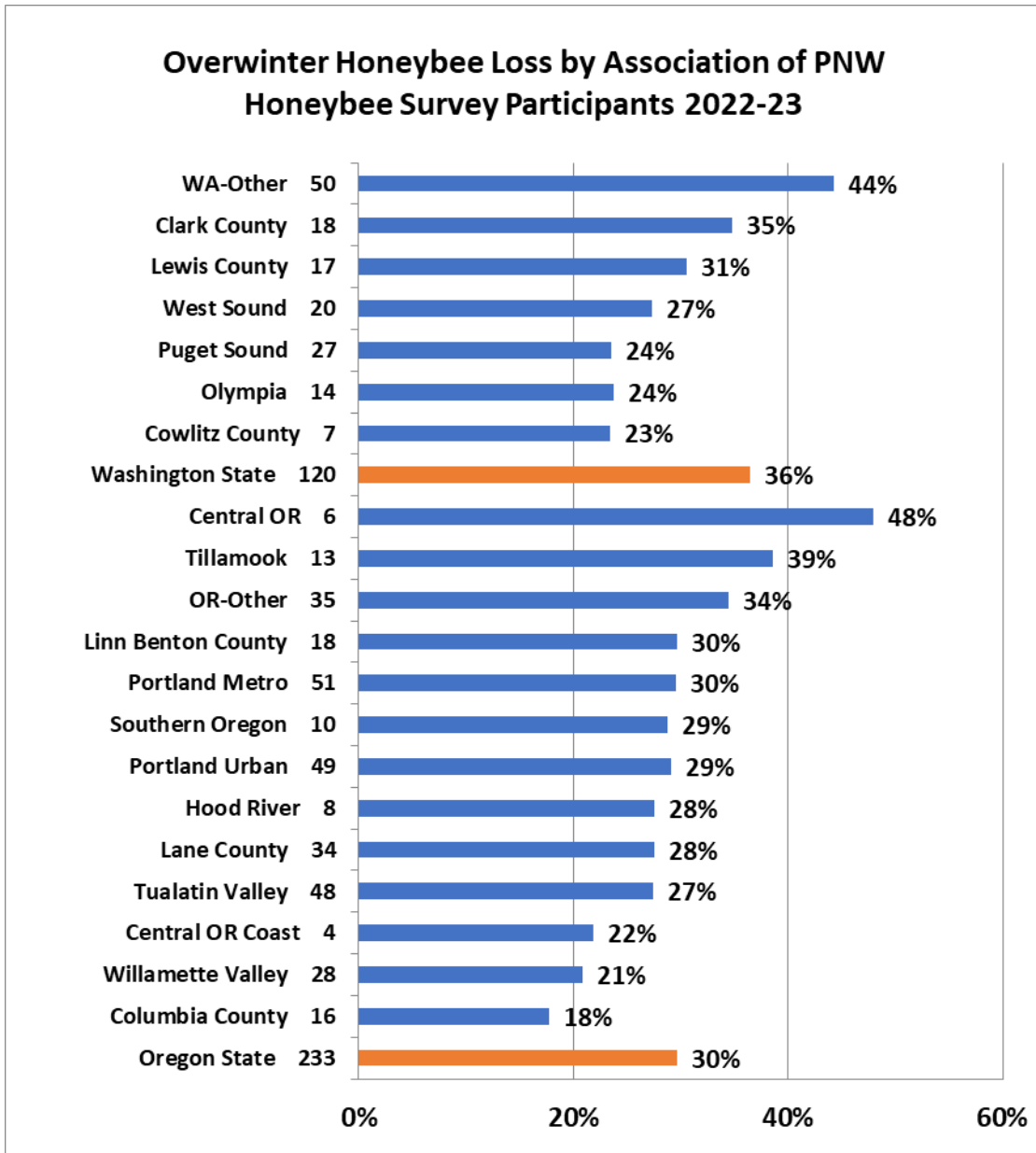


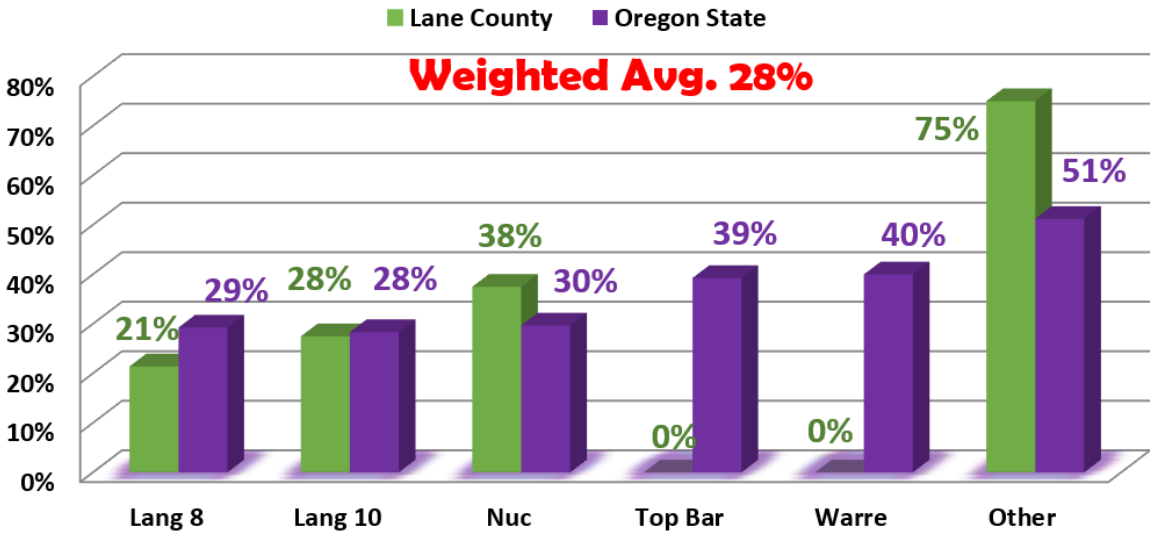
2022-2023 LCBA Winter Loss Report by Dewey M. Caron

Lane Beekeepers were encouraged to complete a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon and Washington. This was the 14th year of such survey activity. I received 233 responses from OR backyarders (13 fewer than last year), keeping anywhere from 1 to 48 colonies; LCBA members sent in 34 surveys, 15 more compared to last year, reporting on 203 colonies (85 more than last year). Thank you.



