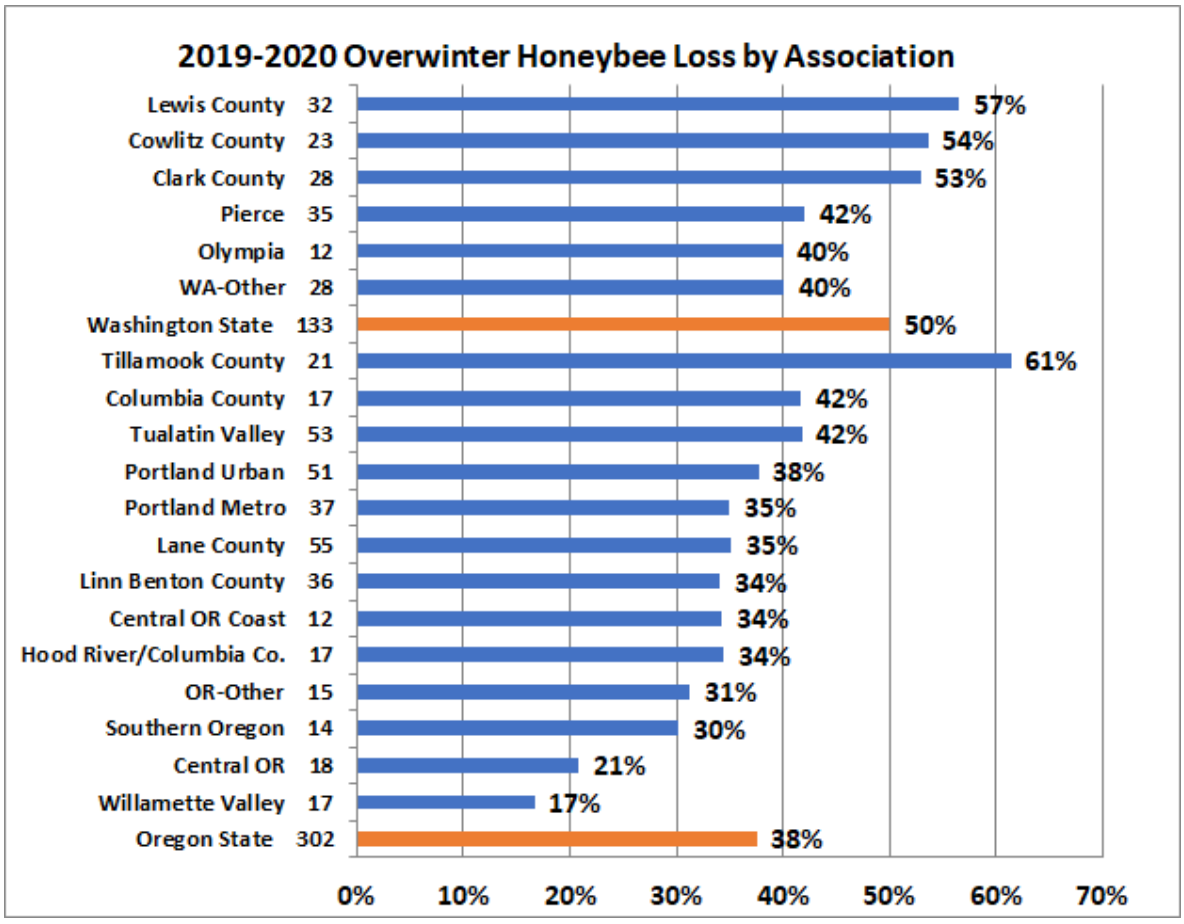
2019-20 Lane County Winter Loss Report by Dewey M. Caron

Oregon and Lane County beekeepers were directed to a web-based survey in a continuing effort to define overwintering successes/losses www.pnwhoneybeesurvey.com.This was the 11Th year of such survey activity. I received 302 responses from OR backyarders and 133 from Washington beekeepers keeping anywhere from 1 to 45 colonies. Lane County members sent in 55 surveys, 11 more than last year and the largest response of any of the clubs. THANK YOU.



Overwintering losses were determined by asking number of fall (October) colonies by hive type and subsequently how many were still alive in the spring (April). **Total LCBA loss = 35%,** three percentage points better than statewide. LCBA response included 276 fall colonies, 88 Langstroth 8 and 10 frame hives + 19 nucs. The 11 non-traditional hives did not fare well over the winter. Two of the 4 other hives were horizontal (1 of the 2 survived) and 2 others were not otherwise identified. Highest colony number was 35. Numbers shown below in Figure 2 includes comparison of Lane Co to statewide.

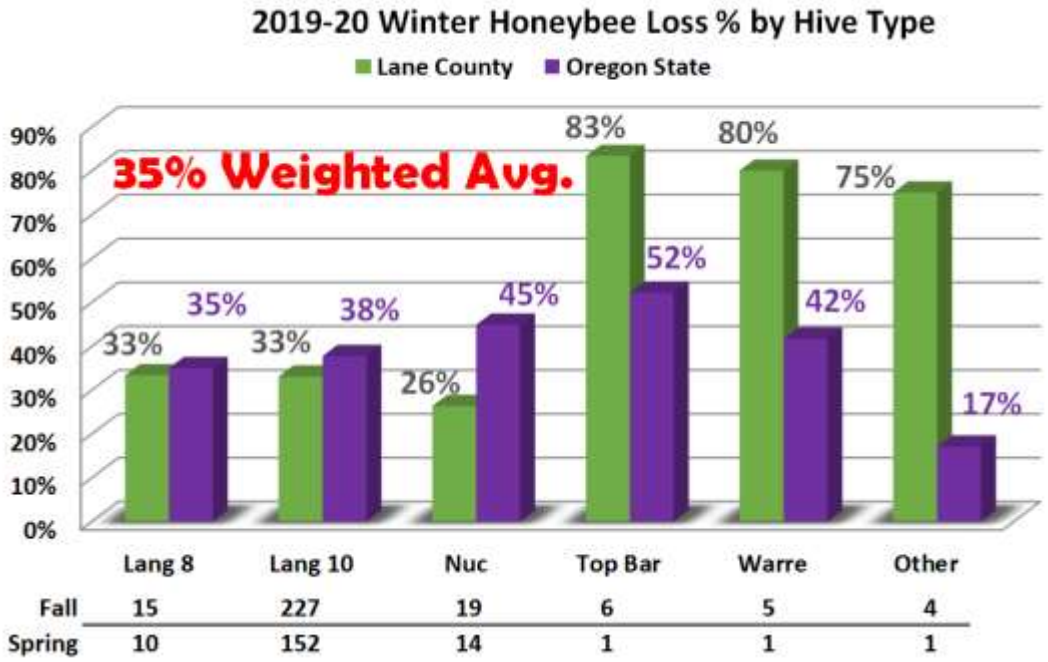


Figure 2

Survey also asked about colony losses by hive origination. Overwintered hives had a 29% loss rate and nucs, swarms and splits exhibited better survivorship, compared to statewide. Only packages did poorly (61% loss). LCBA results compared with statewide in Figure 3.

