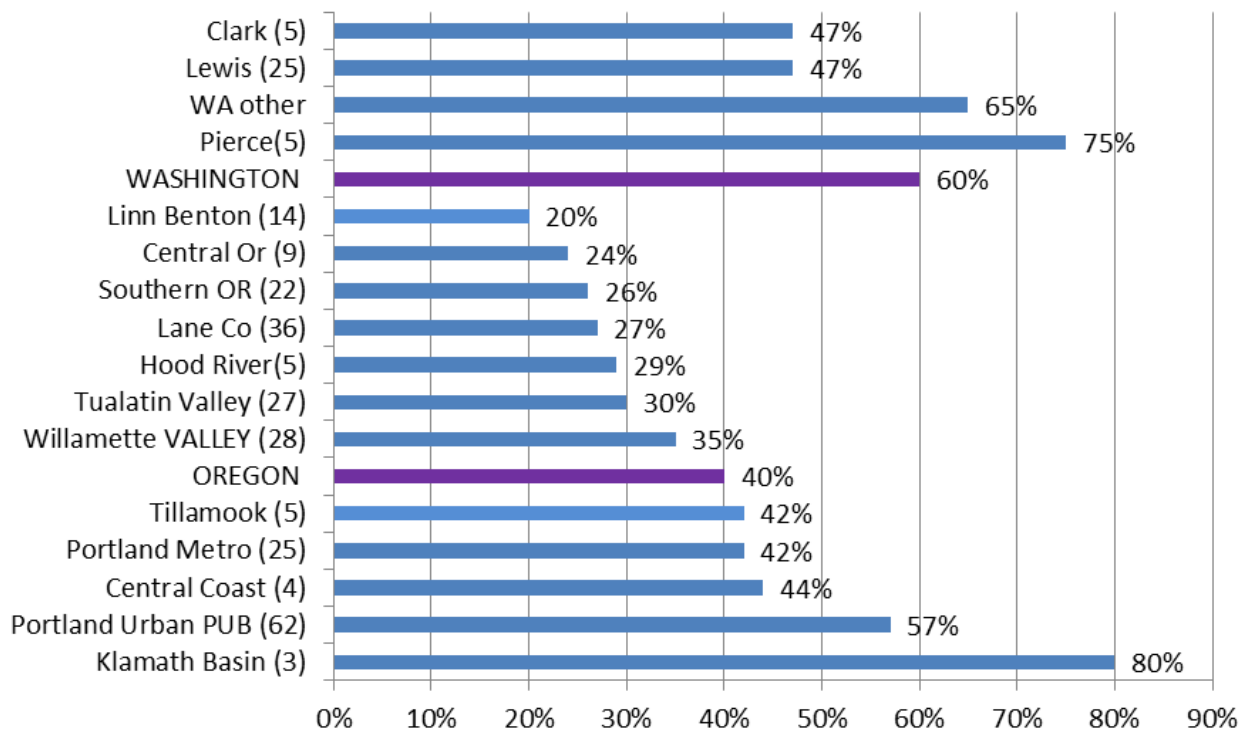


## Lewis Co Bee Losses 2015-16 Winter Dewey Caron and Jenai Fitzpatrick

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](http://www.pnwhoneybeesurvey.com).

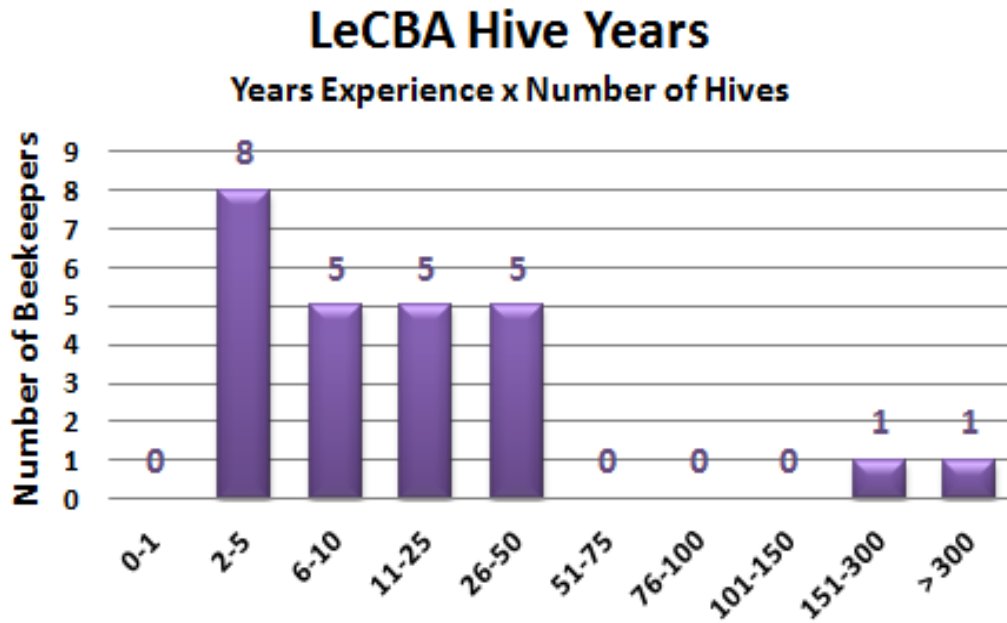
The Lewis Co member response was the largest for 5 I-5 corridor bee associations in Washington. A total of 25 Lewis Co beekeeper responses were analyzed with the 2015-2016 survey, a substantial increase from 7 individuals the previous year. Figure 1 shows the total OR and WA response (number right of association name) and percent overwinter losses by club.

