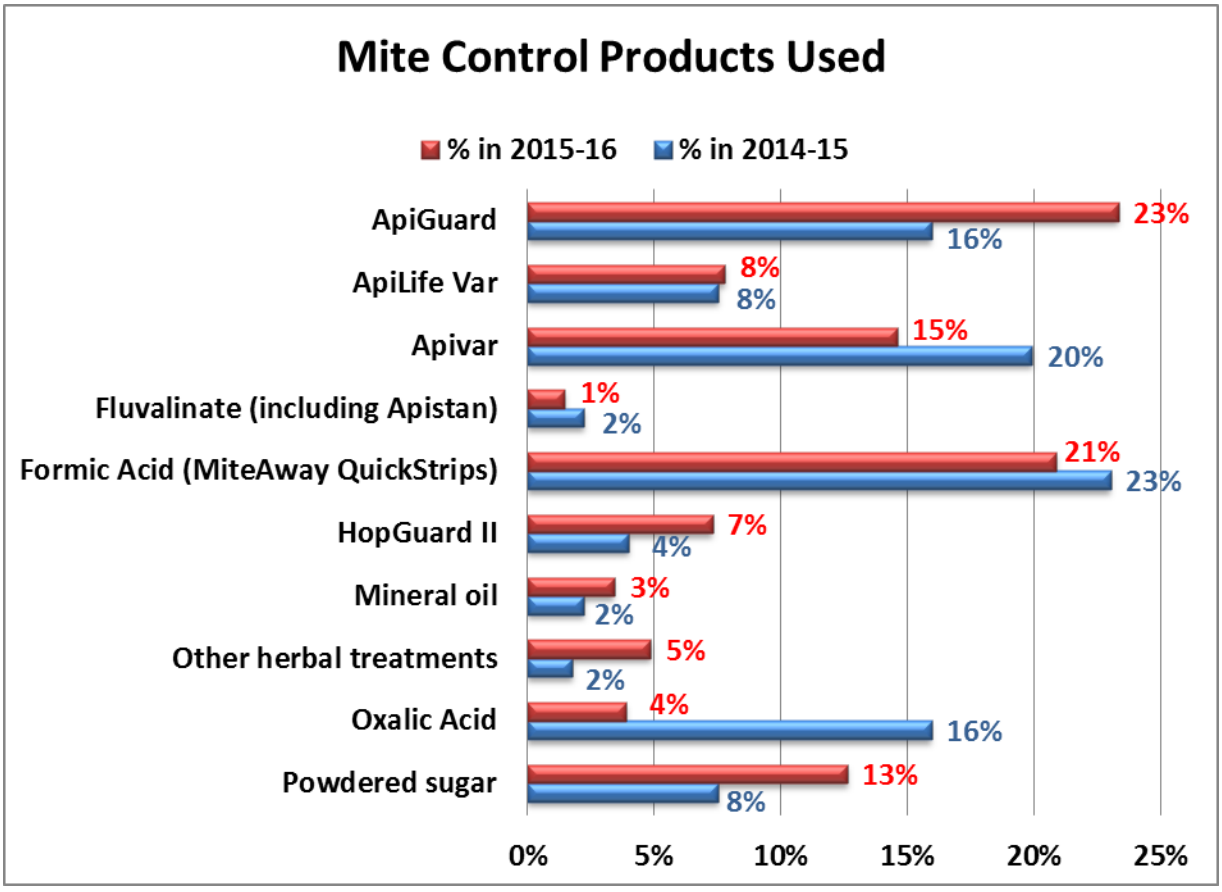


interventive and difficult managements of drone brood removal and brood interruption were less commonly utilized. Drone brood removal and use of brood interruption are all labor intensive and require some experience to complete. They work well only under limited circumstances. Likewise few individual indicated they requeened with hygienic bees. **Timing of use is critical to successful completion in time for the bees to properly prepare for winter and successful mite reduction.**

Chemical Control: More than half of respondent Washington beekeepers said they did not use any mite chemical control. They had a loss rate of 72%. For beekeepers who indicated they used a chemical, the loss rate was 58%. Apivar, the synthetic amitraz chemical, was used by 43 individuals and they had a much better survival rate with only a 23% loss rate. Twenty one individuals used ONLY Apivar, 15 used 2 chemical materials, 5 used 3 chemicals and 1 each used 4 & 5 chemicals. MAQS (Formic acid) was used by 42 individuals and they too had a significantly better survival rate, 23%; among the 42 individuals, 17 used ONLY MAQS, 16 used 2 chemicals, 9 individuals used 3 and 1 each used 4 & 5 chemicals.

The essential oil Apiguard was used by 32 individuals and they had a 26% loss; 14 individuals used ONLY Apiguard, 10 used 2 chemicals, 7 used 3 and 1 used 5 chemicals. Oxalic acid was used by 30 individuals; they had a loss rate of 35%; 7 of these individuals used ONLY Oxalic acid, 15 used 2 chemicals, 7 used 3 and 1 used 4. Powdered sugar was the chemical choice of 16 individuals; the loss rate was 29% of the 16 individuals, 7 used ONLY PS, 2 chemicals were used by 3 individuals and 4 used 5 chemicals.

Bar graph shows chemical selections of Washington and Oregon beekeepers the past 2 survey years.



One individual indicated they fed Terramycin for foul-brood disease and one used Fumigillan for Nosema disease control. **Use of these antibiotics may be helpful but they are not recommended as a general rule.**

SO What works?

