

## 2019-20 LBBA Winter Loss Report by Dewey M. Caron

Oregon beekeepers were directed to a web-based survey document in a continuing effort to define overwintering losses/successes. This was the 11<sup>th</sup> year of such survey activity and the fourth to include a 10+ beekeeper response from Linn Benton Beekeepers. I received 302 responses from Oregon backyarders and 133 from Washington beekeepers keeping anywhere from 1 to 45 colonies. Thirty six LBBA Association members completed a survey, 14 more than last year. THANK YOU. Figure 1 shows response rate, number in ( ) and loss rate for OR and WA clubs.

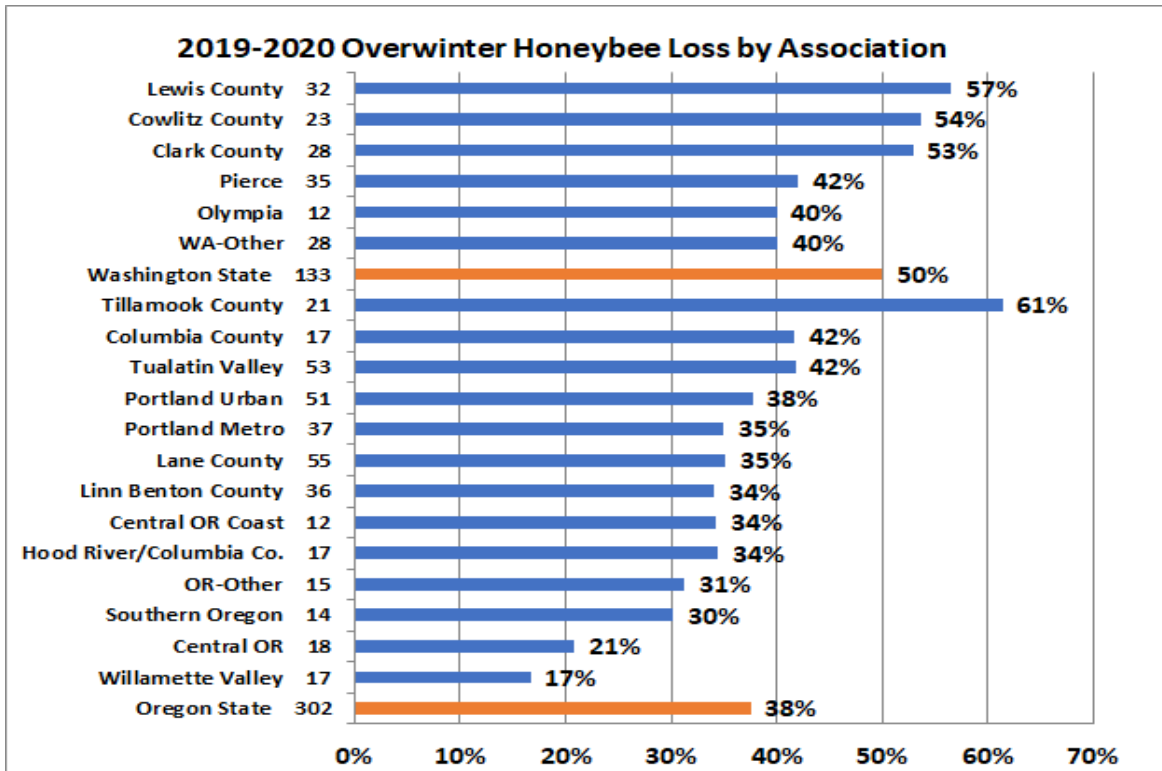


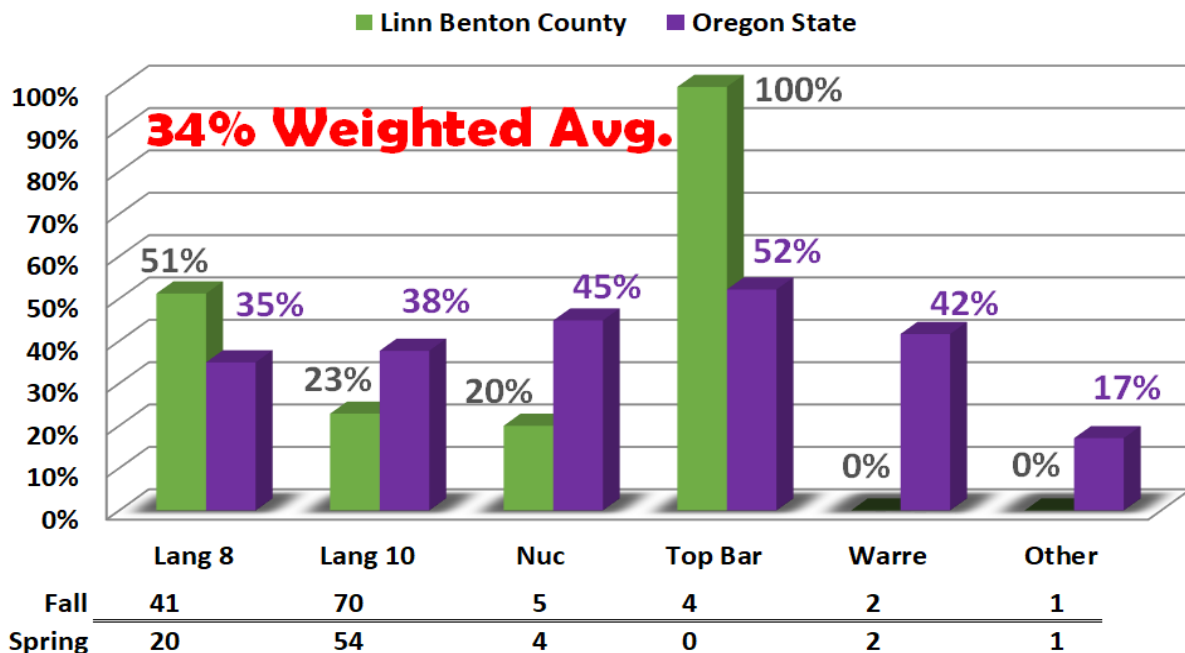
Figure 1

### LBBA Overall average loss rate 34%, 4 percentage points lower than overall state losses.

Overwintering losses of LBBA respondents, as for total OR beekeepers, was determined for number of fall colonies minus number of spring survivors by 5 hive types. LBBA data are shown in Figure 2 compared to statewide loss numbers. Lower losses were largely due to the better survivorship of Langstroth 10 frame colonies (only 23% loss level) and small number of non-traditional hives held by LBBA member respondents. None of 4 Top Bar hives but 2 Warré and 1 other (not further identified) hives did survive. Four of 5 five overwintered nucs survived. See Figure 2.