**% Overwinter loss by Association, 2016**



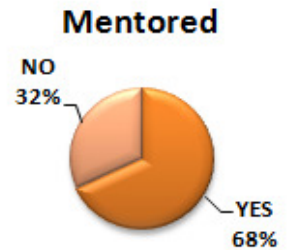
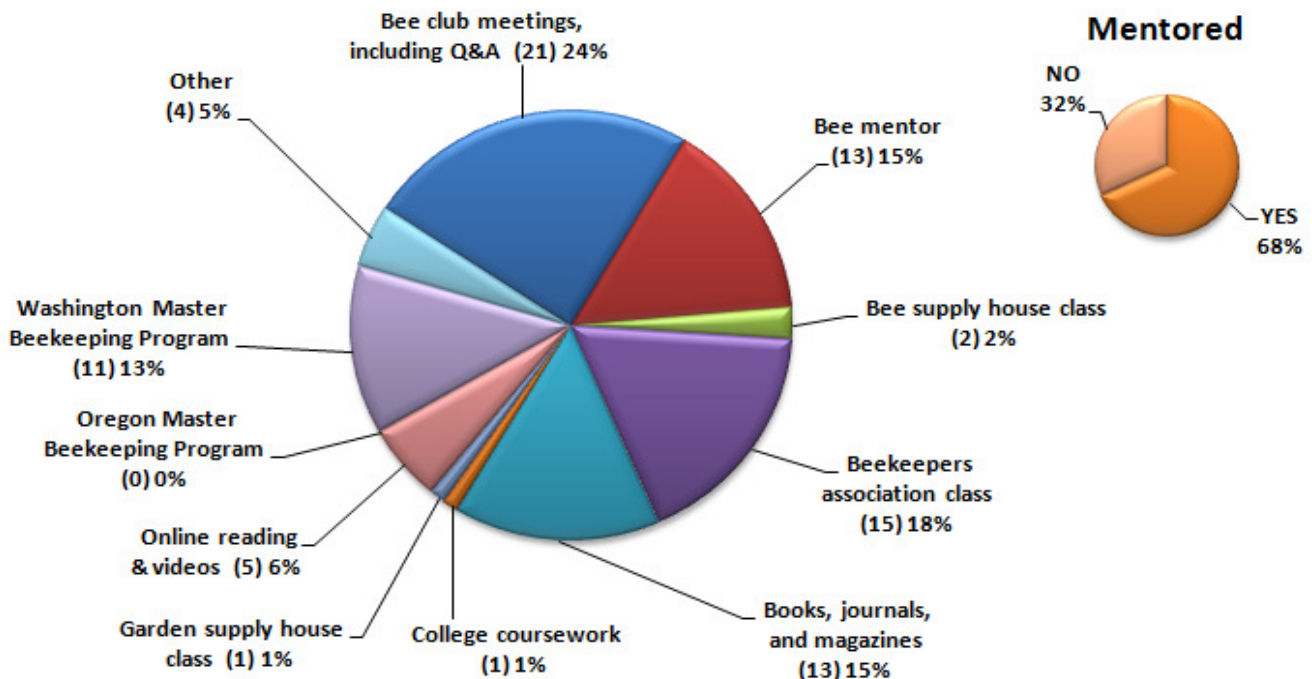
The vast majority of respondents to the survey were new beekeepers. 60% of the 25 Lewis Co. respondents had 1 to 3 years of experience; 20% had 8 or more years of experience with 54 being the longest. Of a total of 135 colonies, 48% of those returning a survey kept 1, 2 or 3 colonies; 2 and 4 colonies were the most numerous with 7 respondents each reporting that colony number. The highest number was 30; 5 individuals maintained 8 or more colonies. To characterize bee experience I multiply number of years of experience by number of colonies =Hive Years). The majority of Lewis Co beekeepers returning a survey, as shown in Figure 2, had

10 or fewer Hive years, demonstrating the relative newness to beekeeping and lower colony numbers of respondents,



68% of Lewis Co respondents reported having a mentor for their first years in beekeeping, down from 100% last year (but there was a total of only 7 Lewis Co respondents last year). 60% of 52 WA beekeepers had an experienced mentor available.

### LeCBA Greatest Value of Beekeeping Educational Experiences



The survey queries the major sources used for beekeeping information. Club meetings and the Association’s Beekeeper course were ranked ahead of a Bee mentor, Books, journals and magazines. The Washington Master Beekeeper program was another major means Lewis County respondents reported getting their bee information. The data supports the concept that Lewis County is doing a good job of fostering and supporting new beekeepers.

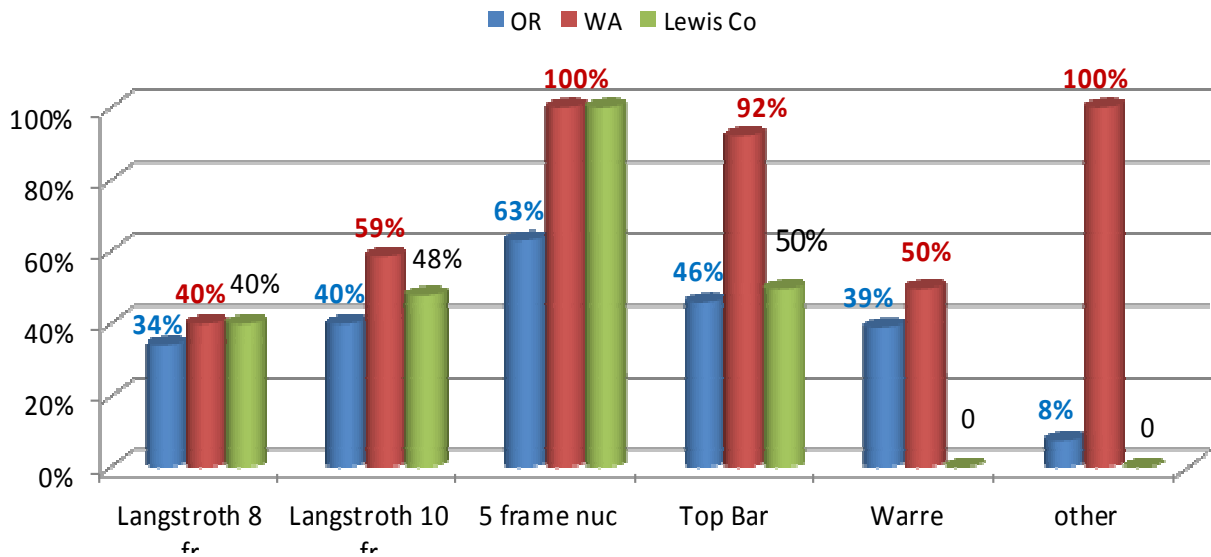
### 2015-2016 Overwinter Bee Losses

**Total PNW (OR and WA) backyard beekeeper overwinter loss = 43.8% loss.**

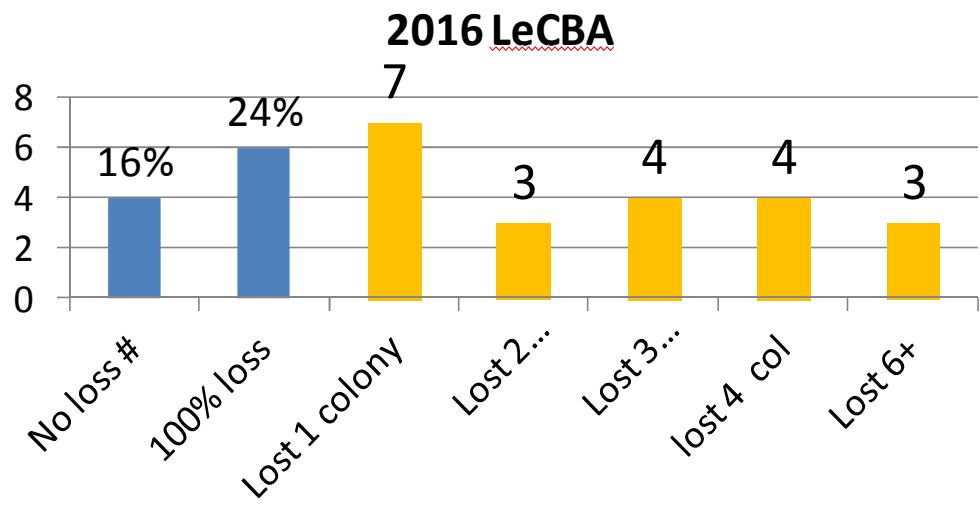
**LEWIS CO Loss rate = 47%, WA beekeeper loss rate=60%**

Our survey overwintering loss statistic was developed by our asking number of fall colonies and surviving number in the spring by hive type. Results, shown in bar graph below, illustrates overwintering losses for 219 OR beekeeper respondents, 52 WA beekeepers and the 25 Lewis Co beekeeper respondents. Among total OR and WA beekeepers, 49 individuals (18%) maintained more than one hive type.