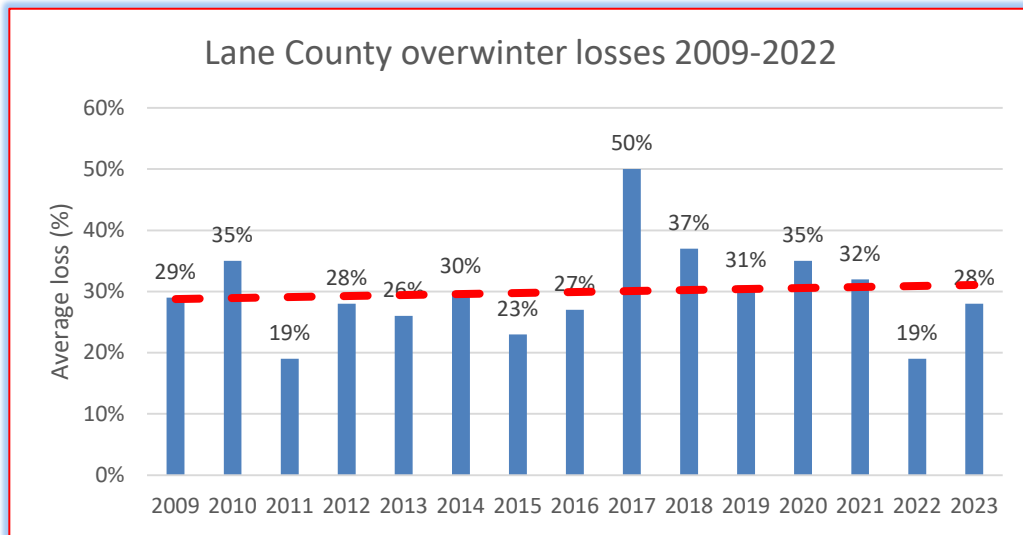
Overwintering losses of LCBA respondents = 28 %, a nine point increase from the low losses of the previous year (but there were fewer respondents in 2022). This was a two percentage point improvement over 30% average Oregon losses and two point improvement over the 13 average losses of Lane beekeepers. Percent losses, determined by hive types, were 21% for Langstroth 8 and 28% for Langstroth 10 frames hives (160 fall colonies). Five of 8 nucs survived the winter and 3 of 3 Warré hives did likewise. The four others were horizontal hives – only one of four survived.