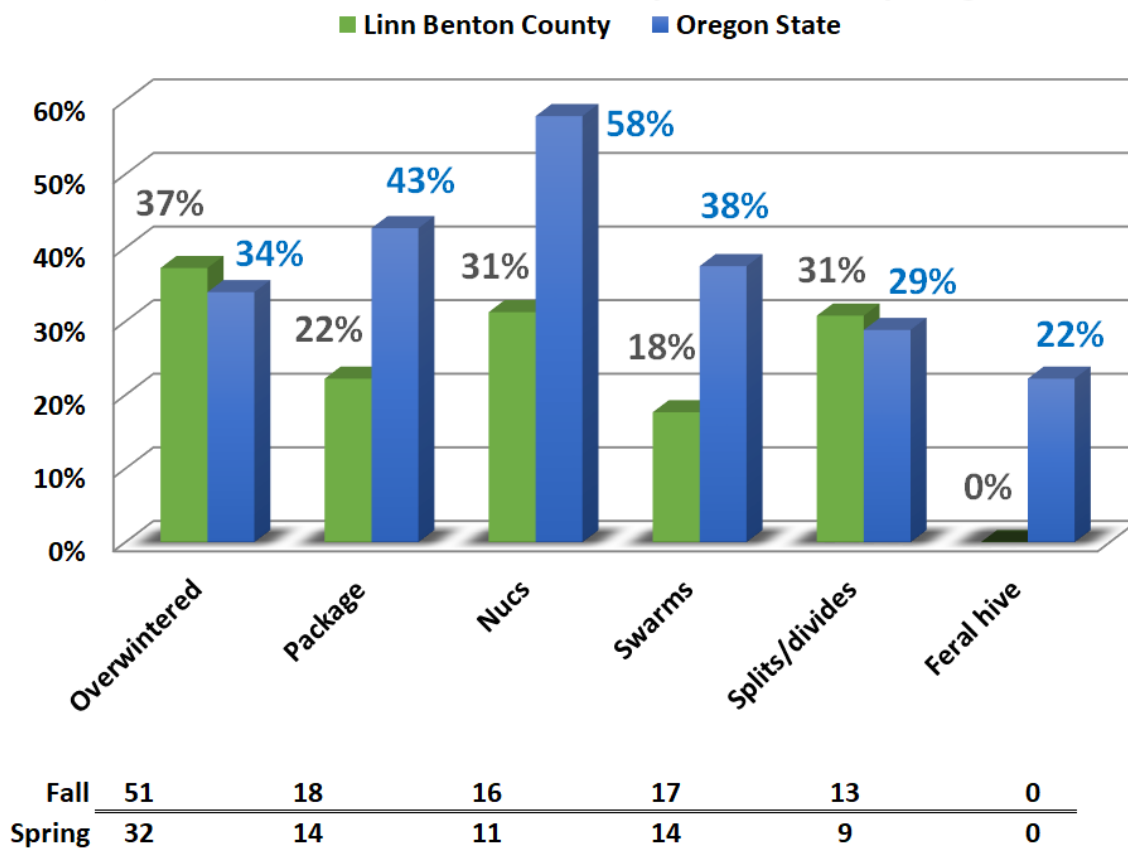
Figure 2 ↓

### 2019-20 Winter Honeybee Loss % by Hive Type

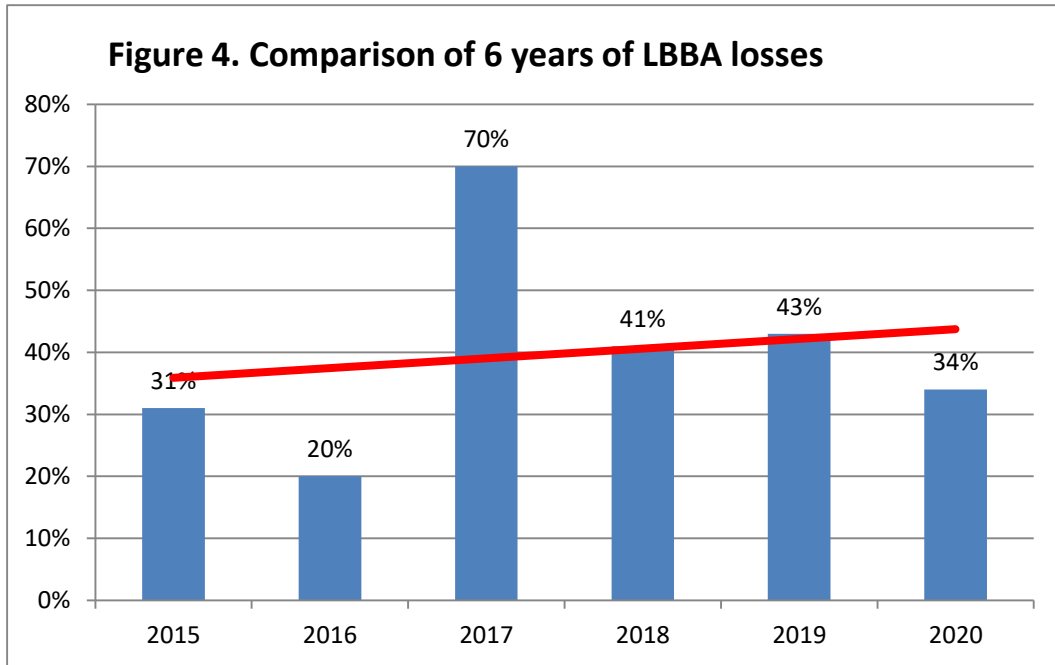


The survey also asked for hive loss by hive origination. Package bees and nuc colonies along with swarms did better for LB compared to statewide. Data comparing LB with statewide shown in Figure 3.

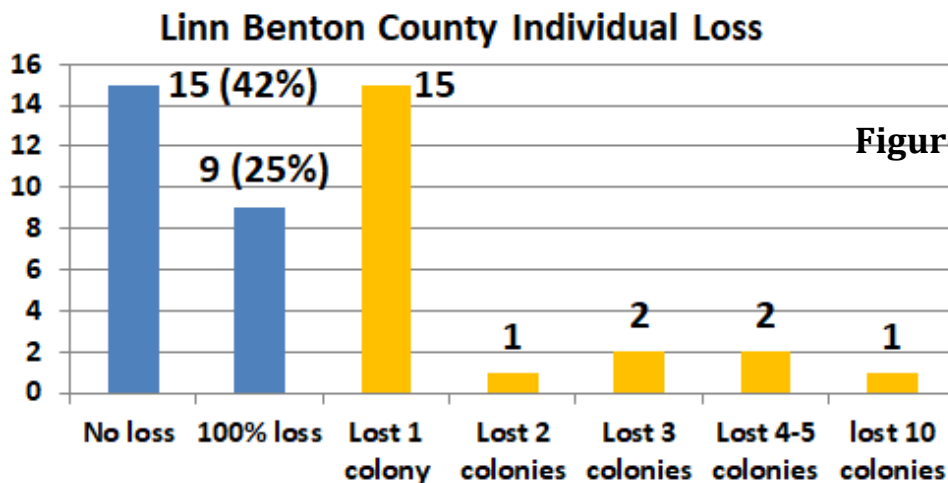
**Figure 3 2019-20 Winter Honeybee Loss % by Origination**



In the 2016-2017 overwintering period LBBA members had the highest loss rate of any of the OR associations and the year earlier (2015-2016) LBBA had the lowest rate of state bee groups. The remaining 3 of past 5 years have been closer to the statewide numbers. Losses this year were below the 5 year LBBA average (41%). Trend line shown in red shows increasing losses over the 5 year period but is not as steep as in other clubs. See figure 4



Fifteen individuals had no loss but 9 experienced 100% loss. Fifteen individuals lost one colony; heaviest loss was ten colonies. The 36 LBBA survey respondents were mainly single digit beekeepers. Twenty two individuals (61%) had 1, 2 or 3 fall colonies, 11 individuals had 4 to 6 colonies and 3 individuals (8%) had 9 to 11 colonies. The highest loss percentage was those individuals with 1 to 3 colonies (45%), followed by those individuals with 4-6 colonies (33%); the 3 individuals with higher colony numbers lost 27½% of colonies.



**Figure 5**

Fourteen (39%) LB respondents had 1 to 3 years of beekeeping experience, 6 individuals had 4 to 6 years experience, 3 had 7 to 9 years experience and 8 individuals (22%) had 10+ years experience, with 36 years the highest. Losses were not very different among years experience (48% among those with the least experience and 46% loss for the 8 with the most experience).

Twenty six individuals (72%) had a mentor available as they were learning beekeeping. One individual respondent kept bees in two apiaries and all colonies survived. Two individuals had a separate location to accommodate swarm captures and one individual moved colonies for better hive separation.

## **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 35 total listing for LB, 1.6/individual, slightly less than statewide. Ten LB individuals listed varroa (31% of respondents), followed by queen failure (28%) and starvation (22%). Four individuals chose Don't know (11%). Other choices were bear and wax moth. Choices were very similar to last year. Table compares LB with % statewide selections.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	Yellow jackets	Don't know	Other
LBBA (#) (%)	10 (31%)	0	5 (16%)	9 (28%)	7 (22%)	2 (6%)	4 (13%)	2 (6%)
Statewide %	40%	23%	29%	27%	18%	4%	14.5%	15%

Survey individuals are asked to indicate what might be an acceptable loss level. Nine individuals listed none. The median (middle) selection was 20%. Seventeen LB responses (46%) were 15% or less; five respondents selected 25% and five 33% or more including one who listed 100% loss as acceptable.

**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. LBBA 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 colonies are**

not as healthy as they should be. LBBA members also considered queen failure and weak in fall as major reasons for high winter losses.