### Comparison of OR, WA & Lewis Co Beekeeper overwinter losses by hive type, 2015-2016

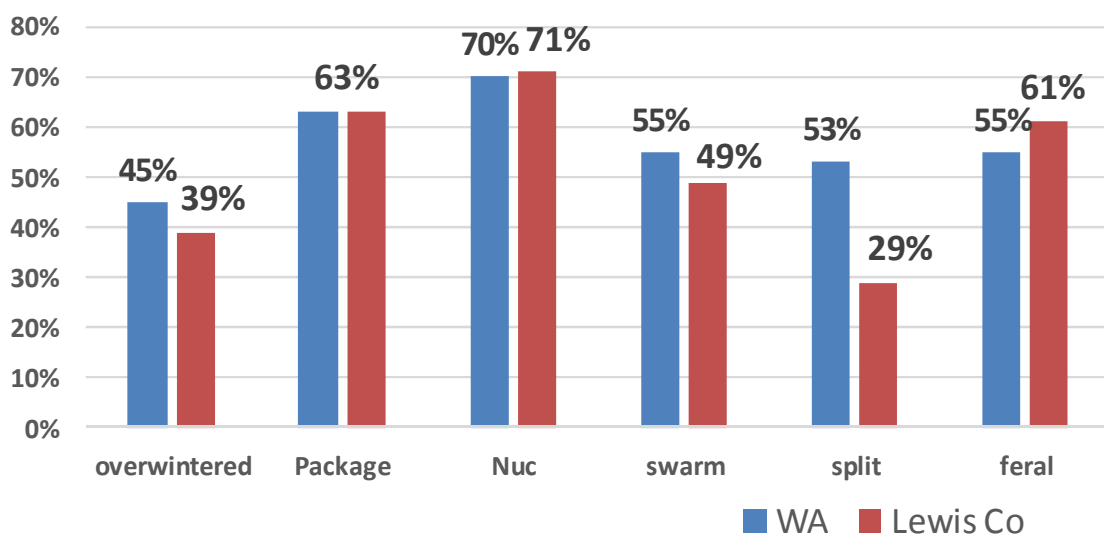


For Lewis Co  
 beekeepers 4  
 individuals (16%) had  
 zero loss;  
 unfortunately 6 (24%)  
 had total loss. Seven  
 individuals lost one  
 colony, while 3  
 individual lost 6 or  
 more colonies:  
 heaviest loss was 10  
 colonies.



**Loss by hive origination:** We also asked survey respondents to list their loss by hive origination. The result is graphically presented below for both WA and Lewis Co beekeepers. **Overwintered colonies, as expected, had the best survival. Packages, swarms and feral hive transfers were less than 50% successful.** Splits were quite successful for Lewis Co beekeepers, less so for others. Relative rates of loss by origination were the same for both survey years; in the previous year’s survey, 20% of overwintered colonies, 22% of packages, 29% of swarms and 50% of ferals were lost.

### Percent winter loss by hive origination, Lewis Co and PNW 2016

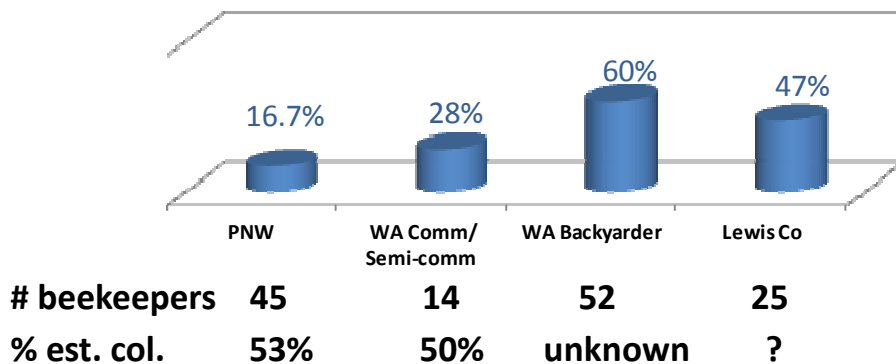


## Comparison of backyarders and commercial/semi-commercial beekeepers

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%. Lewis Co backyarders had lower wintering losses compared to the overall WA.

Last season, for comparison, 41 PNW commercial and semi-commercial beekeepers (representing approximately 60% of the colonies of the 3 states) had a loss rate of 15.7%, seven commercial and semi-commercial beekeepers had a 28% loss while 31 WA backyarders had a 25% colony loss rate. The 2015 Bee Informed national survey, (23% loss rate nationally) estimated total Washington beekeeper losses at 39.3%. Our purpose to “ground truth” the National survey seems to be valid as our PNW numbers are in general agreement.

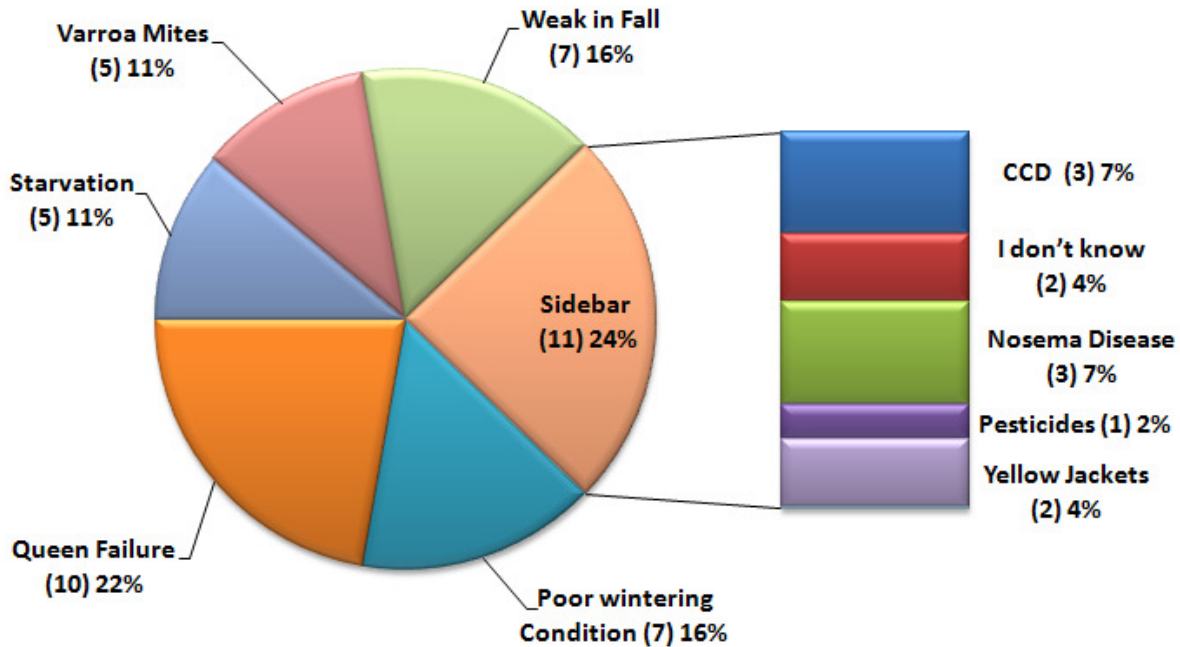
### Comparison PNW commercial/semi-commercial with Oregon commercial/semi-commercial, 271 OR/WA backyarder and BIP National losses, 2016