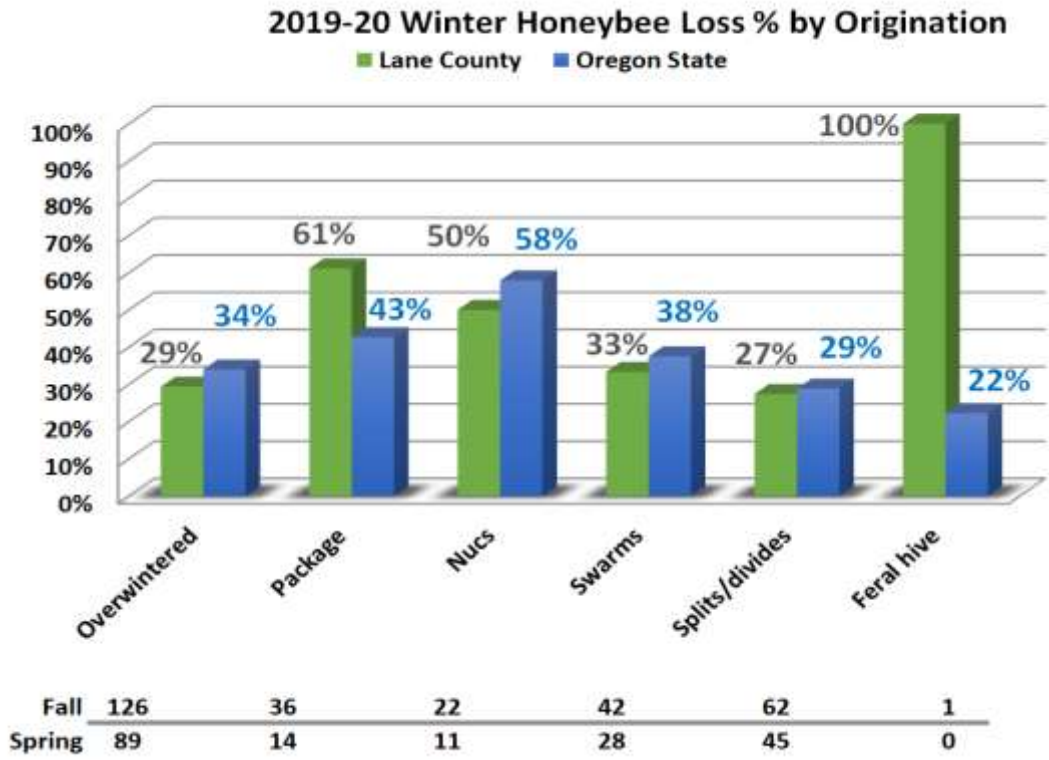


Figure 3

Losses this past winter were reduced from the heavier losses of last winter for both statewide backyarders and OR Commercial beekeepers. Losses of Lane County beekeepers (35%) were up slightly from last year and slightly above average of colony losses for past 9 seasons (31%). Figure 4 shows 11 year loss record of Lane (blue dashed line), **green** dashed line is OR statewide and red dashed line is OR Commercial/semi-commercial). Solid blue line is trend line for LCBA.

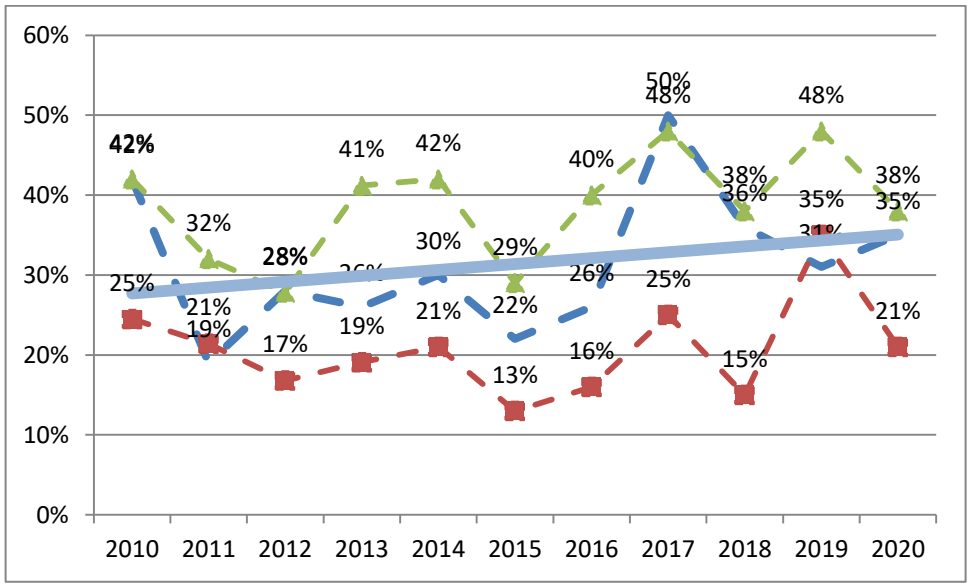
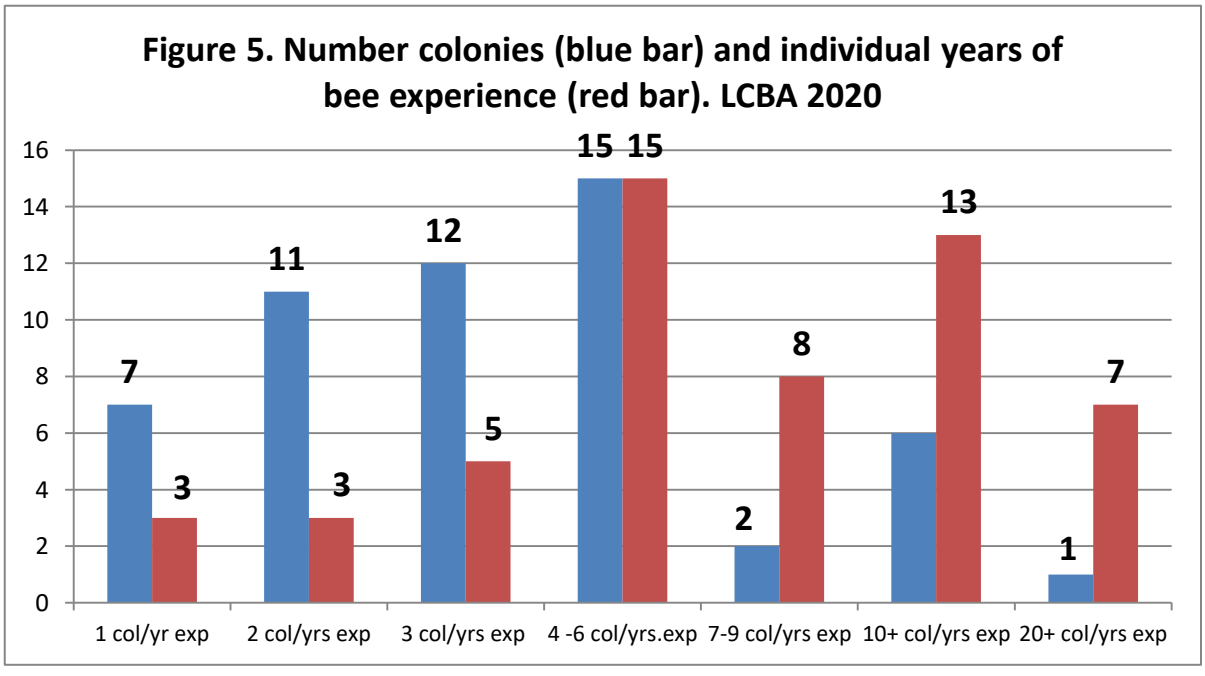