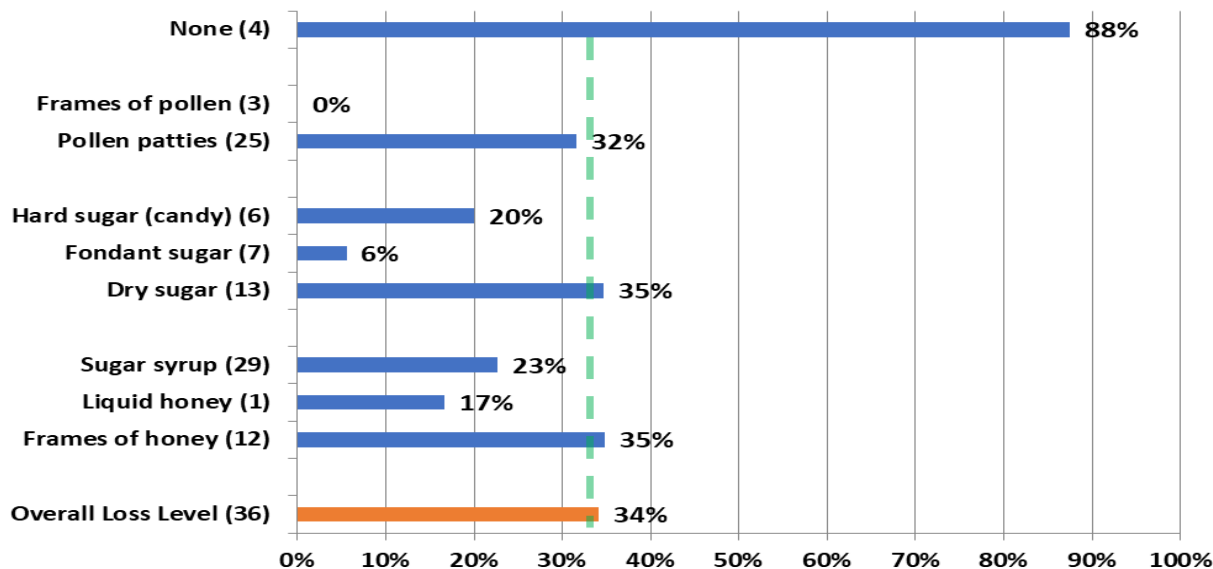
## Management Selections and Losses

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 LBBA and OR beekeepers often do not do just one thing/management to their colony (ies) to control mites or 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:** Linn Benton survey respondents checked 101 feeding options = 2.6/individual (statewide it was 3.3/individual). Four individuals selected none – they had winter loss of 88%, more than double the club average of 34%. These 4 were among 22 who selected none statewide; loss rate of those statewide selecting none was 56%, Three Linn Benton Co. individuals selected a single choice (they had a 50% loss), seven selected 2 options (36% loss), 11 selected three (the greatest choice – 35% loss) and 10 selected four (25% loss) plus 1 individual selected 7 (4 of 4 colonies survived for zero loss.)

Percent colony losses are presented for feeding options with numbers of LBBA members indicating doing the management in ( ). Bar lengths of left of 34% (green dashed line) indicate better than average survival while those to right had heavier than average losses. Individuals feeding pollen patties, (25 individuals) and the 3 persons feeding frames of pollen had improved survival. Individuals feeding non-liquid sugar had better survival with 7 fondant feeders having only a 6% loss. Liquid feeders of honey had improved survival as did those feeding sugar syrup (23%). Feeding managements obviously helped improve survival for Linn Benton beekeepers

**Figure 6. Feeding Options w/ Loss Record (#) = number individuals**



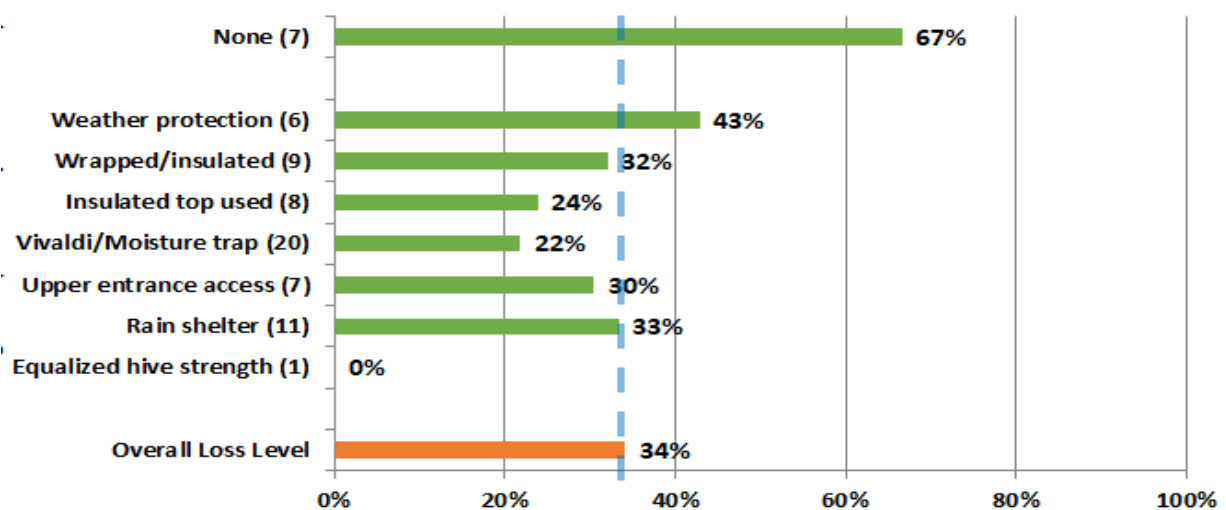
**Summary statewide:** For the last 4 years (=43% average losses), individuals doing no feeding had poorer survival all 4 years: **NO feeding annual losses 12.6 percentage points higher than average overall losses.** For Linn Benton this year, those 4 doing no feeding lost 7 of 8 fall colonies (88%). Individuals statewide that fed sugar syrup had a 7¼% lower loss level (average for the 4 years). This year sugar syrup feeders in Linn Benton had an 11 point better survival. Those feeding liquid honey did even better (17% loss). Statewide feeders of honey (as frames or liquid) had lower loss only 2 of past 4 years, 2018 and this past winter overwinter period.