**Backyard losses have consistently been double the losses of larger-scale beekeepers,** over 7 years of survey responses. The reasons why are complex but commercial and semi-commercial beekeepers examine 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.

**Self-reported “reasons” for colony losses:** See the graphic below for the “reasons” Lewis County respondents provided as the reasons for their overwintering losses. Queen failure was the major factor listed, closely followed by Weak in the fall and poor wintering conditions.

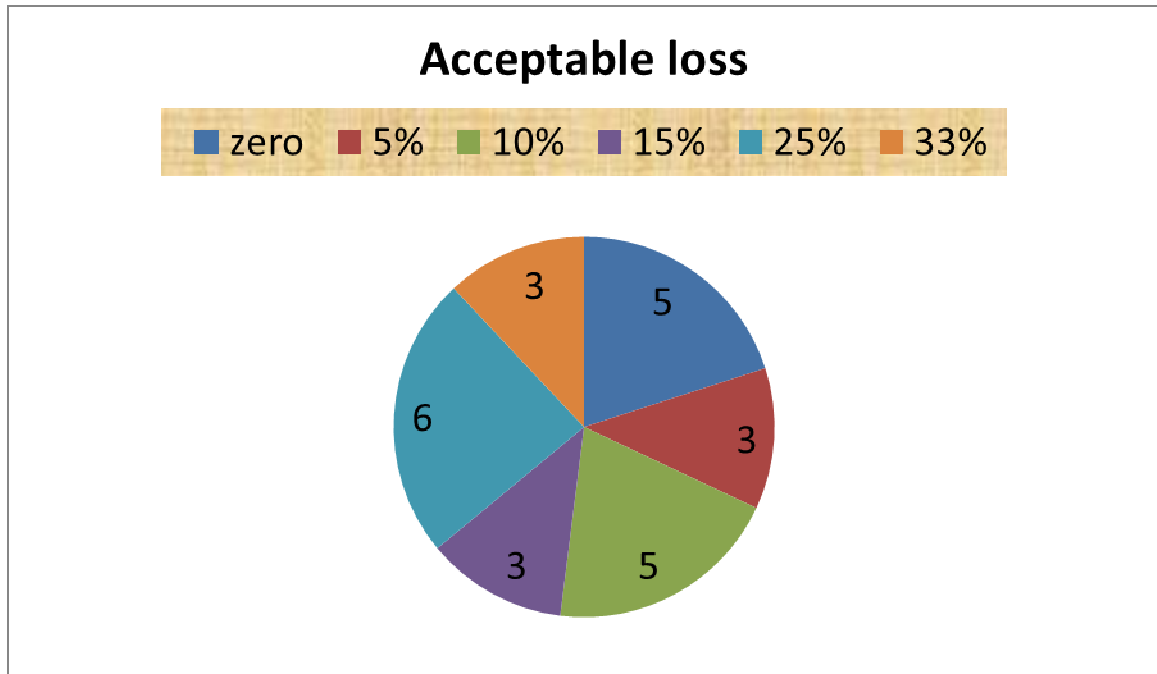
### LeCBA Perceived Factors of Colony Death



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 checking stores to help avoid winter starvation will help reduce some of the losses. Control of varroa mites will also help reduce losses.** Our survey, asked about managements, mite controls and queens as can be read in the following pages.

Respondents were asked to select an acceptable loss level, being offered several categories to check. Five individuals said zero, while zero, 5 or 10% were the selection of 52% of Lewis Co beekeepers. The highest level indicated by any Lewis Co beekeeper was 33%.

**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, failure to do something or doing things incorrectly, remains a factor in our losses.



What effects our alteration to the bee's natural environment and other external 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 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.**

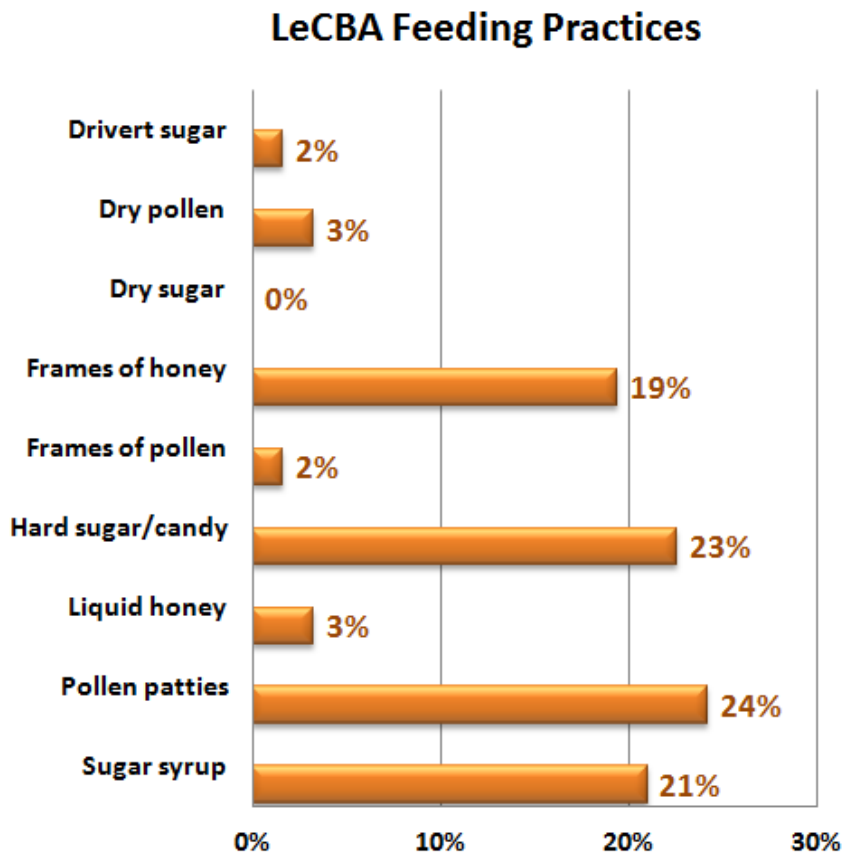
**Pro-active Managements:** Do you feed bee colonies in your care with sugar, honey or protein? Do you take extra measures for wintering preparation? Are we doing the sanitary practices we would in animal husbandry with our bees such as cleaning hive tools between inspecting different hives or when we take a frame from one colony to another do we check to confirm the donor colony is healthy? 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.