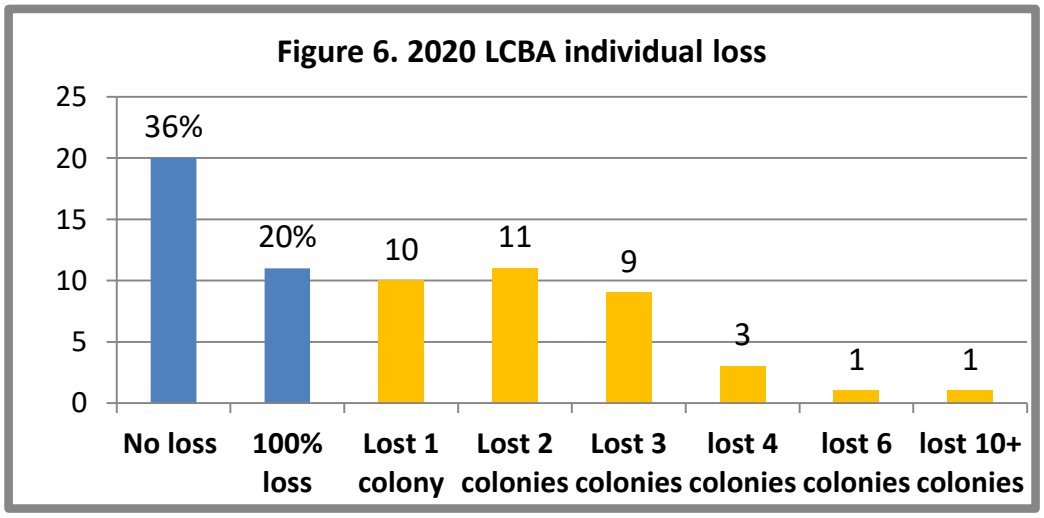
Figure 4

The LCBA association respondents can be characterized, similar to state respondents, by small numbers of colonies and a wide range of years of experience. Seven LCBA individuals had 1 fall colony, 11 had two and 12 had 3 colonies; 54½% of respondents had 1, 2 or 3 colonies. Three was the medium and also largest number, 15 individuals had 4-6 colonies, 2 individuals had 7-9 colonies and 7 had 10+ colonies (35 was largest number). Comparing loss percent, individuals with 1 to 3 colonies had a 45% loss rate while the 7 individuals (13% of individuals) who had 10+ colonies had a 29% loss.



Years experience shows a broad spread. There were 11 individuals with 1, 2 or 3 years experience (20%); 20 individuals (37%) had 10+ years experience. Comparing loss of colonies by years experience, the individuals with 1-3 years had a 45% loss rate, the 13 with 10-18 years experience had a 34% loss and the seven with 20 to 52 years (highest number) had a 40% loss rate. Twenty one individuals (68%) said they had a mentor available when they were learning beekeeping.

Not all LCBA individuals had losses. Twenty individuals (36%) had NO LOSS while 11 respondents (20%) lost all their fall colonies. Ten individuals lost one colony, 12 lost two colonies (the heaviest loss) and 9 lost 3 colonies. Those with a 1, 2 or 3 colony loss represented 68% of total colony loss for LCBA members. Figure 6 below.



Ten individual respondents (18%) kept their bees in 2 apiaries and two in 3 apiaries. Those 10 individuals had slightly lower losses in out apiaries (30.5%) compared to the 35% average Lane losses. Three individuals moved colonies during the year, one for pollination purposes, another due to defensive hives and one due to increase in colony numbers.

Reasons for Colony Loss/Acceptable loss

We asked individuals that had colony loss to estimate what the reason might have been for their loss (multiple responses were permitted). There were 72 total listings for LC, 2.5/individual, slightly greater than statewide 1.9/individual. Twenty individuals (42%) listed varroa, 12 Lane Co. individuals listed queen failure (25% of respondent choices); weak in fall and starvation each were selected by 8 individuals. Eight individuals (17%) checked don't know. Under other, pesticides were indicated by 2 individuals, 1 said excess moisture, 1 said it was a late swarm and finally 1 indicated a colony tipped and that didn't survive. Table compares Lane with statewide % selections.

Survey individuals were asked to indicate what might be an acceptable loss level. The median (middle) selection was 20%. Seven individuals said none, 20 Lane individuals selected 15% or less; five individuals said 50% and one indicated 100% was acceptable

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Star-vation	CCD	Yellow jackets	Other
Lane (#) CBA (%)	20 (42%)	2 (4%)	8 (17%)	12 (25%)	8 (17%)	6 (16%)	3 (6%)	5 (11%)
Statewide %	24%	3%	15%	16%	11%	4%	6%	10%

WHY COLONIES DIE: There is no easy way to verify reason(s) for colony loss. Colonies in the same apiary may die for different reasons. Examination of dead colonies is, at best confusing, and, although some options may be ruled out, we are often left with two or more possible reasons for losses. There is 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. Lane individual choices varied from zero to 100%, with medium of 20%. This acceptable loss level has crept upwards over time.

Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies, Management, especially learning proper bee care in the first years of beekeeping, remains a factor in losses. What effects our changing environment such as global warming, contrails, electromagnetic forces, including human disruption of it, human alteration to the bee's natural environment and other factors, play in colony losses are not at all clear.

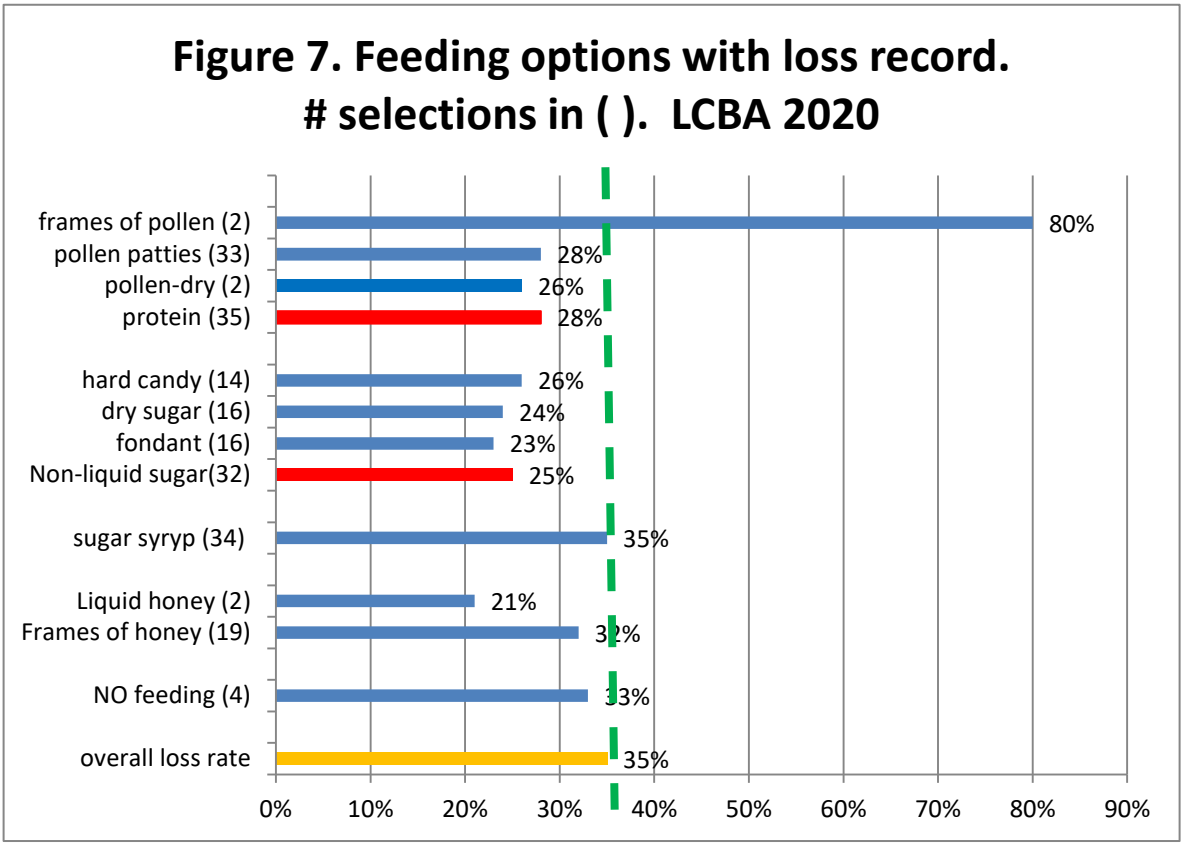
There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are necessarily excessive for all the issues facing honey bees in the current environment. Varroa mites and the viruses they transmit are considered a major factor, but by no means the only reason colonies are not as healthy as they should be.