Individuals statewide feeding non-liquid sugar (in any of the forms) had 5 or 6 percentage point lower losses all four past winter seasons compared to average 4-year losses. The 13 LBBA dry sugar feeders did not have improved survival this year; dry sugar feeders statewide had slightly better survival all 4 winters (average 4 winters 39¼%). Hard candy feeders (6 LBBA individuals - 20% loss is great improvement over statewide candy feeder survival all 4 winters (31% average survival). Fondant feeders had better survival 3 of the 4 winters (37¾ %); the 7 Linn Benton feeders had only 6% loss, reporting loss of a single colony of 18.

For individuals feeding protein statewide, only the protein patty users showed better survival all 4 years; the 25 LBBA members feeding patties had only a 2 percentage point better survival this past winter. None fed dry pollen; statewide dry feeders had much better survival in two of the four years with losses the remaining two years close to the overall yearly average.

**WINTERING PRACTICES:** Seven Linn Benton individuals (20%) reported doing no winterizing; they had loss level of 67%; 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 loss than overall state loss of 38%. Multiple selections were possible and in fact the 29 Lane members doing winter managements averaged 2/individual. Ten individuals chose a single management and had a 21% loss level, 8 selected 2 and 9 had 3 choices (both had 27% loss). The single individual with 4 and the one with 5 had 67% loss.

**Figure 7 2019-20 Winter Management Options w/ Loss Record of 36 Linn Benton County Beekeepers**

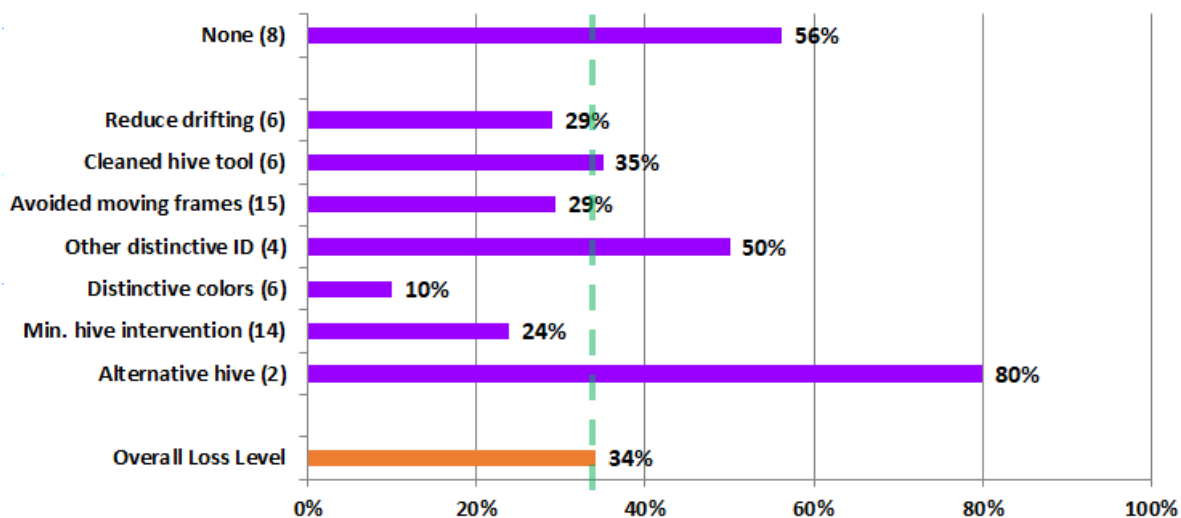


The two most common wintering managements selected were use of a rain shelter (117 individuals statewide (47%) and similar usage by Linn Benton (11 individuals – 39%) and use of a quilt box (Vivaldi board) at colony top (175 individuals statewide, 71% of total respondents and 20 individuals, 71% by LBBA). Figure 7 shows number of individual choices for Linn Benton members in ( ) and percent loss of each selection.

Over the past three years individuals that did no winterizing practice (average 13<sup>1</sup>/<sub>3</sub>% of individuals statewide) 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 Linn Benton lost 67% of their colonies, double the LBBA average. Statewide only 2 winterizing managements improved survival all 3 years – these were wrapping (30 % lost rate, an 11 percentage point improvement only marginally bettered survivorship for the 9 LBBA members doing this management - 32% compared to 34% overall for members) and top insulation (32 % survival average over 3 years, a 9 percentage point improvement statewide while for 8 Linn Benton members this resulted in a 10 percentage point survival improvement this past winter. Vivaldi board/moisture trap (38 % loss rate over 3 years), upper entrance, also 38% (Vivaldi boards often have an upper entrance built into the equipment) and wind/weather protection (also 38%) had only slightly improved survival rates statewide over the past 3 years– 3 percentage points. For Linn Benton beekeepers, Vivaldi boards used by 20 members showed 12 percentage point better survival than LBBA average and the 7 beekeepers using top entrance had a 4 percentage improvement. Adding wind/weather protection did not improve LBBA member survival this past winter.

**SANITATION PRACTICES:** It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care toward insuring healthy bees. Linn Benton beekeepers had 53 responses 2/individual to sanitation management questions. Sixteen percent statewide and 8 Linn Benton individuals (23%) 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%; the 8 LBBA individuals had a 56% loss rate. Nine Linn Benton members had 1 selection (loss rate 20%), 11 made 2 choices (17% loss), 6 made 3 choices and one individual selected 4; their loss rate was 50%.