This report is of the numbers. Until this year the response rate from Lewis Co beekeepers was too small to permit meaningful analysis. I plan to look into such correlations this year – in the meantime here are the numbers of management choices for LCBA beekeepers.

**FEEDING PRACTICES:**

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 Lewis Co beekeepers (more than one selection could be checked). All beekeepers selected at least one alternative and most listed more than one alternative. These four selections were the same most popular choices last season, with a slightly lower percentage indicating sugar candy and a greater percentage checking frames of honey.



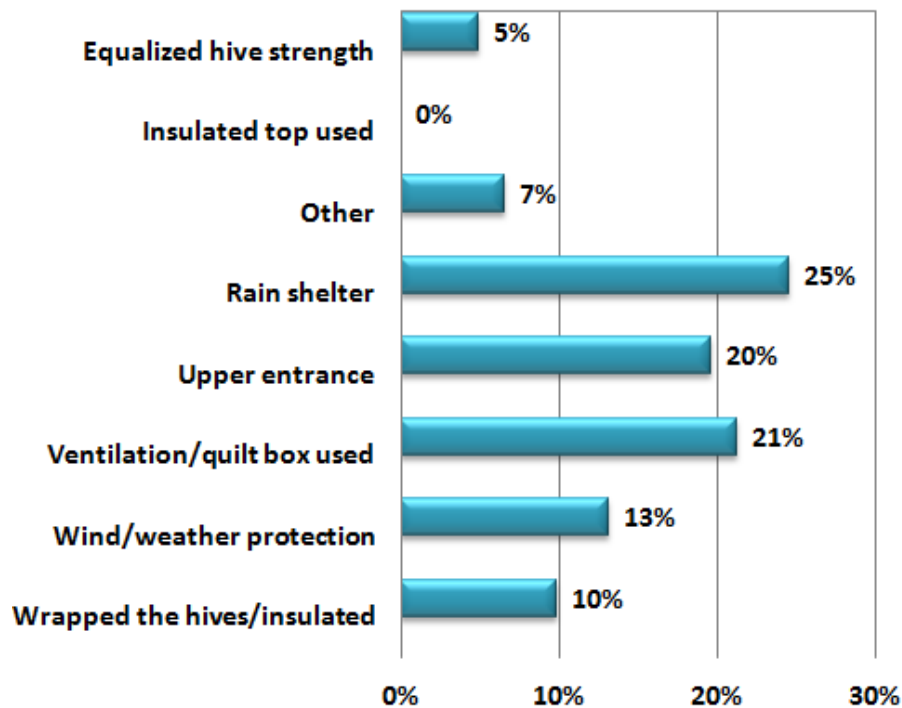
Looking at losses, none of the feeding options, for either Lewis Co beekeepers or the larger data base, improved winter survival rate. That does not mean feeding is not of value as feeding management may be done for many more reasons than just to improve winter survival.

**Wintering:** All but a single Lewis Co beekeeper indicated they did something to improve overwintering success. Seventy two percent selected more than one choice; Rain shelter, upper entrance and ventilation or quilt box were the most popular managements chosen. Under other category, use of electrolytes, addition of a slatted rack, screen bottom board and tipping



hives forward were additional managements added to the selections offered by the survey. Selections were similar to previous season with rain shelter use down seven percentage points and equalizing hive strength down 12 percentage points. Use of wind/weather protection was a new selection in this survey year it is obviously a popular wintering practice, selected by 13% of respondents. As with feeding, none of the options, by themselves, reduced wintering losses.

### LeCBA Wintering Practices

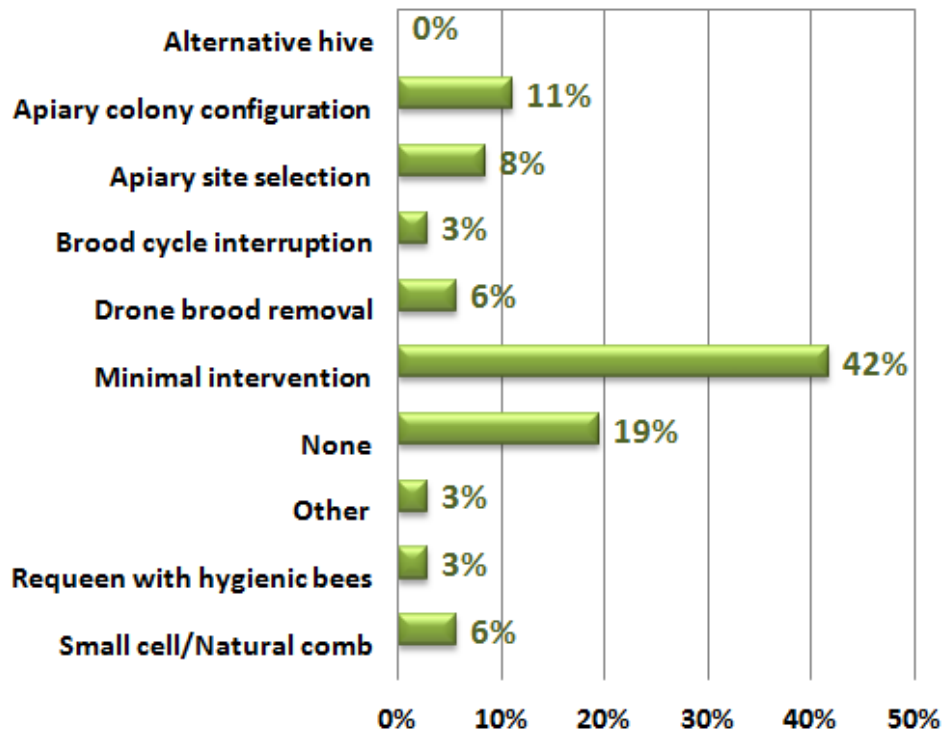


**Sanitation Practices:** It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. Seven individuals (28%) did not select any of the options listed under sanitation practices; eight indicated more than one option. **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 Lewis Co beekeepers, are important sanitation choices

because giving colonies a distinctive “addresses” 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

### LeCBA Sanitation Practices

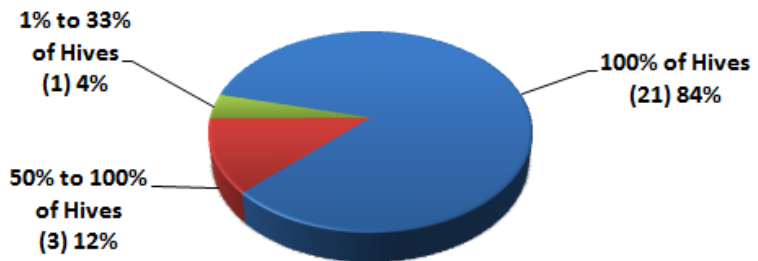


interruption are all active management options designed to help reduce mite levels, and while important, might not necessarily be considered sanitation - the question and options need to be modified prior to a subsequent survey season. No single option improved winter survival rate.