Winter Honeybee Loss % by Hive Type, 2022-23

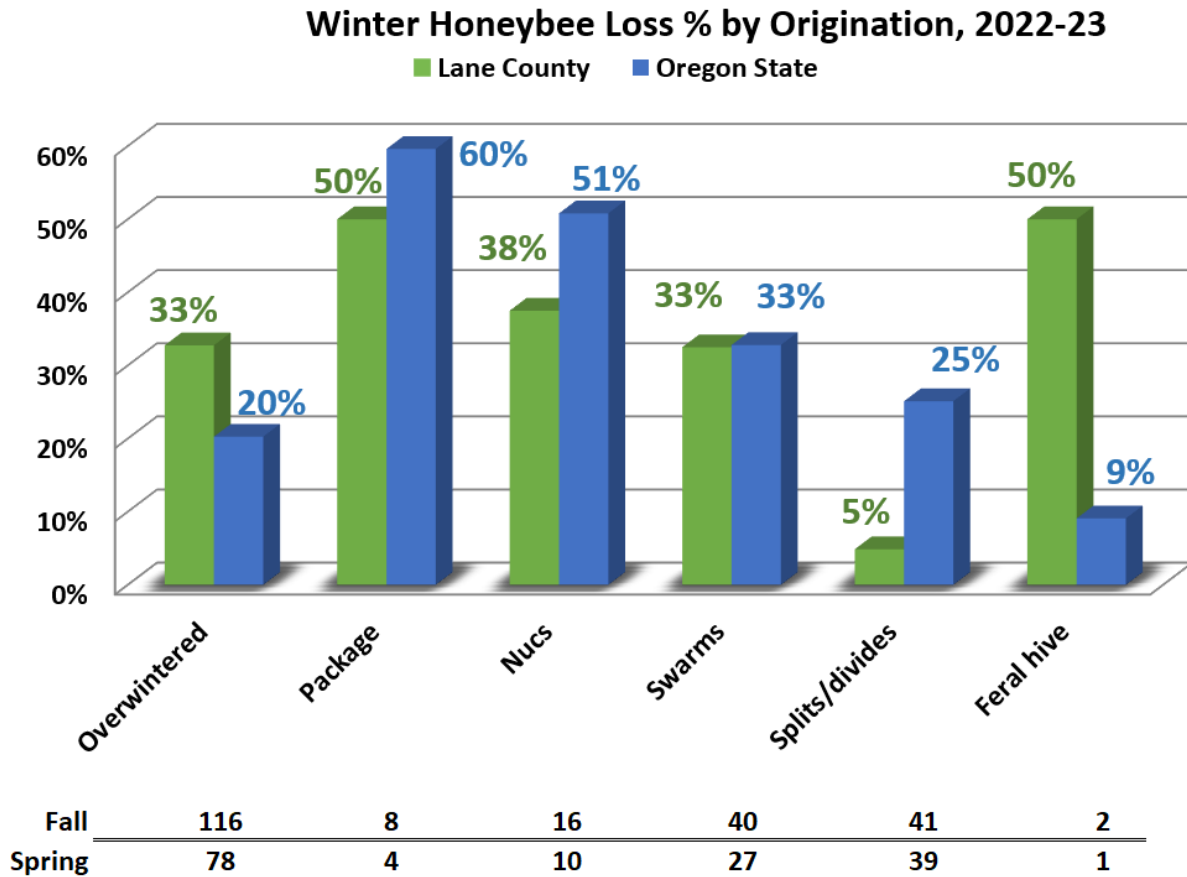


Fall	28	160	8	0	3	4
Spring	22	116	5	0	3	1

The attached figure shows LCBA losses for the past 14 years. Dashed red line is loss trend. The average for last 15 years is 29.9%.



The survey also asked for hive loss by **hive origination**. Members reported 33% loss of previously overwintered colonies, a loss of 50% of packages (8 total, lost 4) and 38% of nucs (10 of 16 survived). Swarms had same survival as overwintered colonies but splits/divides did exceedingly well overwinter, with only two of 41 lost. One of the two feral transfers survived. The graph compares LCBA losses to Oregon statewide numbers.



Not everyone had loss. In fact, 14 members (41% of survey respondents, 48 colonies) reported NO LOSS. Three respondents (9%) reported total winter loss, total of 8 colonies. Greatest loss was 14 colonies. The heaviest loss numbers were 1 and 2 colonies (7 individuals each). Two individuals lost 3, one lost 4 and 2 lost 10+ colonies.

Fifteen Individuals with 1 to 3 fall colonies lost 26.5% of their colonies, 9 individuals with 4-6 colonies lost 35.5%, the 4 individuals with 8 or 9 colonies lost 11.5% , the 6 individuals with 10+ colonies had a 31% loss. The 2 individuals with 20+ lost 37% of fall colonies. Statewide, the greater the number of colonies the reduced loss percentage but this wasn't true for LCBA.

Atypical of the statewide data, the LCBA respondents are not new beekeepers. Seven individuals had one to three years experience (20.5% of LCBA respondents); they had a 50% loss. Nine individuals had 4 to 6 years experience (loss rate =28%) while 6 respondents (17.5%) had 7 to

9 years experience with 28.5% loss rate. Eight individuals had 10-14 years experience (loss rate 29.5%) and the 2 individuals with 20+ years experience experienced a 28.5% loss rate. There were two individuals with 50+ years experience – they lost none of their 12 colonies. Statewide as with colony numbers increase, increasing years of experience increase the survival rate.

Some Other Numbers

Ten individuals had more than a single apiary location. The loss level at 2nd apiary was the same as at home apiary. Sixty-eight percent (68%) of respondents said they had a mentor available as they were learning beekeeping. Five individuals (15%) moved their bees. One was forced to move, one moved because of proximity to a school, one moved to a better site, one gifted hives and the fifth moved for pollination. Distances were two to 20 miles away.

Reasons for Colony Loss/Acceptable loss

We asked of individuals that had colony loss to estimate what the likely reason(s) might have been, Multiple responses were permitted. Sixteen of 22 individuals, 73% of those having losses, said varroa, nine indicated weak colony (41% of respondents) and 7 indicated a queen issue. Four (18%) checked yellow jackets. Two individuals said pesticides while remainder were all indicated by a single individual – poor overwintering, small hive beetle, starvation and absconding.

Seven individuals said no loss was an acceptable level of loss, The median level of acceptable loss was 20%; 25% was the greatest response (8 individuals). Five individuals (32%) indicated 33% or greater losses was acceptable.

Why do colonies die?

There is no straightforward way to verify reason(s) for colony loss. Colonies in the same apiary may die for several 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.

Major factors in colony loss are mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide exposure 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 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.

Management selections and losses

We asked in the survey for information about some managements practiced by respondents. The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, mite monitoring, both non-chemical and chemical mite control techniques and queens. Most Oregon beekeepers do not perform just one management to their colony (ies) toward improving colony health and overwintering success. This analysis however is mainly of a single factor equated with loss level of those same individuals. Such analysis is correlative - doing a similar management as fellow beekeepers does not necessarily mean you too will improve success.

FEEDING: LCBA survey respondents checked 79 feeding options = 2.55 individual. Three individuals had no indicated selections and had 63% loss (total of 19 colonies managed by these three). Five individuals (16%), other than the three who indicated no feeding, selected a single choice and had 55.5% loss while the 13 individuals who selected two choices had 33% loss. Seven individuals selecting 3 choices had a 13% loss but the 4 individuals who had 4 choices had a 40% loss. One individual had 5 and another 6 selections with their loss at only 6.5% (lost 2 of 31 fall colonies).