Management Selections and Losses

The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring and both non-chemical mite control techniques (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls utilized. Individuals could check none or more than one response; many LCBA and OR beekeepers often do not do just one thing/management to their colony (ies) to control mites to

improve overwintering success. This analysis however is mainly of a single factor equated with loss level. Such analysis is correlative and doing a similar management as fellow beekeepers do does not necessarily mean you too will improve success.

FEEDING: Lane survey respondents checked 138 feeding options = 2.6/individual (statewide it was 2.9/individual). Four individuals selected none – they had winter loss of 33%. These 4 were among 22 who selected none statewide; loss rate of those statewide selecting none was 46%, an increase of 8 percentage points above the statewide average of 38%. Ten Lane Co. individuals selected a single choice (they had a 52% loss), ten also selected 2 options, 17 selected three (the greatest choice) and 12 selected four plus 1 individual selected 5. These 13 individuals with greatest number of selections had a 20% winter loss. Doing more improves survival.



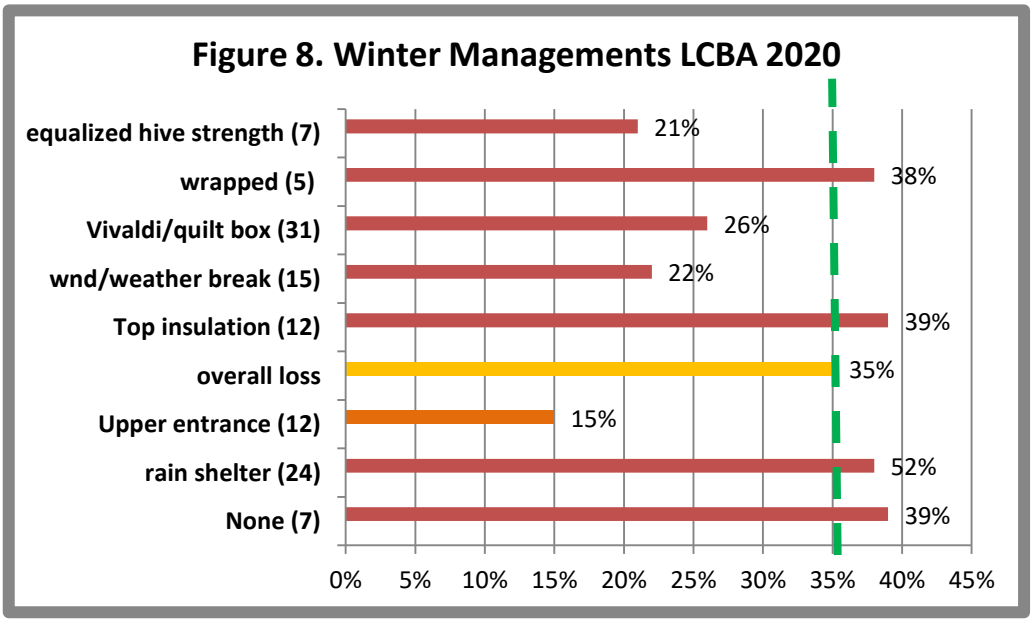
Percent colony losses are presented for feeding options with numbers of Lane members indicating doing the management in ( ). Bar lengths of left of 35% (**green dashed line**) indicate better than average survival while those to right had heavier than average losses. Individuals feeding pollen patties, (33 individuals) and the 2 persons feeding dry pollen had improved survival. Individuals feeding non-liquid sugar had better survival, with fondant feeders having the best survival rate. Liquid feeders of honey had improved survival.

Summary statewide: For the last 4 years (=43% average losses), individuals doing no feeding had poorer survival all 4 years: **Those doing NO feeding had annual losses 12.6 percentage points higher than average overall losses.** For Lane this year, the 4 individuals doing no feeding had a 2 percentage point better survival.

Individuals statewide that fed sugar syrup had a 7¾% lower loss level (average for the 4 years). This year sugar syrup feeders in Lane did not show improved survival. Those feeding honey (as frames or liquid) had lower loss only during the 2018 and this past winter overwinter period. Lane honey feeders did better than average this past year. Individuals statewide feeding non–liquid sugar (in any of the forms) had a 5 or 6 percentage point improvement from overall losses. Lane dry sugar feeders had better survival this year. Dry sugar feeders statewide had slightly better survival all 4 winters (average 4 winters 39 ¼%) while hard candy feeders had a much improved survival all 4 winters (31% average survival). Fondant feeders had better survival 3 of the 4 winters ($37^{3}/_{4}$ %).

For individuals feeding protein statewide, only the protein patty users showed better survival all 4 years; dry pollen feeders had much better survival in two of the four years with losses the remaining two years close to the overall yearly average. Lane pollen patty and dry protein feeders did better this year.

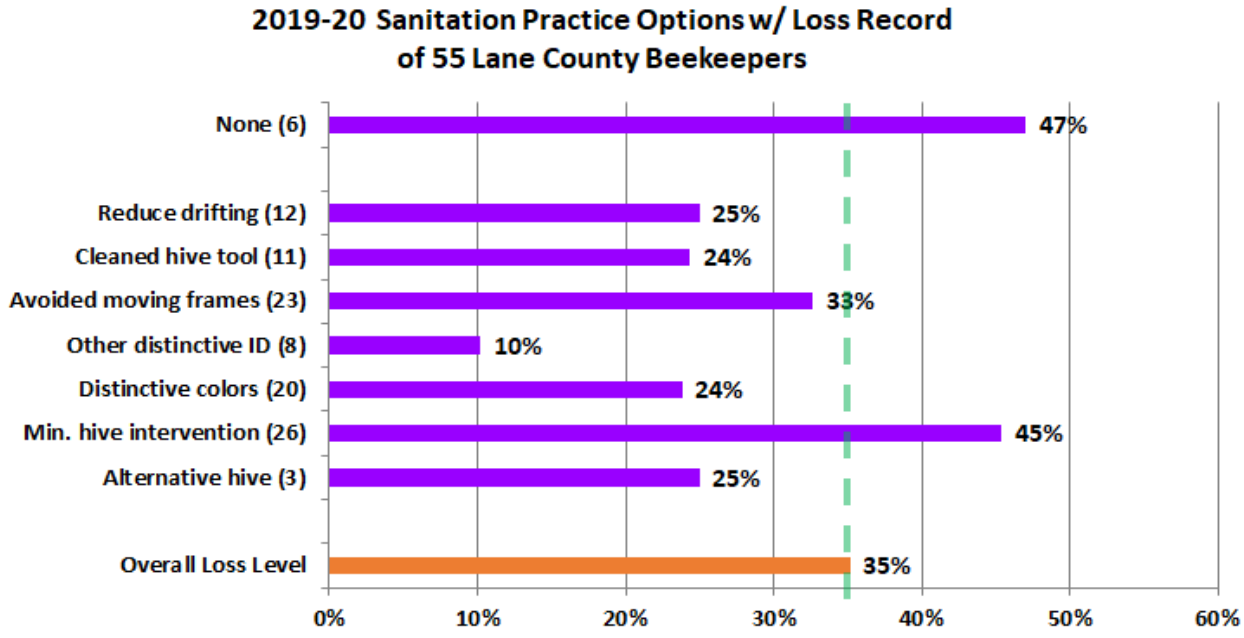
WINTERING PRACTICES: Seven Lane individuals (13%) reported doing no winterizing; they had loss level of 39%; statewide these 7 were among 37 individuals (12½% of overall statewide respondents) that indicated none of the several listed wintering practices; statewide losses were 50% for those doing no winterizing managements, 12 percentage points higher than overall state loss of 38%. Multiple selections were possible and in fact the 48 Lane members averaged 2.4/individual. Seventeen individuals chose a single management and had a 44% loss level while the 9 individuals checking 4 (5 individuals) or 5 (4 individuals) options had a 23% loss level. Thirteen individuals chose 2 selections and 9 selected 3 options. It appears advantageous to prepare for winter in several ways.