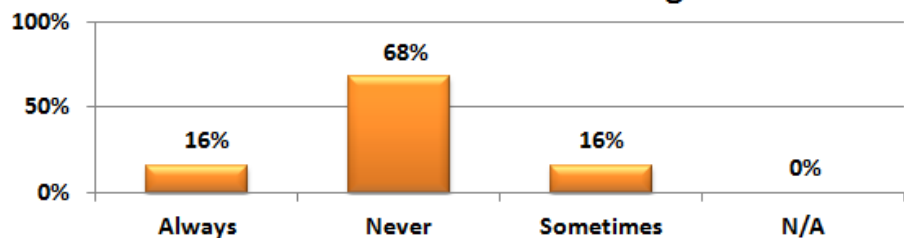
**Things that seem to improve winter success:** Moisture kills bees, not cold, so we recommend hives be located out of the wind, in the sun, and provided some extra wind/weather protection. Leave screened bottom boards open and insure a top ventilation. Use of screen tops with moisture collector such as burlap, straw, old towels, etc is a good idea.. Feed bees either sugar syrup or honey from other hives to insure enough food stores. Once fall rains start. feed dry sugar or as a hard candy 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 colony 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). **Four Lewis Co individuals (16%) 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. There is no good science 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 cleaner. When use of screen bottoms was compared to non-use, there was a 5 percentage point difference in improved survival overwinter for the 271 beekeeper respondents from Washington and Oregon. This advantage was the same for our two survey sections, both directly asking about screen bottom board use or use of SBB as one of the non-chemical alternatives. Losses when left open or closed were not different. It does appear there may be a slight advantage to use of screen bottoms (see [www.pnwhoneybeesurvey.com](http://www.pnwhoneybeesurvey.com) report on screen bottom boards – under reports).

**LeCBA Used Screened Bottom Board on ...**



**..and Blocked Screen Bottom During Winter**



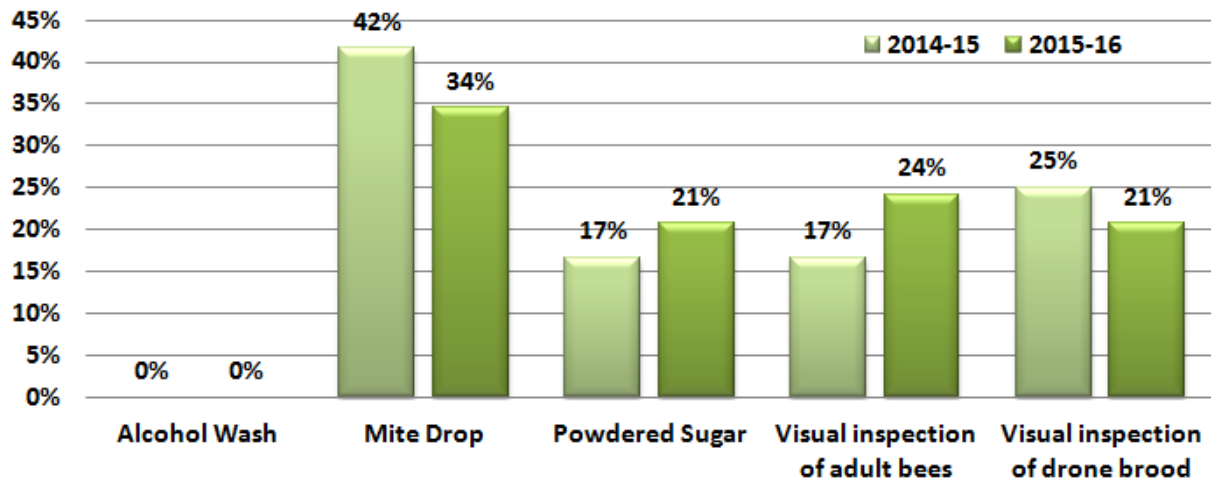
### Mites, Mites, Mites

Many researchers and beekeepers believe mites are a major factor in heavy 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.

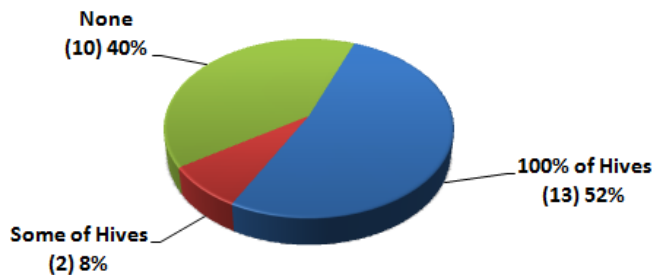
**Mite monitoring management:** It is important to KNOW YOUR MITE NUMBERS. Backyard beekeepers might actively choose to treat or not to treat a colony, but without

regular pre-treatment sampling, followed by a post-treatment sampling, you don't know how your approach worked. Comparison of monitoring method used the past two season by Lewis Co beekeepers shows use of Sticky boards down slightly from the previous year followed by nearly equal efforts of sugar shake and visual inspections. No alcohol washing was indicated. Preferred monitoring methods are sugar shake or alcohol wash; sticky boards may help indicate a potential problem but are not reliable for control decisions.

### LeCBA Mite Monitoring Method(s) Used

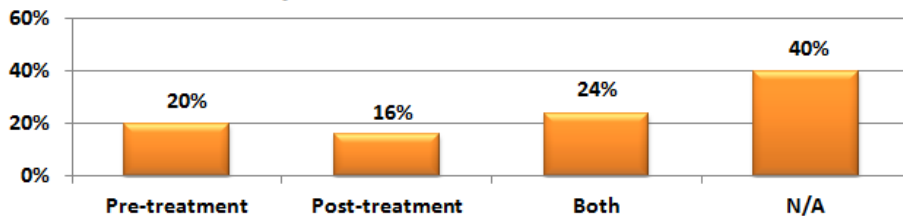


### LeCBA Percent of Hives Monitored For Mites



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 the majority of respondents.

### Sampled Pre or Post Treatment



Individuals who did monitor had an improved survival percentage when their losses were compared to individuals who said they did not monitor. **Pre-treatment can help with control decisions and checking on control effectiveness by post-treatment monitoring is important. Most effective sampling methods are the sugar shake and alcohol wash methods.**

See Tools for Varroa Monitoring [www.honeybeehealthcoalition.org/varroa](http://www.honeybeehealthcoalition.org/varroa) on the Honey Bee Health Coalition website for a description of how best to do sugar shake or alcohol wash sampling. The Tools guide 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 routinely done to check effectiveness of all control treatments.