**Feeding Options w/ Loss Record
(#) = number individuals**

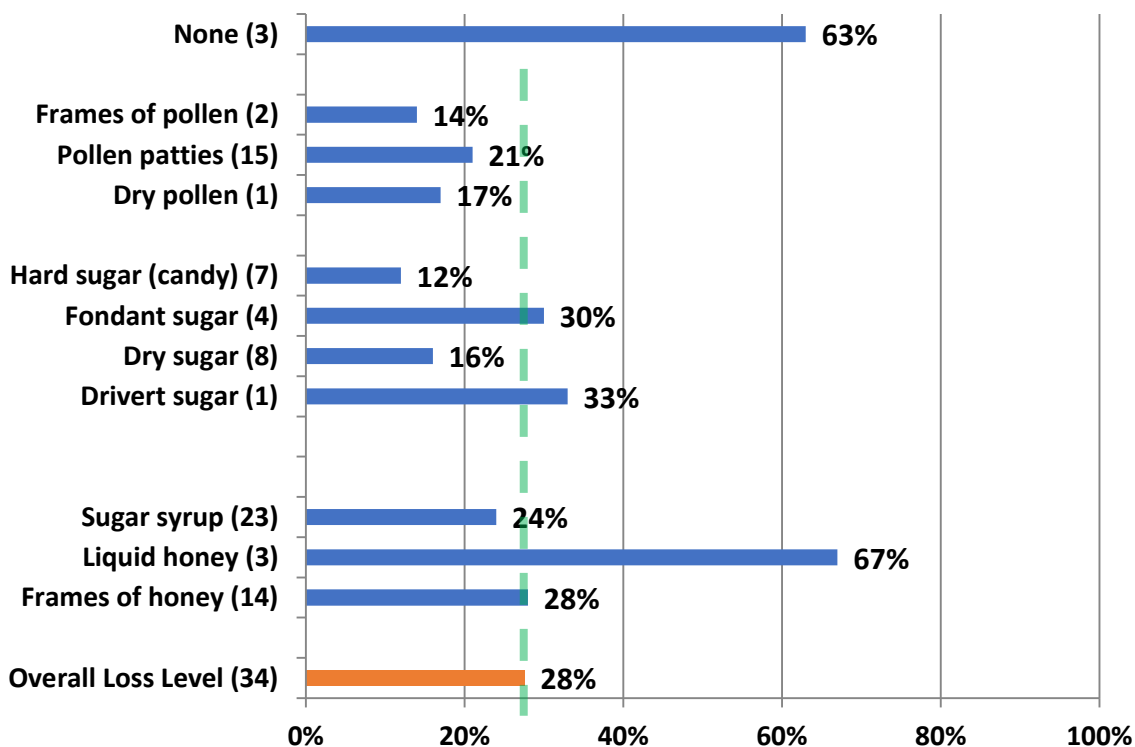


Figure 5

The choices, with number of LCBA individuals making that selection is in () in Figure 5; bar

length indicates loss level of individuals doing this management. Those managements with bar lengths to left of 28% **green dashed** marker had better survival than average while those to right had a greater loss level.

Statewide for the last 7 years individuals doing no feeding had 6 percentage point higher losses (average 45%) i.e. poorer survival, compared to an average loss rate of 38%. The 3 LCBA individuals likewise had heavier losses (63%). Individuals statewide that fed sugar syrup had a 4.3 percentage point lower loss level average for the 7 years; this year it was four percentage point greater survival for LCBA respondents. Those feeding honey (as frames or liquid) had lower loss only during 3 of the past 7 years, this year for LCBA those feeding frames of honey had same loss level while the 3 feeding liquid had higher losses. Individuals feeding non-liquid sugar (in any of the forms) had lower losses six of past 7 past winter seasons; this year dry sugar and candy feeders had lower losses. The 4 fondant feeders had better survival 3 of the 7 past winters statewide, but not for LCBA members this season.

For individuals feeding protein, the protein patty users showed better survival 6 of 7 years. LCBA members likewise feeding protein dry, in patty form or as frames of pollen did much better than average.

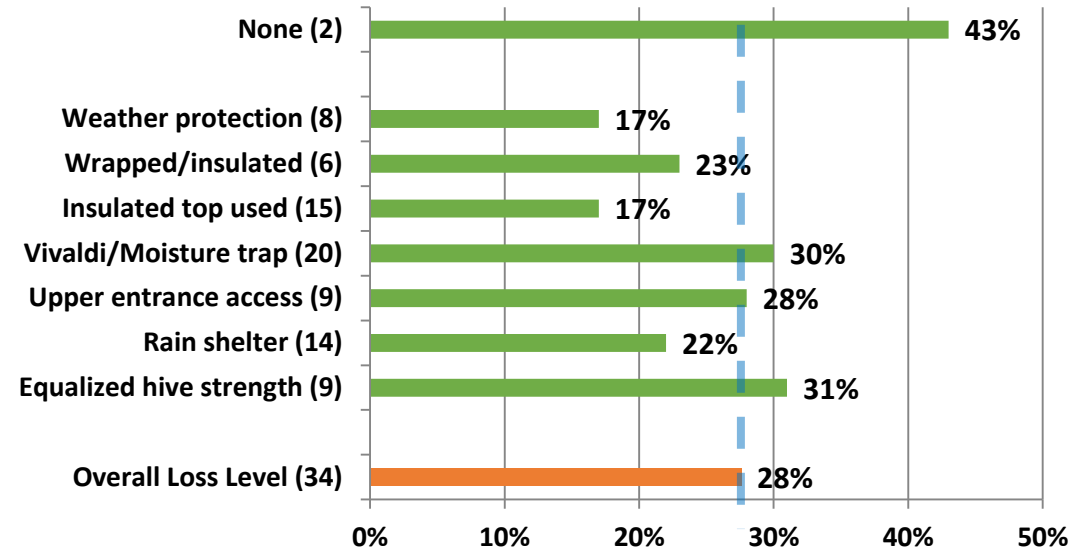
WINTERING PRACTICES: We received an average of 2.6/individual selections by LCBA beekeepers on their wintering management practices (more than one option could be chosen). Two LCBA individuals of 34 respondents indicated doing none of the several listed wintering practices; these individuals had 7 fall colonies and lost 3 of them. These two LCBA respondents were among the eighteen individuals (7%) statewide respondents indicated doing none of the several listed wintering practices – statewide loss was 40% of colonies which was 10 percentage points above average loss. For those 32 indicating some managements, four individuals did one single thing (31% loss), 10 did 2 with 42% loss level, 8 did 3 and lost 32% while the 8 doing 4 had only a 13% loss.