The two most common wintering managements selected were use of a rain shelter (117 individuals statewide (47%) and similar usage by Lane (50%) and use of a moisture box (Vivaldi board) at colony top (175 individuals statewide, 71% of total respondents and 65% by Lane). Figure 8 shows number of individual choices for Lane members in ( ) and percent loss of each selection. The 12 Lane individuals who used upper entrance had the best survival (85% - 15% loss rate).

Over the past three years individuals statewide that did no winterizing practice (average $13^{1}/_{3}$% of individuals) averaged 48% loss compared to 41% overall average loss of last 3 years, a 7 percentage point poorer survival rate. The 7 doing none among Lane lost 39% of their colonies, 4 percentage points greater than average. Only 2 winterizing managements improved survival all 3 years – these were wrapping (30 % lost rate, an 11 percentage point improvement – which did not improve survivorship for the 5 Lane members doing this management - 38% compared to 35% overall for members) and top insulation (32 % survival average over 3 years, a 9 percentage point improvement – for 12 Lane members this resulted in slightly lower survival of 39% this past winter). Vivaldi (38 % loss rate over 3 years), upper entrance also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (also 38%) had only a slightly improved 3 percentage point survival increase over the past 3 years. For Lane beekeepers, Vivaldi boards used by 31 members showed 9 percentage point better survival.

SANITATION PRACTICES: It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care to insure healthy bees. Lane beekeepers had 109 responses 2.4/individual. Sixteen percent statewide and 6 Lane individuals (11%) said they did not practice any of the 6 offered alternatives. Loss rate statewide was 52%, fourteen percentage points higher than the overall loss rate of 38%; for lane the 6 individuals had a 33% loss rate. Seventeen Lane members had 1 selection (loss rate 39%), 16 made 2 choices, 10 made 3 choices; three individuals selected 4 and 1 each 5 or 6 selections; the 4, 5 and 6 individuals had a 24% loss rate.



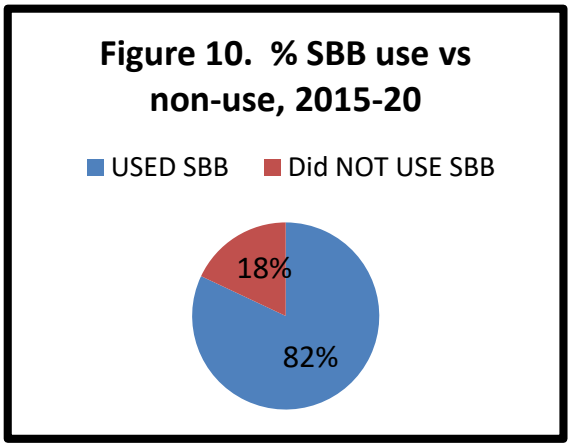
Minimal hive intervention (26 individuals, 47%) was the most common option selected along with generally avoiding frame movement (23 LCBA members) and painting distinctive colors (20 individuals). Avoiding frame movement had minimal difference in loss but painting option had 11 percentage point better survival. The three sanitation choices that did seem to improve survival were taking other distinctive ID measures (10% loss, 8 individuals), reducing drifting (12 individuals, 25% loss) and cleaning hive tool (11 individuals, 24% loss rate).

Avoiding moving frames and reduce drifting were the two sanitation choices that demonstrated better average survival statewide the past three years – 4 year loss rate was 35% for frame moving and 37½% for reducing drifting compared to overall statewide rate of 41%, though both were relatively minor 6 and 3 ½ percentage point differences. Avoiding moving frames (37% loss rate this year, 40% last 3 years) plus distinctive hive address via painting (40% this year, which was also 3 year average) had but a single percentage point advantage over average loss rate (41%) of last 3 years statewide.

Screen Bottom Boards (SBB)

Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In the recent survey 30 individuals statewide (10%) and 4 in LCBA (7%) said they did not use screen bottom boards. This was the lowest percent of respondent non-use of SBB in last 6 years. Average non-use is 18% vs 82% use on some or all colonies over 6 year period. Figure 10 shows 6-year statewide results.

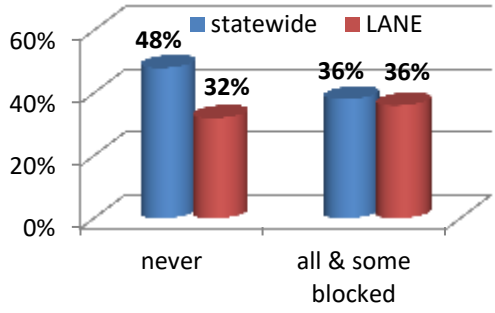
Figure 10. % SBB use vs non-use, 2015-20



This past overwintering season, the 30 statewide non-SBB users (10% of respondents) had 222 fall colonies of which they lost 120 for 54% loss. The 220 beekeepers using SBB on all of their colonies had 37% loss. This was the greatest difference between non-users and users in past 5 years. **Examining the five year average of SBB use, loss level of those using SBB on all or some of their colonies had a 41% loss level whereas those not using SBB had loss rate of 36% (a 5 percentage point positive survival gain for those using SBB versus those not using them). SBBs are very minor in improving overwinter survival.**

We asked if the SBB was left open (always response) or blocked during winter. This past season, 29 Lane respondents (53%) always or

Figure 11. SBB blocked in winter 2020.



sometimes blocked their SBBs. Those who said they never blocked (24 individuals in Lane – 47%) had a 32% winter loss. This was not the same as statewide respondents. **Comparing the always and sometimes left open with the closed in winter (all closed + some closed) response reveals an 12 percentage point difference in favor of closing the SBB statewide over the winter period to improve survival** See Figure 11.

Summary: Screen bottom board use has a slight survival advantage. For those using SBB, the advantage appears to be to close, partially or completely, the open screen bottom over the winter period by statewide beekeepers but not for Lane County beekeepers.

Things that seem to improve winter success: It should be emphasized that these comparisons are correlations not causation. They are single comparisons of one item with loss numbers. Lane beekeepers do not do only one management nor do they necessarily do the same thing to all the colonies in their care. We do know moisture kills bees, not cold, so we recommend hives be located in the sun out of the wind. If exposed, providing some extra wind/weather protection or wrapping/insulating colonies might improve survival.