### Use of medications and control treatments

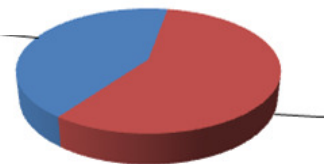
We asked about general non-chemical mite treatments and also about use of chemicals for mite control. **Twelve individuals said they did employ a mite control (alternative or chemical).**

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.

**Lewis Co, individuals that treated had 46% loss while those who did not treat had a 52% loss.**

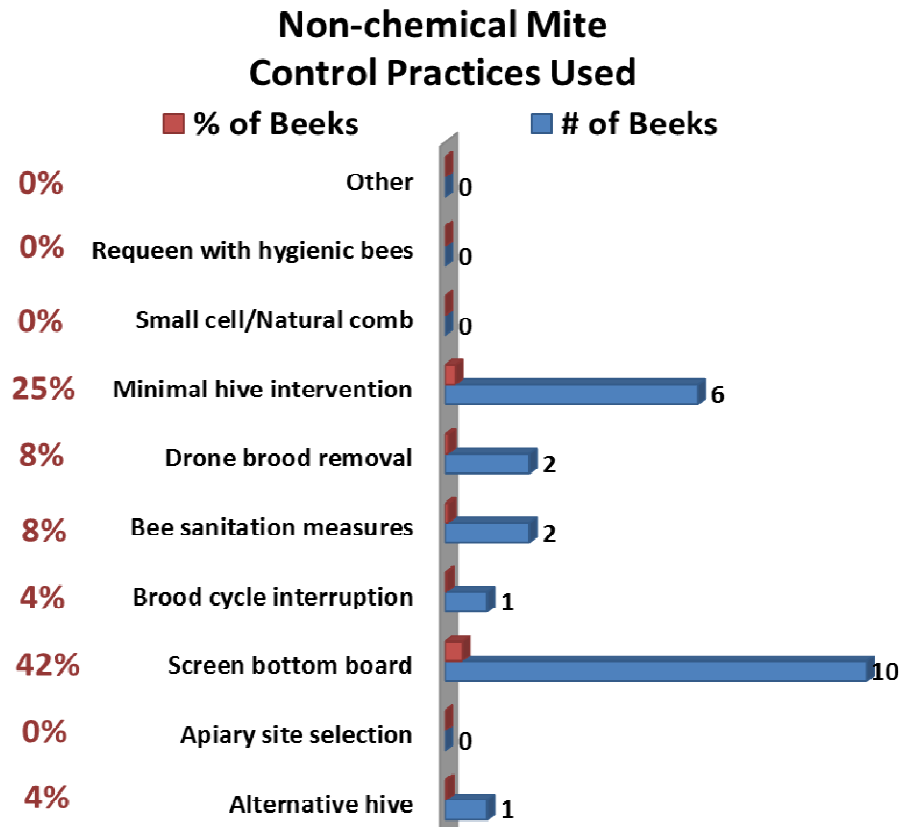
YES 48%



NO 52%

**Non-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey, 9 Lewis Co respondents (36%) indicated they did not use any of the choices. These individuals had a 70% winter loss. For the respondents who checked at least one choice other than none (more than one selection was permitted), **use of screened bottom board was listed by 10 individuals. The next most common selection was minimal hive intervention.** The highly interventive and difficult managements of drone brood removal and brood interruption were collectively used by 3 individuals. 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. No individual indicated they requeened with hygienic bees. Those who used at

least one alternative had a 43% loss rate. **Timing and proper application of alternatives is critical to successful completion. Bees need time to properly prepare for winter following successful mite reduction.**



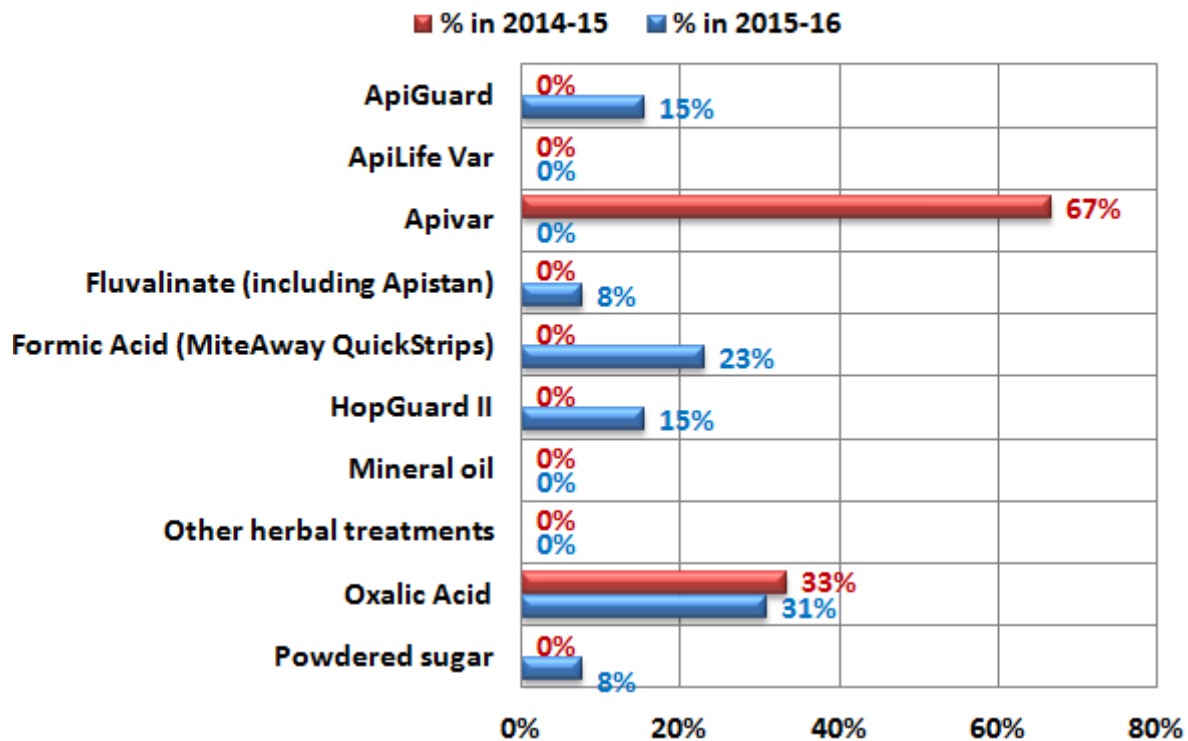
**Chemical Control:** Eleven Lewis Co Beekeepers indicated they used a chemical last year. Apivar was most commonly utilized the previous season but zero indicated use this year. The acids, Oxalic and Formic (MAQS), followed by Hopguard II, were the most popular chemical controls used followed by Apiguard (=essential oil thymol). One individual used powdered sugar and another Apistan. Comparisons of responses in both years are illustrated in Figure. The significance of such wide changes this year compared to last is unknown but small amount of use may be the reason for such wide variation.

For Washington beekeepers who used a chemical treatment, the loss rate was 58%; for those that did not use a chemical it was 72%; Lewis Co respondents who did not use any chemical had a 57% loss rate and for those who did the loss rate was 50%.