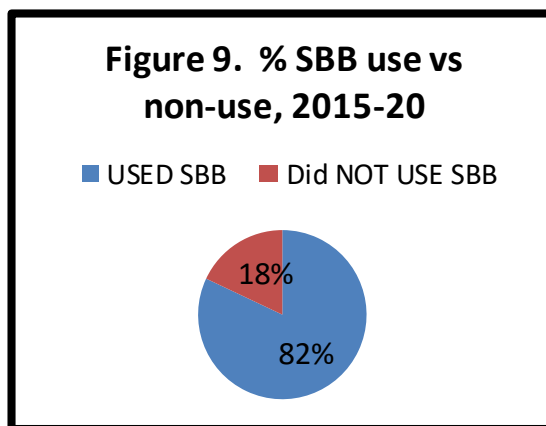
**Figure 8 2019-20 Sanitation Practice Options w/ Loss Record of 36 Linn Benton County Beekeepers**



Minimal hive intervention (14 individuals, 24% loss) and avoiding moving frames (15 individuals, 29% loss) were the two most common options selected. The two sanitation choices that most improved survival were distinctive color (10% loss) and avoiding drifting (29% loss). Statewide, avoiding moving frames and reducing drifting were the two sanitation choices that demonstrated better average survival 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%, minor 6 and 3 ½ percentage point differences. Making colonies distinctive and reducing drifting seems to also help improve winter survival.

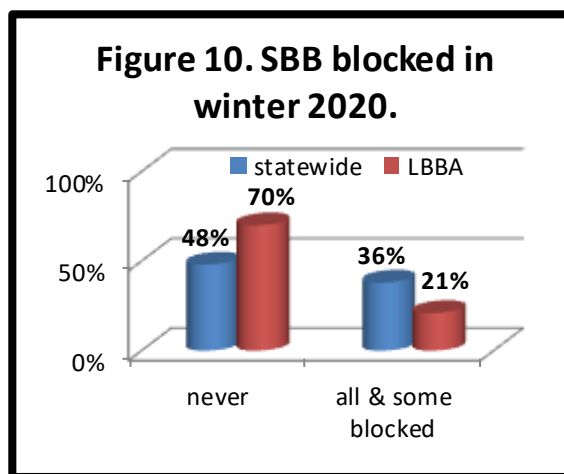
## Screen Bottom Boards (SBB)

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 LBBA (11%) 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 9 shows 6-year statewide data.



This past overwintering season, the 30 statewide non-SBB users (10% of respondents) had a 54% loss. The 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. This was not case for LBBA this last year. Four none SBB users had 27% winter loss while those who used on some or all colonies had 31% loss. **Examining the five year average of SBB use, loss level of those using SBB on all or some of their colonies was 41% 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). They are very minor in improving overwinter survival.**

We asked if the SBB was left open (always response) or blocked during winter. This past season 21 Linn Benton respondents (60%) always or sometimes (4 individuals - 11%) blocked the SBBs during winter. Those 10 who said they never blocked (29%) had a 70% winter loss (compared to 21% loss of those who always or sometimes blocked). This was a much bigger difference than statewide. **Comparing the always and sometimes left open with the closed in winter (all closed + some closed) statewide response, reveals an 12 percentage point difference in favor of closing the SBB statewide over the winter period to improve survival; for Linn Benton members it was a 49 percentage point advantage.** See Figure 10.





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.

**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. Linn Benton 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 can improve survival.

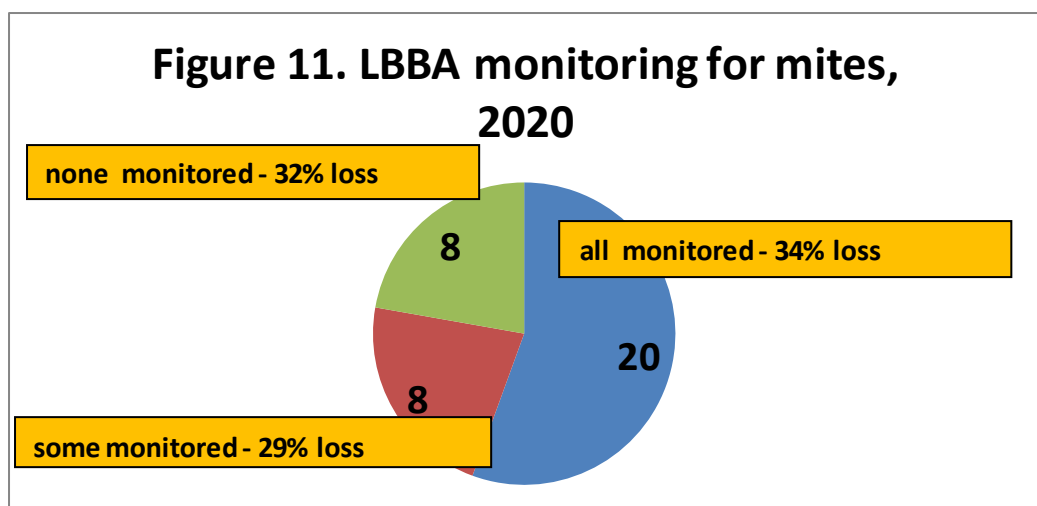
Feeding, a common management, appears to be of some help for beekeepers statewide in reducing losses. Feeding fondant sugar, a hard sugar candy or dry sugar during the winter means lower loss levels. Feeding honey and/or sugar syrup also meant lower losses for some individuals; such feeding management 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 so colonies build the fat bee population needed for successful overwintering.