The choices, with number of LCBA individuals making that selection is in () in Figure 6; bar length indicates loss level of individuals doing this management. Those managements with bar lengths to left of 28% **blue dashed marker** had better survival than average while those to right had greater loss level.

Over the past six years individuals that did no winterizing practice (average 11.3% of individuals) averaged 41.3 loss compared to 37.7% overall average loss of last 6 years, a 4.6 percentage point poorer survival rate. Only a single winterizing management improved survival all 6 years statewide – insulated top (6 year average loss of 30%, a 7.7-percentage point improvement); for LCBA members the 17% loss was a 39% improvement over average loss. Vivaldi/quilt box, upper entrance (most Vivaldi boards have an upper entrance built into the equipment), wrapping and wind/weather protection had only slightly improved survival rates and were not noted in all past 6

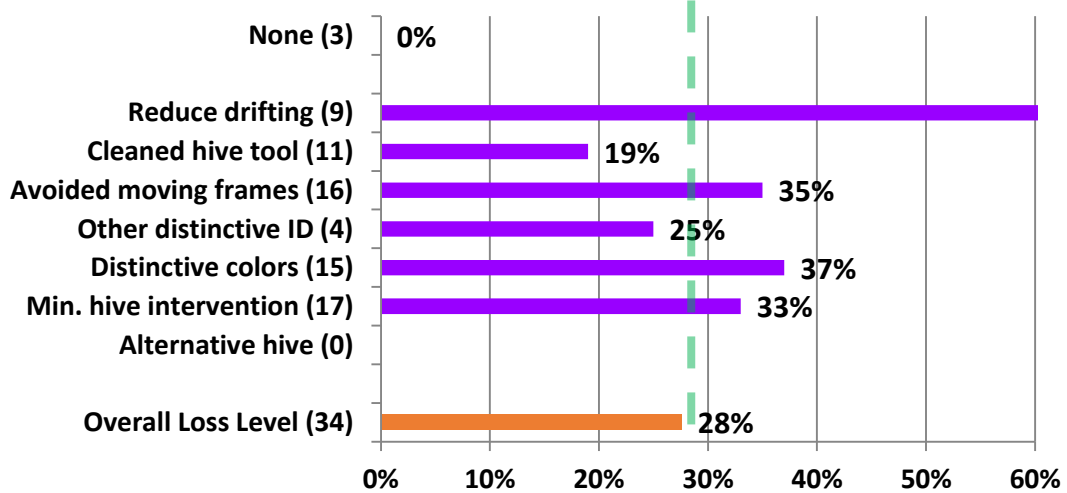
years. Weather and rain protection improved LCBA beekeeper colony survival. Equalizing hive strength was the best management to improve survival both this and the past year statewide but not for the 9 LCBA indicating as doing this management.

Figure 6 Winter Management Options w/ Loss Record
 (#) = number individuals



SANITATION PRACTICES: For LCBA respondents the five individuals making no selections had zero losses (5 colonies total). For the two most common interventions, the 16 individuals who avoided moving frames

Sanitation Practice Options w/ Loss Record
 (#) = number individuals



had 35% loss and the 17 individuals who had minimum hive intervention had 33% loss level and the 15 who indicated distinctive hive colors had a 37% loss rate. The best survival was recorded by those who said they cleaned their hive tool (18.5% loss) and those providing other measures to reduce drifting (4 individuals, 25% Loss).

There were 71 total selections (2.3/individual) . Those 5 who indicated one selection had a 15% loss level, those 13 with 2 had a 42.5% loss level, the 6 with 3 choices had a 14% loss while the 4 indicating 4 choices had 21.5%. One individual made 5 selections and all 3 of their colonies survived.

Minimal hive intervention (98 individuals) was the most common option selected statewide, as it has been for the last 4 years. It could be argued that less intervention might mean reduced opportunity to compromise bee sanitation efforts of the bees themselves and that excessive inspections/ manipulations can potentially interfere with what the bees are doing to stay healthy. This option, however, did not demonstrate improved winter survival; the loss rate for this group the past 6 years was 47%, eleven percentage points above the average 6-year loss of 36% loss rate compared to those individuals that did nothing.

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. Average non-use for the last several years statewide is 16%, vs 84% use, on some or all colonies over the past 7-year period. Twenty-four of 34 LCBA members (70%) indicated use of screen bottom boards, six on some (not all) of their colonies. Examining the eight-year average of SBB use statewide loss level of the 84% using SBB on all or some of their colonies had a 33.9% loss level whereas the 16% not using SBB had loss rate of 36.8%, a 3.1-percentage point positive survival gain for those using SBB versus those not using them. Screen bottom boards offer a minor improvement for overwinter survival. Forty eight point five percent always blocked and an additional 15% of LCBA members sometimes blocked their screen bottoms during winter. There is a slight advantage statewide in favor of closing the SBB over the winter period to improve survival.

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. Individual 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 the inability of bees to manage moisture overwinter kills bees, so we recommend hives be located in the sun out of the wind. If colonies are in an exposed site, providing some extra wind/weather protection and wrapping/insulating colonies might improve survival.