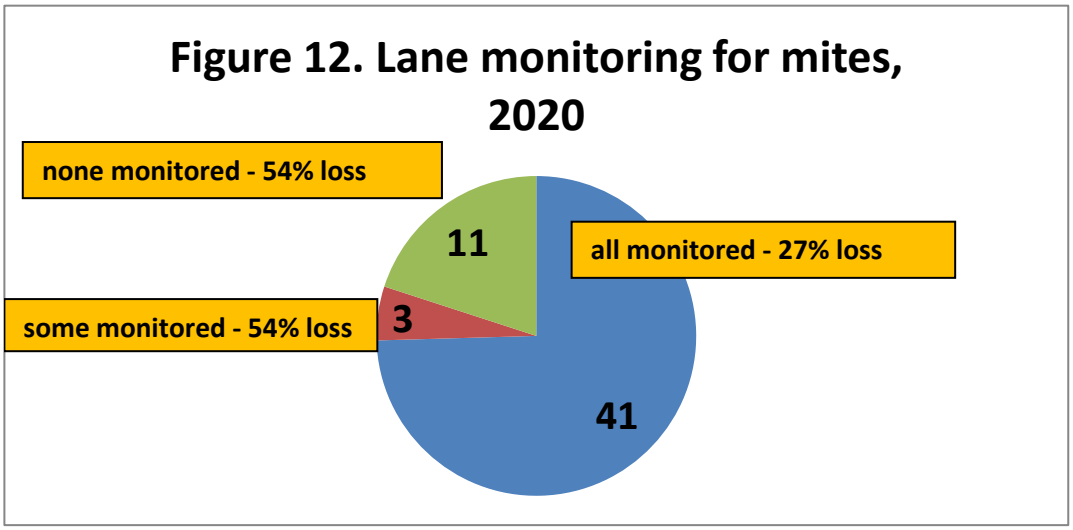
Feeding, a common management appears to be of some help for beekeepers statewide in reducing losses. Feeding fondant sugar, a hard sugar candy or dry sugar during the winter means lower loss levels. Providing frames of honey and feeding sugar syrup also meant lower loses for some individuals and such feeding management is of great value for the spring development and/or development of new/weaker colonies. Feeding protein in form of dry pollen and pollen patties did slightly improve survival. The supplemental feeding of protein (pollen patties), might be of assistance earlier in the season to build strong colonies and in the fall to build the fat bee population needed for successful overwintering.

Winterizing measures that apparently helped lower losses for some statewide beekeepers was a moisture trap (Vivaldi board or quilt box) and upper insulation, plus wrapping the colonies (or otherwise adding some insulation to provide added protection against the elements). Spreading colonies out in the apiary and doing other measures to reduce drifting also appeared to be of some value in reducing winter losses. Avoiding movement of frames from one colony to another might also improve survival but the gain over what this interchange might accomplish to bolster weak colonies and start new divides might be greater than a minor advantage in survival.

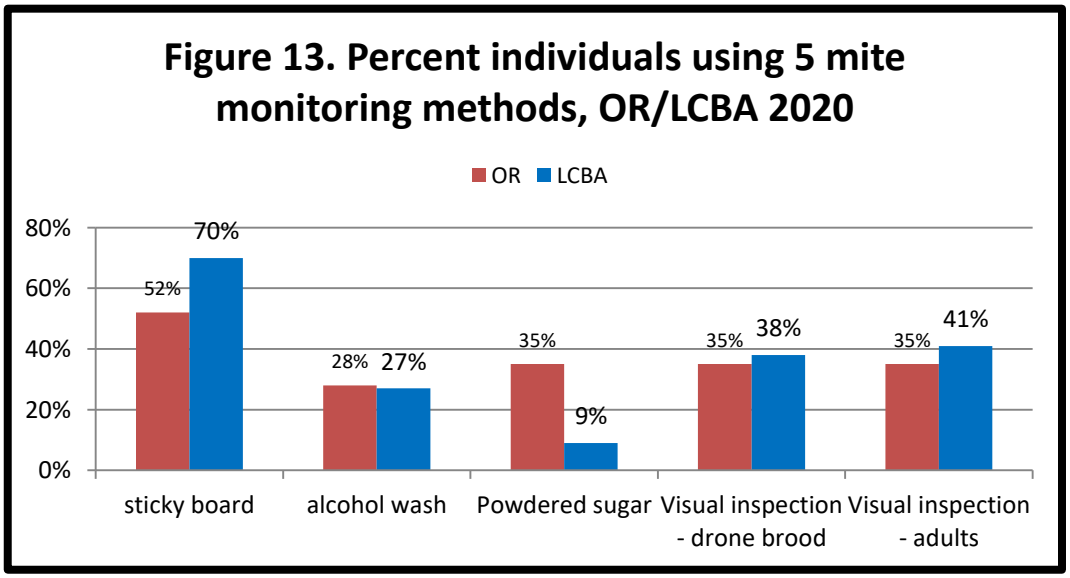
It is clear that doing no feeding, winterizing or sanitation resulted in the heaviest overwinter losses, although in regards to sanitization, management did not make much difference. Replacing standard bottom boards for screened bottoms marginally improved winter survival. It is apparently advantageous to close the bottom screens during winter.

Mite Monitoring/Sampling and Control Management

We asked percentage of Oregon hives monitored for mites during the 2019 year and/or overwinter 2019-20, whether sampling was pre- or post-treatment or both and, of the 5 possible mite sampling methods, what method was used and when it was employed. Among Lane, 41 individuals (75%) monitored all colonies; they had 27% loss. Three individuals monitored some colonies; they had a 54% loss level. Eleven individuals (20%) did no monitoring and they had a 54% loss. Statewide 82% said they monitored all or some of their hives (losses =51%); 18% reported no monitoring (loss rate = 59% loss.



In order of popularity of use, Sticky boards were used by 70% of total Lane respondents (of those 82% who monitored (as shown above, 18% did no monitoring). Twenty seven per cent of individuals used alcohol monitoring but only 9% used powdered sugar monitoring, a considerable difference from statewide. In past 5 years, the use of sticky boards has decreased in use statewide and both alcohol wash and powdered sugar shake have increased in use. Figure 13 red bars are statewide responses and blue is LCBA for 2020.

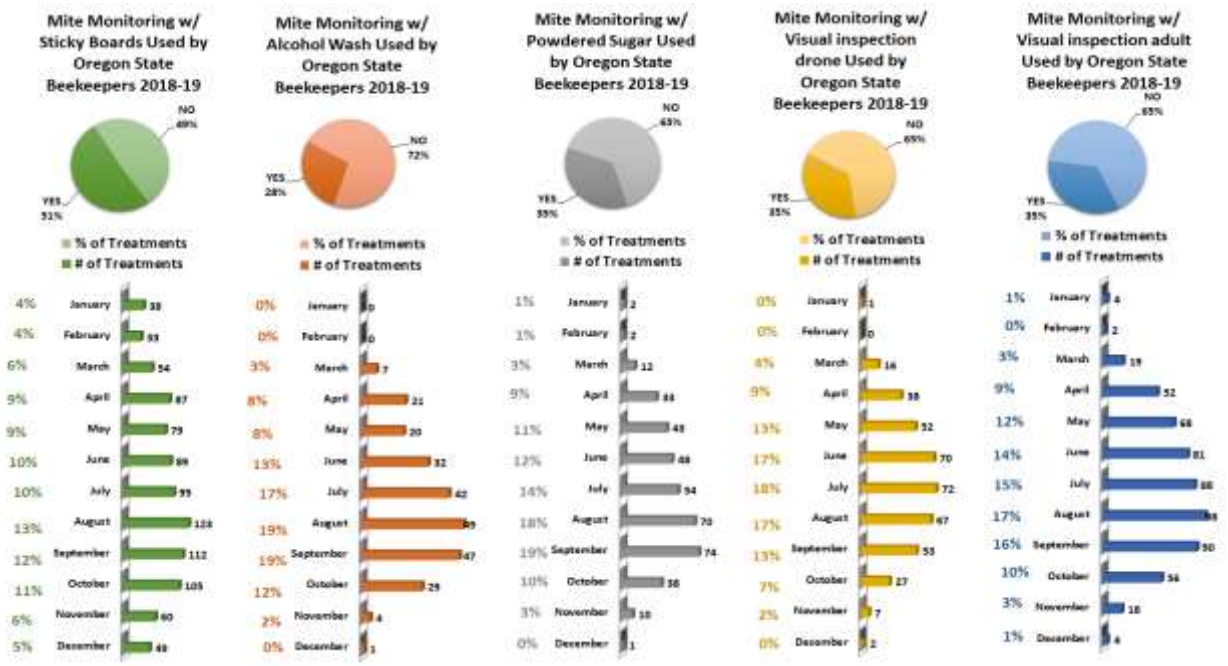


It is obvious that monitoring alone is a means towards improved winter survival. The table below compares per cent individual and per cent winter loss for individuals statewide who monitored all colonies compared with those who monitored none. The 14-15% who monitored some colonies was variable but 3 year average mirrors those who monitored all colonies.