Most spectacular was use of Apivar – those Washington beekeepers who used it had only a 25% loss; no Lewis Co beekeepers who filled out a survey used Apivar this past year. There was too little use of the various chemical tools to make analysis significant for Lewis Co. In a separate report, I have a report on Chemical and non-chemical alternatives and their effectiveness in reducing overwinter losses. It uses the total data base. Here is a summary: 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.

## LeCBA Mite Control Products Used



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.**

**What works:** Drone brood removal is a non-chemical treatment that helps slow mite development in most colonies during spring buildup. You can buy 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. It is critical to harvest the drones at capping stage before they emerge as adults, to suppress mite growth. 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% according to BIP data and by five percentage points among Oregon and Washington beekeepers. This technique can only be utilized 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 reduced 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 vs. 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 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



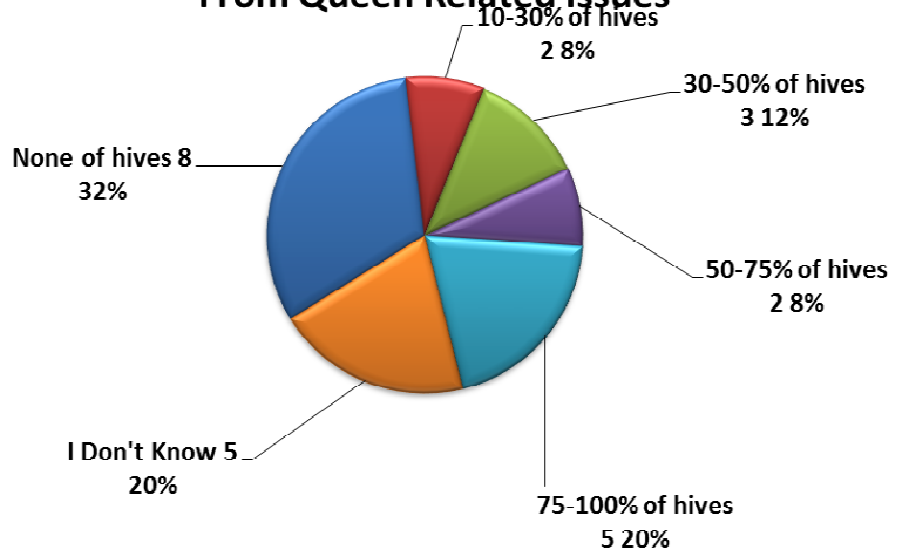
agent. BIP respondents reported 37 to 41 % fewer losses when it was used during late fall or when used in absence of capped brood.

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.

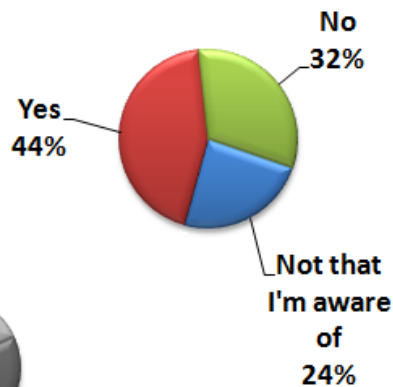
## QUEENS, QUEENS

We hear lots of issues related to queen “problems”. On the survey we asked what percentage of loss could be attributed to queen problems. Thirteen individuals said none or I don’t know (52%). Number of individuals, in ( ), and percentage of estimate of loss rate is shown in Figure.

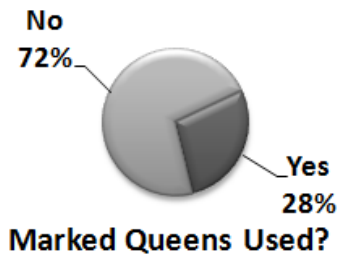
**LeCBA Percentage of Colonies Lost From Queen Related Issues**



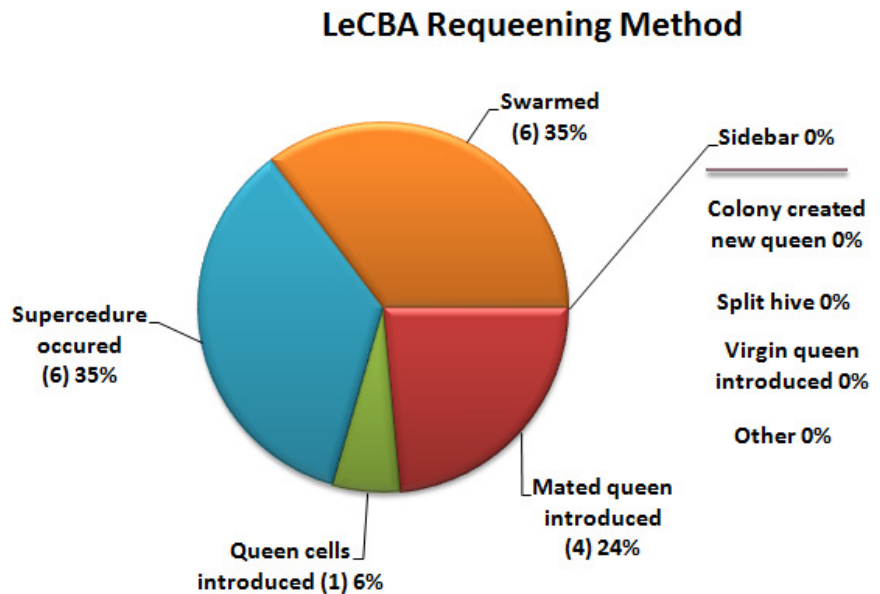
**LeCBA hives requeened in any form during the 2015/16 season?**



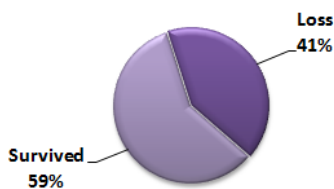
Queen events can be a significant factor contributing to a colony not performing as expected. We asked “Did you or did your hive requeen, in any form during the year”. Eleven individuals said yes while eight said no. Responses were very similar to previous year with 5 percent more saying no and 4% fewer saying yes. We asked if queens were marked. Only 28% said yes. Outside of the beekeeper requeening a colony, it would be difficult to say yes or no to question about colony requeening in the absence of queen marking.



The question “How did bees/you requeen” received 17 responses as illustrated in Figure 27. Nearly half of respondents indicated their bees requeened via swarming and supersedure. It can be useful as the brood break will reduce mite population buildup. Mated queen introduction was indicated by four individuals and queen cell introduction by one beekeeper.



#### Winter Survival of Local Queens Created in 2015



Fifty one individuals in OR and WA indicated they reared 150 local queens via splitting/grafting or other method. Three-fifths survived winter. In Lewis Co, 3 individuals reared one queen each and 2 of the 3 survived winter. Local survivor stock may have some value in recuing mite populations.

**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 please consider participating in the PNW and/or the National BIP survey next April! Help make the Lewis County report more robust with an even larger participant base next year**