Feeding, a basic management for all livestock, appears to be of some help statewide in reducing losses. Feeding a hard sugar candy or dry sugar during the winter means lower loss levels. Providing frames of honey and feeding sugar syrup also yields lower losses for some individuals. Such feeding management is of great value for spring development and/or development of new/weaker colonies as

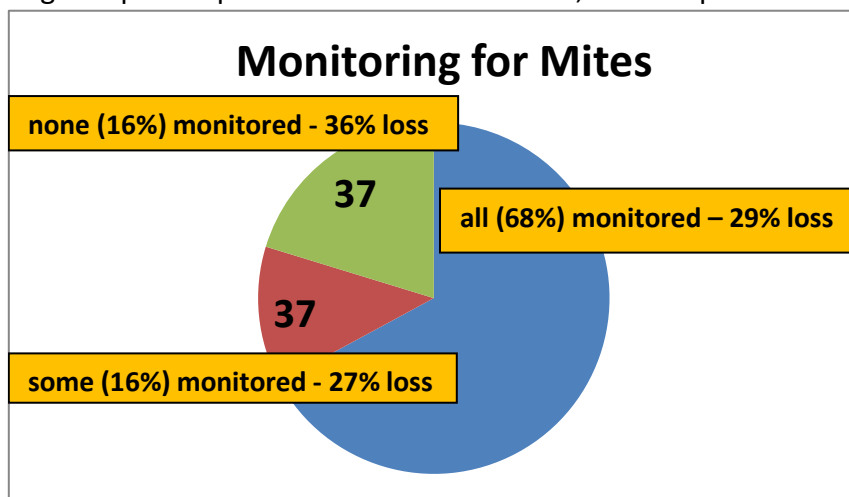
well as for colony rearing of bees to overwinter. Feeding protein in any form did slightly improve survival. The supplemental feeding of protein (pollen patties) might additionally be of assistance earlier in the season to build strong colonies and in the fall to build the fat bee population needed for successful overwintering. To determine if feeding might help monitor what sources your bees are visiting and manage accordingly.

Winterizing measures that apparently helped lower losses for some statewide beekeepers were top insulation and 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.

Replacing standard bottom boards with screened bottoms marginally improved winter survival. It is apparently advantageous to close the bottom screens during winter. It is clear that doing no feeding, winterizing or sanitation resulted in the heaviest overwinter losses.

Mite monitoring/Sampling and Control Management

We asked the percentage of Oregon hives monitored for mites during the 2022 year and/or overwinter 2022-23, 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. 159 individual respondents (68%), two percentage points above the previous year, said they monitored all their hives; 24 LCBA members who monitored had 17% loss, the five that did not monitor was 62%. The losses of those individuals monitoring (29%) was 7 percentage points less than those who did no monitoring. For Lane members that difference was much wider. Figure shows statewide numbers.



Monitoring alone is a means towards improved winter survival. The table below compares % statewide individuals and % winter loss for individuals who monitored all colonies compared with

those who monitored none. Five-year difference is 8 percentage point better survival monitoring all colonies. The loss rate of 13-15% who monitored some colonies was variable, averaging 4 percentage points lower than those monitoring all colonies.

	ALL Colonies Monitored % individuals	% Loss	SOME Colonies Monitored % individuals	% loss	No colonies Monitored % individuals	% loss
2023	68%	29%	16%	27%	16%	36%
2022	66%	37%	15%	27%	18%	42%
2021	73%	34 %	11%	36%	17%	36%
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%
7 year loss avg		38%		35%		46%

individuals indicated use of 1.6 monitoring techniques on average. In total choices, in order of popularity of use, 18 individuals (62%) used sticky boards compared to statewide of 50%, 9 individuals used alcohol wash, which at 31% is nearly ½ as few as statewide (53%). Six individuals used powdered sugar monitoring and 7 each visual inspection of drones and visual inspection of adults. Statewide this was the first year Alcohol use monitoring was the major monitoring technique and I am not sure why it was so much less practiced by Lane County respondents.

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 counting the mites can be hard, especially for new beekeepers). Sticky boards used for a single day pre- and post-treatment can help confirm the effectiveness of a treatment, if numbers drop post treatment. Visual sampling is not accurate: most mites are not on the adult bees, but in the brood, especially when there is a lot of brood and the adult mites are NOT on the adult body where they can be observed (over 90% are on the lower abdomen, tucked within the overlapping bee sternites). Sampling 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 bees that will overwinter. 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

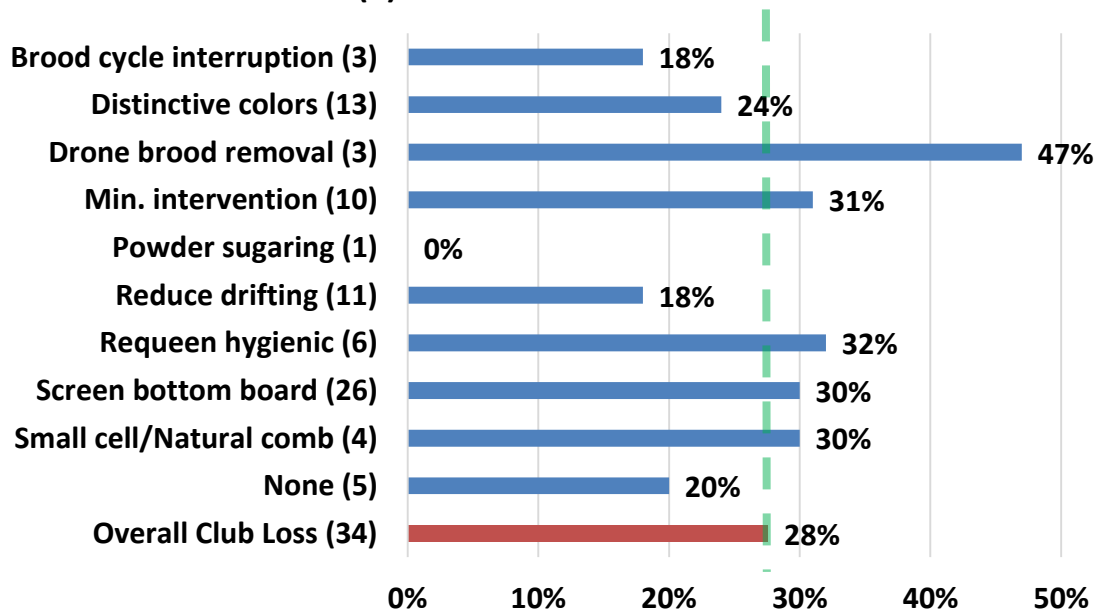
colony. We are seeing more colonies suddenly disappear (abscond?) during the fall, which may be related to the treatment itself.