	ALL Colonies Monitored % individuals	% loss	SOME Colonies Monitored % individuals	% loss	No colonies Monitored % individuals	% loss
2020	67%	33%	13%	16%	20%	49%
2019	67%	51%	15%	50%	18%	59%
2018	63%	38%	14%	26%	26%	49%
2017	63%	43%	15%	60%	22%	48%
3 year loss age		41%		38%		51%

Most mite sampling was done in July – September, as might be expected since mite numbers change most quickly during these months and results of sampling can most readily be used for control decisions. See Figure 14 below for when each of the 5 sampling methods were used.

Figure 14



It is important to KNOW mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out

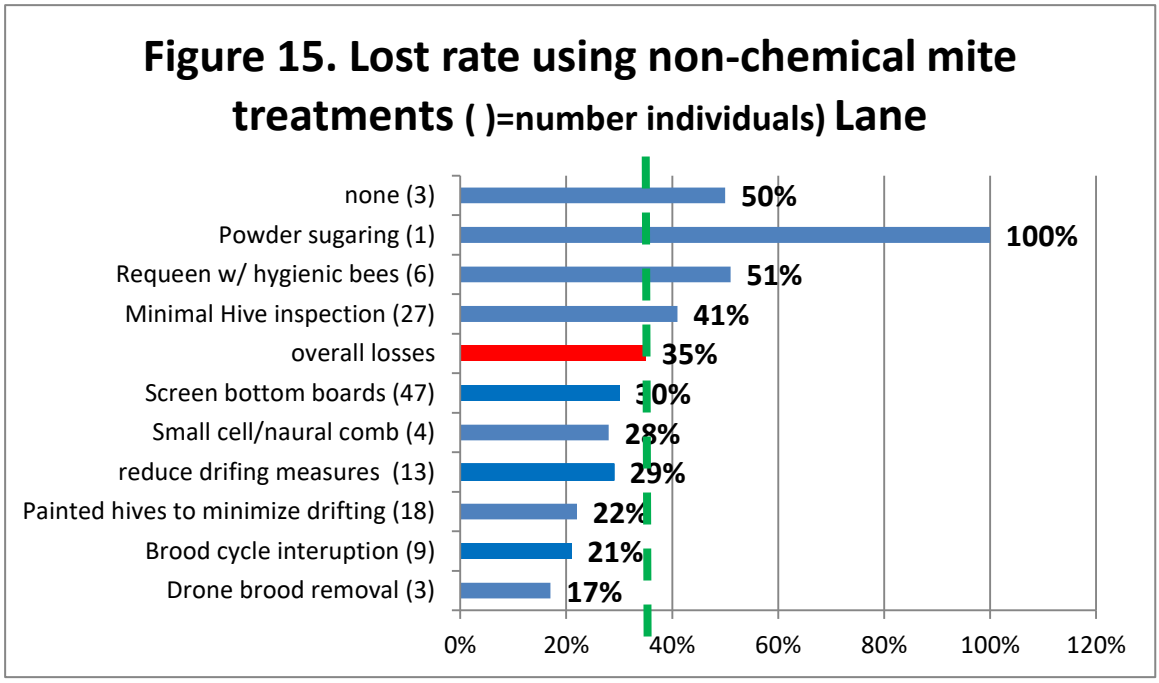
the mites can be hard, especially for new beekeepers); on other hand sticky board use can help confirm the usefulness of a treatment when inserted post treatment. Visual sampling is not accurate: most mites are not on the adult bees, but in the brood. Unfortunately looking for mites on drone brood is also not effective as a predictive number but can be used as an early warning that mites are present; if done, look at what percentage of drone cells had mites.

See ***Tools for Varroa Monitoring Guide*** www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of and to view videos demonstrating how best to do sugar shake or alcohol wash sampling. The Tools guide also includes suggested mite level to use to base control decisions based on the adult bee sampling. A colony is holding its own against mites if the mite sample is below 2%. It is critical to not allow mite levels to exceed 2-3% during the fall months when bees are rearing the fat fall overwinter bees. It is also the most difficult time to select a control method (if one is deemed needed) as potential treatment harm may negatively impact the colony. We are seeing more colonies suddenly disappear (abscond?) during the fall, which may be related to high numbers of mites or mite control treatment itself.

Mite Control Treatments

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Three LCBA individuals (5½%, one-half the statewide percentage 12%) said they did not employ a non-chemical mite control and 11 LCBA individuals (18%), did not use a chemical control (statewide=20%). Those LCBA individuals who did not use a non-chemical treatment had a 50% loss, slightly less than statewide 61%. The 11 LCBA members (18%) not using a chemical control had a loss rate of 64%; statewide lost rate was 57% of fall colonies.

NON-CHEMICAL CONTROL: Of nine non-chemical alternatives offered on the survey (+ other category,) 3 individuals selected none – they had 50% loss. The remaining 52 individuals selected 129 choices – 2.5/individual. Eleven individuals used one method (61% loss), 19 used two, 12 used three, 6 used 4 and 4 indicated 5 managements – these last 10 individuals had a 24% loss. Doing more improves winter survival.