Winterizing measures that apparently helped lower losses for some statewide beekeepers was to use moisture trap (Vivaldi board or quilt box) and upper insulation, even 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 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 or winterizing or sanitation resulted in the heaviest overwinter losses.** Sanitization management options did not make much difference. Replacing standard bottom boards for screened bottoms marginally improved winter survival but 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 LBBA members, 20 individuals (57%) monitored all colonies; they had 34% loss. Eight individuals monitored some colonies; they had a 29% loss level. Eight individuals (22%) did no monitoring and they had a 32% loss.

Although there was no advantage in monitoring by Linn Benton members, statewide (67%), said they monitored all their hives; losses of those individuals was 33%. Sixty one individuals (20%), reported no monitoring; they had a higher loss rate of 49% loss. 38 individuals reported monitoring some of their colonies; they had a 16% loss. In order of popularity of use, sticky boards were used by 57% of total LBBA respondents eight individuals (29%) used alcohol monitoring, 25% used powdered sugar monitoring, 21% used drone brood and 25% said they monitoring by looking at adults. Most sampling to monitor mites 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.

**It is obvious that monitoring alone is a means towards improved winter survival.** The table below compares per cent individuals 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.

	<b>ALL Colonies Monitored</b> <b>% individuals</b>	<b>% loss</b>	<b>SOME Colonies Monitored</b> <b>% individuals</b>	<b>% loss</b>	<b>No colonies Monitored</b> <b>% individuals</b>	<b>% loss</b>
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%

**It is important to KNOW mite numbers.** Less effective mite monitoring methods include sticky (detritus) boards below the colony although often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers. Sticky boards 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](http://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 either high mite numbers or sometimes to the treatment itself.

## Mite Control Treatments

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Six LBBA individuals (17% compared to 12% statewide) said they did not employ a non-chemical mite control and 2 LBBA individuals (6%), did not use a chemical control (statewide=20%). Those LBBA individuals who did not use a non-chemical treatment had a 71% loss, slightly greater than statewide 61%. The 2 LBBA members (6%) not using a chemical control had a loss rate of 50%; statewide lost rate=57% of colonies for individuals using no chemical treatment.

**NON-CHEMICAL CONTROL:** Of nine non-chemical alternatives offered on the survey (+ other category) 6 individuals selected none – they had 81% loss. The remaining 29 individuals selected 1, 2 or 3 treatment choices, 61 total or 2.1/individual. Eight individuals used one method (40% loss), 16 used two (17% loss) and 7 used 3 with 29% loss, Doing more than one treatment improves winter survival.

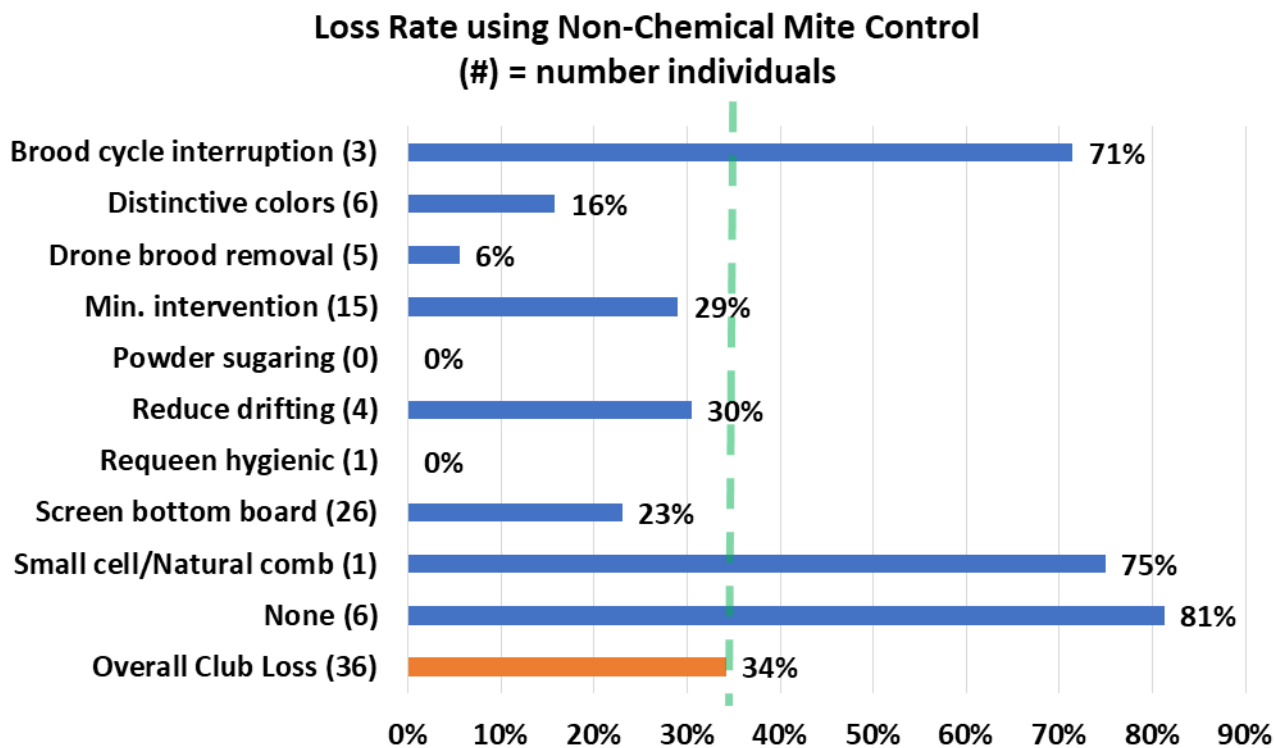
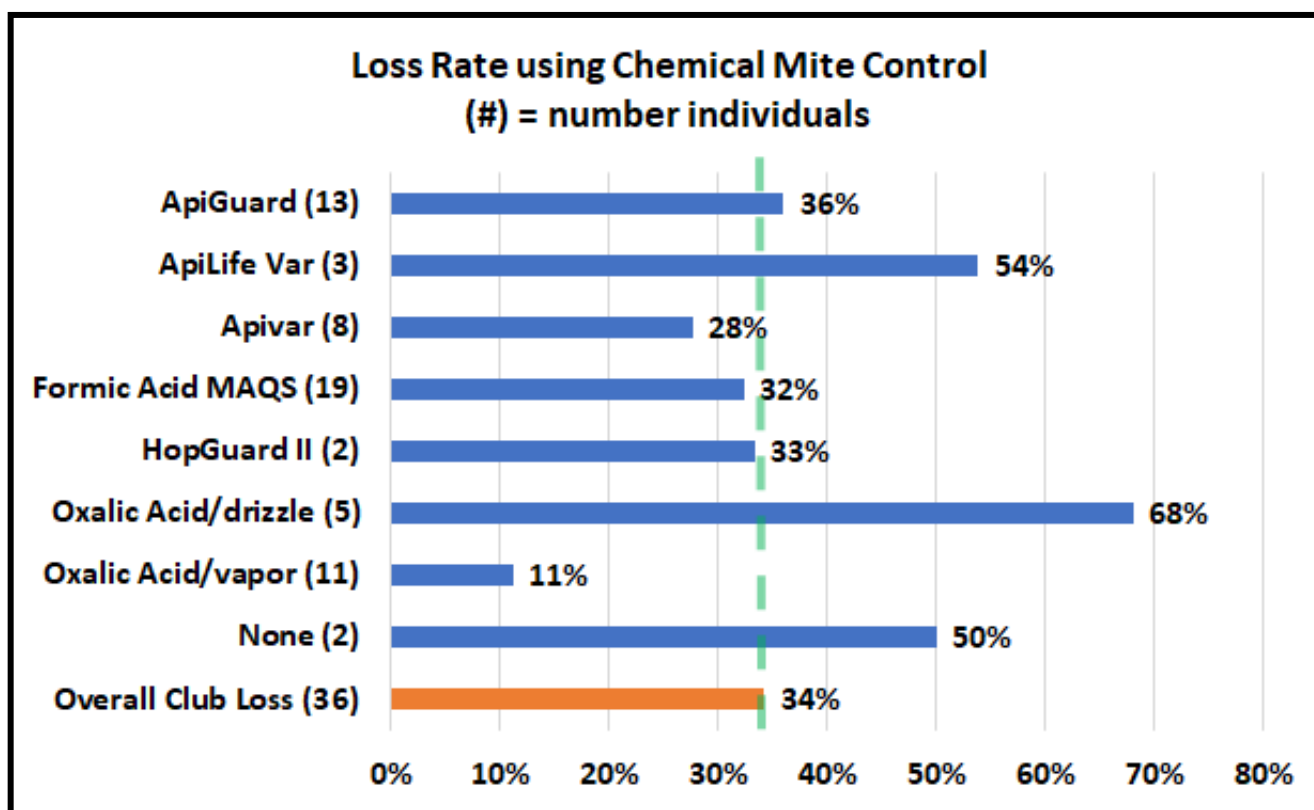