Mite Control Treatments

The survey asked about surveying for mite numbers. The three LSBA member who did not survey had a 50% winter loss. All 19 LCBA individuals said they used a non-chemical mite control while one LCBA did not use a chemical control; that individual lost all four of their colonies (100%). The individual options chosen for non-chemical control are discussed below.

Non-Chemical Mite Control: Five LCBA members said they did not use a non-chemical alternative offered on the survey (+ other category). They had only a 20% loss. Seven LCBA individuals used one method and had a 11% loss, 6 individuals used two (40% loss rate), 9 used three (22% loss rate) and 5 individuals did 4 (42% loss) and 1 each did 5 or 6 and had a 11.5% loss. Bar length in figure below represents average loss level of those individuals using each method. Those left of **green dashed** line including brood cycle interruptions and reduces drifting had improved survival.

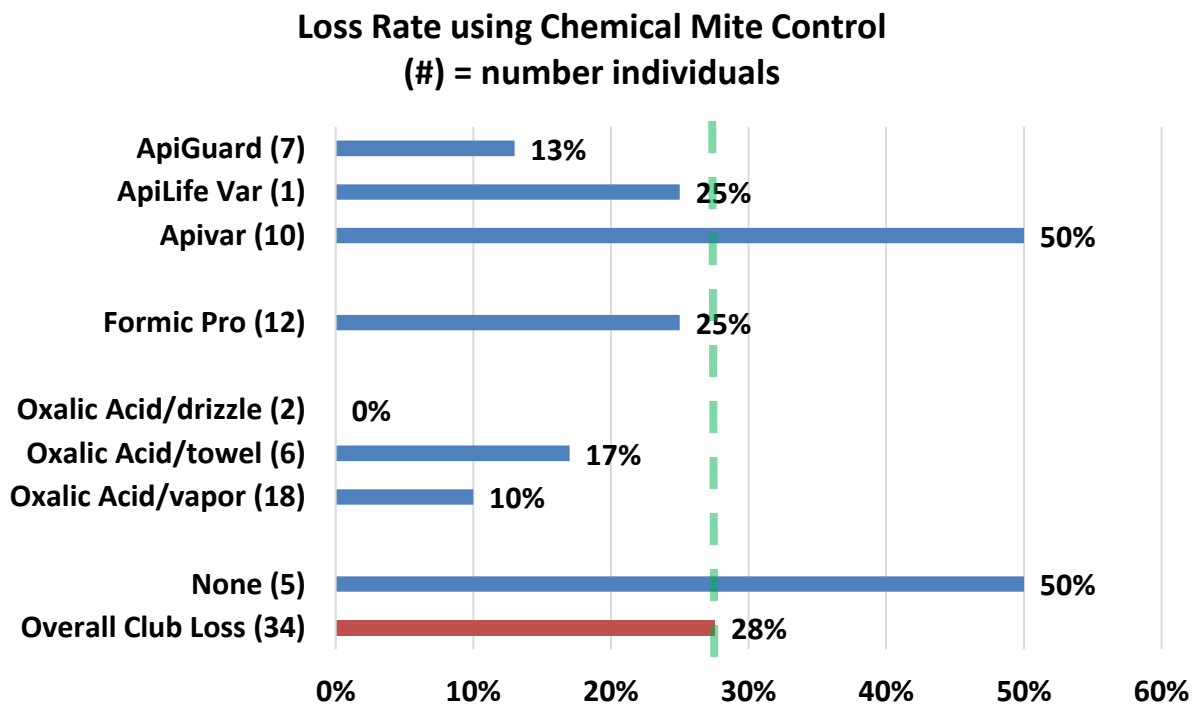
Loss Rate using Non-Chemical Mite Control
 (#) = number individuals



Three of the non-chemical alternatives have demonstrated reduced losses over the past 6 years. Reducing drifting such as spreading colonies (30% loss average for 5 years) – which also held for Lane members this past season and brood cycle break (33.9% average) have consistently year after year demonstrated somewhat better survival than average loss (35.6% average loss last 5 years and 37.5% loss last 6 years respectively); Brood cycle break for the 3 LCBA members improved their survival. Different colony colors in apiary 36% average loss and drone brood removal (37% average loss) were

just slightly better than average 6-year loss (38%); different colors was helpful for Lane members but not drone brood removal.

Chemical Control: For mite chemical control, five individuals used NO chemical treatment. They lost 50%. Those using chemicals used at rate of 1.9/individual. Thirteen LCBA individuals (22% of total respondents using a chemical) used one chemical (had 29% loss level), nine individuals used two (25.5% loss level), 4 used 3 (34.5% loss) and 3 used 4 or 5 (these individuals had 3% loss level).



New to the survey this year we asked how many times a chemical was used in addition to which chemicals were used. For example, 55 individuals indicated they used the synthetic chemical Apivar (amitraz). The overall loss level was 28%. 42 used Apivar once and lost 27%; 12 used it twice, losing 37%. One individual used Apivar 3 times (label permits use twice per year) and lost 2 of 8 colonies overwinter – a 25% loss level. For LCBA members all but one used it once, the individual using it twice had 67% loss.

There are two essential oil products on the market. Apiguard, the thymol gel, was used by 64 individuals. They had a loss level was 20.5%. The 44 individuals that used it once had a 20% loss, the 12 using it twice had loss of 24%, the 6 using it 3 times had a 19% loss level and the 2 individuals (6 colonies total, with one lost overwinter) had a 17% loss. For Lane members 2 individuals (10.5%) used it twice losing 2 of 19 colonies. ApiLifeVar, the wafer thymol product was used by 23 individuals - their overall loss was 22%. Those who used it once lost 17%, the 3 individuals using it twice had double the

loss level of 33% while the 4 individuals that used ApiLifeVar 3 or 4 times had no loss of 13 overwintered colonies. The single LCBA member using it (25% loss) used it one time.