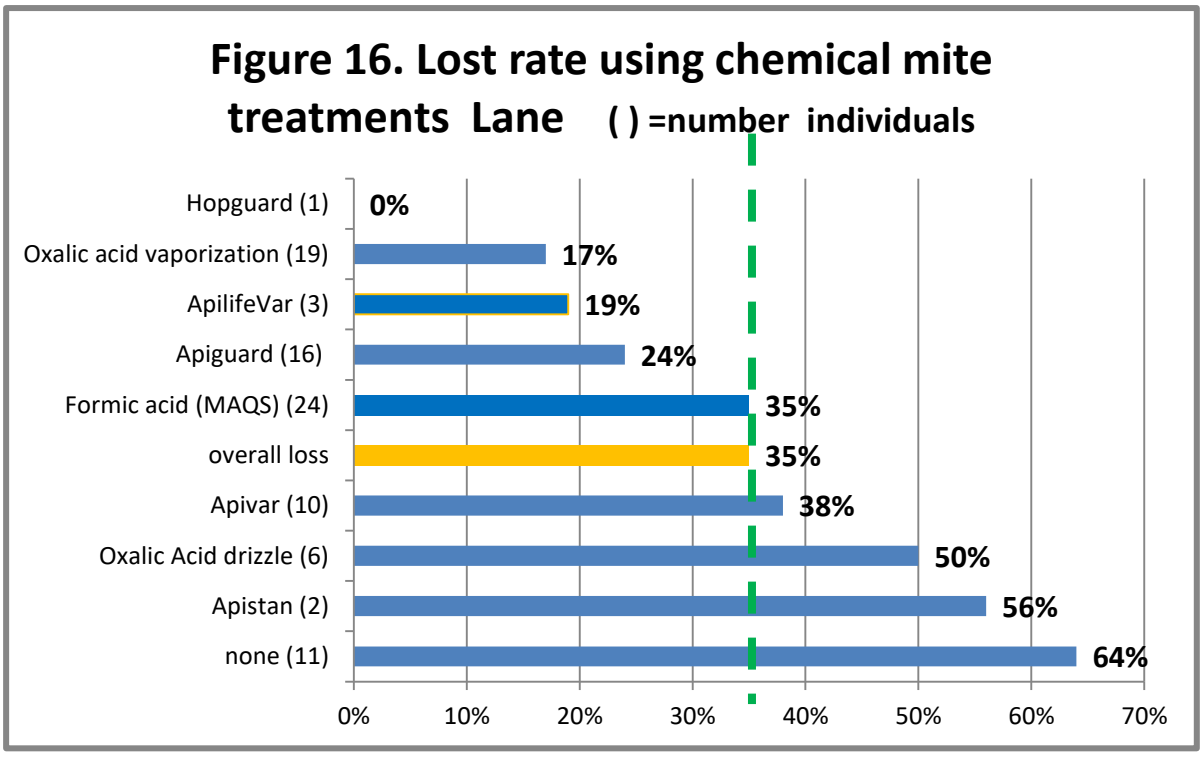
Use of screened bottom board and minimal hive inspection (47 and 27 individuals respectively among Lane respondents) were most common. As shown in Figure 15 above, SBB use shows a slight advantage (30% loss compared to 35% overall for LCBA members) but minimal hive intervention does not, either statewide nor for LCBA members. Drone Brood removal (3 individuals,17% loss), brood cycle interruption (9 individuals, 21% loss) and painting hive to reduce drifting (18 individuals, 22% loss rate) were the three options showing best survival for Lane members.

Three of the non-chemical alternatives have demonstrated reduced losses for statewide beekeepers over past 4 years. Reducing drifting such as spreading colonies (35% loss average for 3 years – question not asked in 2016-17 survey), brood cycle break (39% average over 4 years, only 4 percentage point better survival) and different hive colors in apiary (42% average loss last four years –only one percentage point difference) has demonstrated better survival. Drone brood removal average loss for 4 year is the same as average loss for the four years (43%). Some non-chemical control alternatives demonstrate an advantage for one or two years but not an overall improvement.

Chemical Control: For mite chemical control, 11 individuals (20% of total Lane respondents) used NO chemical treatment. They had loss rate of 64%. Those using chemicals did so at rate of 1.9/individual (same as statewide). Lane members using one chemical (16 individuals) had a 33% loss rate, those 18 individuals using 2 had a 37% loss rate while the 10 individuals who indicated use of 3 chemical treatments had a 22% loss rate.

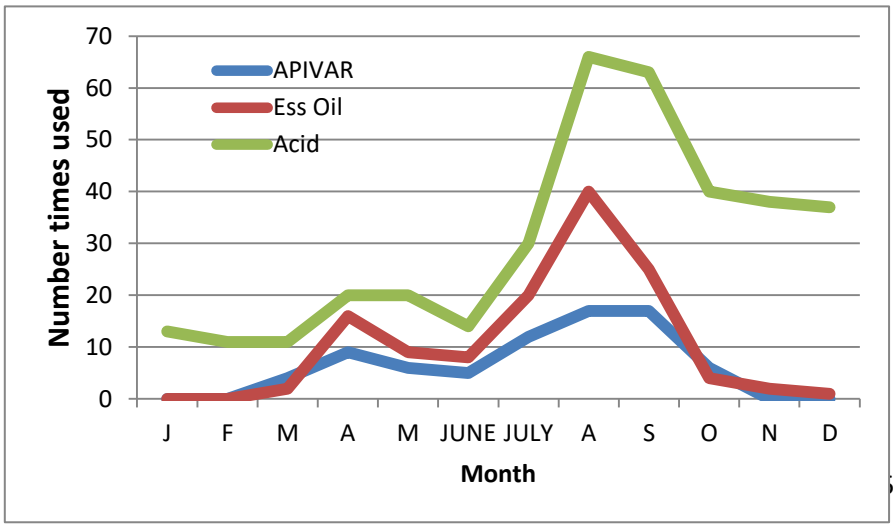
Eighteen LC Beekeepers (41% of those using chemicals) indicated they utilized MAQS, formic acid. None selected Formic Pro. Survival was same as overall level 35%. Oxalic acid vaporization (19 individuals, 43% of total chemical users), and the two essential oils, Apiguard and ApiLifeVar showed improved survival. The one individual using Hopguard, 6 colonies, had no loss - last year the 2

Hopguard users had 80% loss (lost 4 of 5 colonies). Figure 16 illustrates number of users ( ) and bar length indicates the loss rate for those using that chemical. The 11 individuals doing nothing had greatest loss. The 2 individuals using Apistan had over 50% loss level. Oxalic acid drizzle users had 3X the loss level of those using oxalic vaporization.



Consistently over the last 4 years five different chemicals have helped statewide beekeepers improve survival. The essential oils Apiguard (average 4 year loss level 32%), Apivar (32.5% average 4 year loss level), Oxalic acid vaporization (33.5% average loss level over last 4 years – in contrast the oxalic acid drizzle average of last 3 years is 41% loss level – those 7 individuals mixing oxalic acid into shop towels had heavier loss (54% statewide) and ApiLifeVar (36% average loss level over last four years). The formic acid MAGS formulation loss is same as average loss level (43%). Formic Pro has increased in use – it looks very promising at a 26% loss level the past two years (when average loss was 43%).

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 17 for 2019-20 season. Further review is needed to determine if the timing of treatments was more



effective than at other times for the various chemicals.

Queens

We hear lots of issues related to queen "problems". Thirteen LCBA individuals (33%) said they did not have any queen issues and 10 (26%) said they didn't know. Seven individuals of the 16 individuals (42%) who said they did have queen issues checked 10-30% and 4 checked 75-100%. Two said 30-50% and 3 50-75%. Statewide 50% said none and 19% said they didn't know.

Queen events can be a significant factor contributing to a colony not performing as expected. We asked if you had marked queens in your hives. Twenty one individuals said yes (38%) and 34 said no. Statewide 31% said yes. The related question then was did you or your bees replace their colony queen? Twenty three (43%) said yes, 13 did not know and 19 (35%) said no; statewide 45% said yes, 33% said no.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. Responses to the question "How did bees/you requeen" included thirteen individuals who used a mated queen and 3 who used queen cells (42% total). The remainder requeened naturally via supersedure (6 individuals), split and bees raised their own queens (9 individuals) and 8 said their colonies swarmed as queen replacement method. Statewide one-third of respondents indicated their bees were requeened with a mated queen and 58% indicated it was the bees that requeened via swarming (22%), supersedure (16%) or emergency rearing (20%). That means too few were seeking to use this valuable tool for mite control.

Closing Comments

This survey is designed to 'ground truth' the larger, national Bee Informed loss survey. Some similar information is additionally available on the BeeInformed website www.beeinformed.org and individuals are encouraged to examine that data base as well. Recall that the BeeInformed survey is measuring the larger scale OR beekeepers not the backyarders (figure 6 of OR state loss report.) Reports for individual bee groups are customized and posted to the PNW website.

We intend to continue to refine this instrument each season and hope you will join in response next April. If you would like a reminder when survey is open please email us at info@pnwhoneybeesurvey.com with "REMINDER" in the subject line. We have a blog on the pnwhoneybeesurvey.com and will respond to any questions or concerns you might have.

Thank You to all who participated. If you find any of this information of value please consider adding your voice to the survey in a subsequent season. Dewey Caron June 2020