Drone brood removal is a non-chemical treatment that works in most colonies during spring buildup. You can purchase a drone foundation frame or put a shallow frame into a standard brood box and have bees construct drone cells below the shallow bottom bar. A

female mite in a drone cell can reproduce 3 daughters, as opposed to 1 in a worker cell. If we harvest the drones at capping stage before they emerge as adults, we knock down that mite number as it is growing. Feed the drone brood to your chickens. The colony doesn't need that many drones. For northern beekeepers drone brood removal reduced winter losses 10 to 33% reduction in loss (according to BIP data), so it may have helped. This technique only works during spring buildup.

Breaking the brood cycle, with requeening, especially if hygienic queen stock or local selected stock is substituted, can also keep mite numbers at manageable levels in most bee colonies. Both are a lot of work and new beekeepers should not seek to use such techniques until they have a better understanding of bee colony life cycles and queen event behaviors in colonies.

There is a wide array of chemical treatments available to treat varroa mites. They are often the best choice when mite populations are high as they can be very effective. Materials that can be used include acids such as formic acid (Mite-Away Quick Strips, or MAQS) and oxalic acid), essential oils [Apiguard or Apilife-var] and the highly effective synthetic miticide, Apivar (amitraz). All have possible serious negative effects to the beekeeper applicator and they can contaminate the beeswax and honey of the hive. They work best under certain conditions.

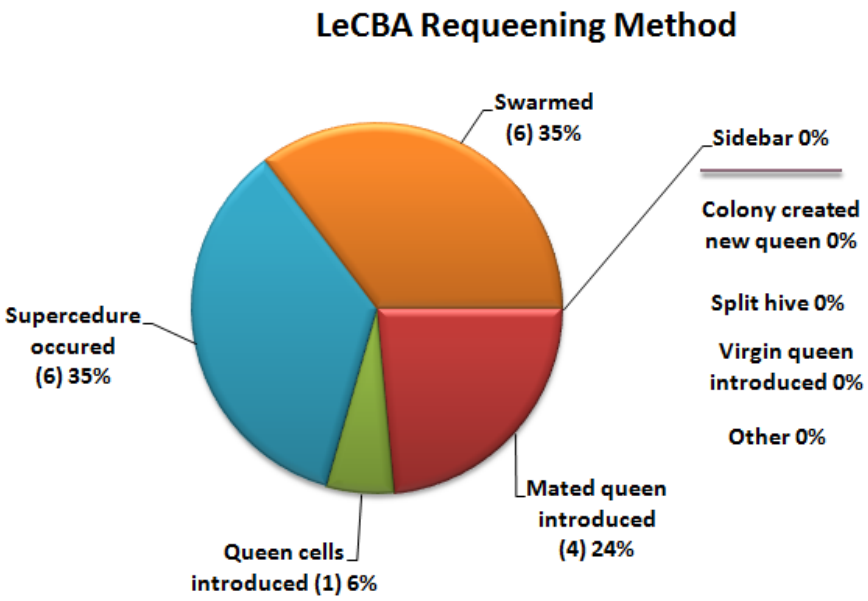
For essential oils, those who used the essential oils Apiguard or Apilife Var reported 26 to 31% fewer overwintering losses in 4 consecutive BIP survey years. Honey-B-Healthy, a sugar syrup with drops of 2 essential oils is not of sufficient strength to control mites, and there was no significant difference in losses for those who did v. did not use it. Concentration (dosage) is the difference between a food, a medicine, and a poison. In HBH, there is not enough essential oil to control mites; however, HBH does have other uses, such as helping bees accept sugar syrup, and helping unite swarms.

Formic acid (Mite-Away Quick Strips, or MAQS) when used reduces losses 16 to 31%. Those beekeepers using Hopguard II reported 10% fewer losses in one survey year, 2013-14 (it is a relatively new absence period in the hive. product). There have been heavier queen losses noted with MAQS and Hopguard II has completely failed for some beekeepers. Oxalic acid is the newest mite killing agent. BIP respondents reported 37 to 41 % fewer losses when it was used during late fall or during a seasonal capped brood absence.

Apivar [amitraz] users reported 35 to 47% fewer overwintering losses, but it does have possible side effects: it may affect drone sperm and queen rearing.

QUEENS, QUEENS, QUEENS

We hear lots of issues related to queen "problems". On the survey we asked what percentage of loss could be attributed to queen problems. We also asked "Did you or did your hive requeen, in any form during the year". There was wide variation in responses and we feel not very useful in our analysis. Figure below shows Lewis Co response to 2nd question.



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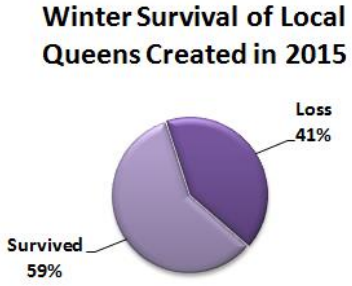

Fifty one individuals on OR and WA indicated they reared 150 local queens via splitting/grafting or other method. Three-fifths survived winter. Local survivor stock may have some value in reducing or suppressing mite population growth.

Queen related colony loss: 45% of respondents re-queened, or their colonies did. 36% did not, and 19% said their colony did not requeen, at least that they were aware of. Queen stock is a key to eventually not having to do constant mite control. There are local queen rearers working on breeding bees for our habitat (including a group in Washington and another in Oregon). WSU and the USDA lab in Louisiana have significant efforts underway seeking bees that are more mite tolerant/resistant. Russian bees have better ability to resist mites as does proven hygienic stock. WSU's program with imported semen is yielding bees with improved hygienic behavior to remove mites. Mixing local stock with hygienic stock seems to be working.

Final note: Bee counted-Bee informed! If you find any of this useful – it is beekeepers communicating to beekeepers – please consider participating in the PNW and/or the National BIP survey next April! Please help make the Clark County report more robust with a larger participant base next year. For a notification when the survey is ready please email info@pnwhoneybeesurvey.com with *"REMINDER"* in the subject line.