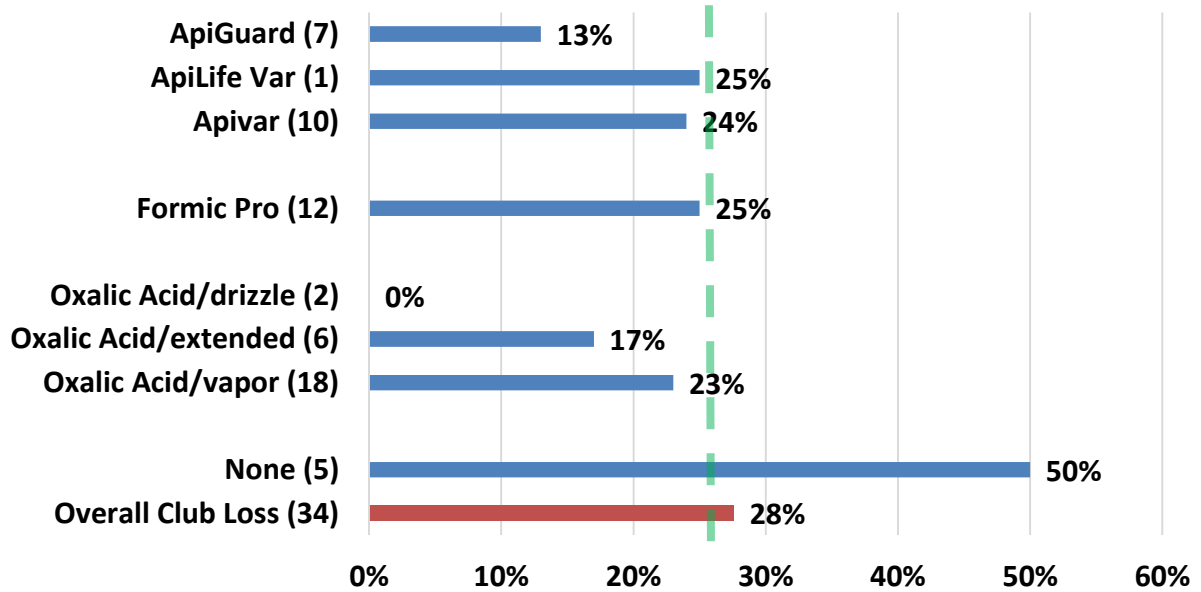
One hundred twenty-six statewide respondents (62%) indicated they used oxalic acid vapor (OAV), 28 used oxalic acid dribble (OAD) and 14 used oxalic acid extended (OAE). Loss rates were 27% for OAV, 28% for OAD and 20.5% for OAE. For OAD, 22 used it once with 27% loss,, 5 individuals used it twice but had 31% loss and the single individual who used it 5 times had 67% loss (lost 2 of 3 colonies). Overall loss for OAD was 28%. For LCBA two individuals using dribble (2 colonies total) had no loss, the 6 using OAE had a 17% loss and the 18 using OAV had a 23% loss.

For Oxalic acid extended (OAE) – and the actual method used likely varied a great deal as everyone was experimenting on their bees as there is no approved product, or even application method, for OAE) – 18 individuals statewide used it once with 25% loss, 8 said they used it twice (13.5% loss level), 5 indicated using it 3 times (19% loss) and one individual used it 5 times and lost 1 of 4 colonies overwinter (25%). The single Lane user of OAE once had no loss (9 colonies), while the one individual using it three times lost 2 of 3 colonies.

For oxalic acid vaporization, I sorted the data differently. Statewide 26 individuals used it once and had 23% loss, 28 used it twice with 22.5 % loss and 20 said they used it 3 times with 28% loss. This group using it one to 3 times, 84 individuals, had an overall 24% loss level. Additionally, 13 individuals said they used it 4 times with 30.5% loss and 10 individuals used it 5 times with 39.5% loss. Another group of 18 individuals used it 6+ times and had 31.5% loss. This group of 31 individuals using oxalic acid 4 to 6+ times had 33.5% loss. All oxalic acid users, a sum total of 125 individuals, had a loss level of 26.5 percent Statewide. For LCBA members, 10 individuals using it 1 to 3 times had a 9% loss. Three individuals used it 4 or 5 times had a 57.% percent loss and the 4 individuals indicating use 6+ times had a 31% loss.

Consistently over the last 7 years, four different chemicals have helped beekeepers improve survival. These were essential oils Apiguard (average 7-year loss level 29.1%), Apivar (30.6% average 7-year loss level), ApiLifeVar (32.6% average loss level over last seven years) and Oxalic acid vaporization (30.7% average loss level over last 7 years. The average loss level has been 37.9% in the last 7 years. Formic acid too has done better than average the last 7 years but the product has changed from MAGS to Formic Pro. This year the survey did not specify Formic Pro (formic acid MAQS was listed which no longer is on market), so I cannot be sure what was used as Formic acid by the 107 respondents who reported using it. Oxalic acid drizzle average of last 7 years is 36.2%, same as overall loss level of same 7 year time frame. The extended OAE (absorbing oxalic acid and glycerin into sponges) did very well in promoting better than average survival this year but last year was only slightly better than average. For Lane members, oxalic acid did well as did the thymol products Apiguard and ApiLifeVar. Apivar (10 users) did well (93 total colonies treated – 24% loss level).

Loss Rate using Chemical Mite Control (#) = number individuals



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 (See *American Bee Journal* April 2020 article by Dewey). 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 2022