Figure 12

Use of screened bottom board and minimal hive inspection (26 and 15 individuals respectively among Linn Benton respondents) were most common choices. As in Figure 15 above SBB use shows a slight advantage (23% loss compared to 34% overall for LBBA members) as did minimal hive intervention (29% loss). The single individual requeening with hygienic stock did not lose any of their 4 fall colonies. Drone Brood removal (5 individuals, 6% loss) and using distinctive hive colors (6 individuals 16% loss) had very low loss levels.

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 a minor 4 percentage point better survival and different colony colors in apiary (42% average loss last four years – only one percentage point difference) have consistently 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 on one or two years but overall no improvement.

**Chemical Control:** For mite chemical control, 2 individuals (6% of total Linn Benton respondents) used NO chemical treatment. They had loss rate of 50%. Those using chemicals did so at rate of 1.9/individual (same as statewide). LB members using one chemical (15 individuals) had a 32% loss rate, those 12 individuals using 2 had a 44% loss rate while the 7 individuals who indicated use of 3 or 4 chemical treatments had a 23% loss rate.



Eighteen LB Beekeepers (58% of those using chemicals) indicated they utilized MAQS, formic acid, two used Formic Pro (all 3 fall colonies survived). Oxalic acid vaporization (11 individuals, 43% of total chemical users), and Apiguard users (3 individuals) showed improved survival. Figure 13 illustrates number of users ( ) and bar length indicates the loss rate for those using that chemical.

Consistently the last 4 years five different chemicals have helped 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 who mixed oxalic acid into shop towels have heavier losses (54% statewide): none in Linn Benton indicated they used this delivery method.) and ApiLifeVar (36% average loss level over last four years). The formic acid MAGS formulation has 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%).

## Queens

We hear lots of issues related to queen “problems”. Ten LBBA individuals (36%) said they did not have any queen issues and 7 (25%) said they didn’t know. Four individuals of the 11 individuals who said they did have queen issues checked 10-30% and 5 checked 75-100%. One each said 30-50% and 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. Eight individuals said yes (22%) and 28 said no. Statewide 31% said yes. The related question then was did you or your bees replace their colony queen? Eighteen (47%) said Yes, 9 did not know and 11 (29%) 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 twelve individuals who used a mated queen and 1 who used queen cells (42% total). The remainder requeened naturally via supersedure (4 individuals), split and raised their own queens (7 individuals) and 7 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](http://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](mailto: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