

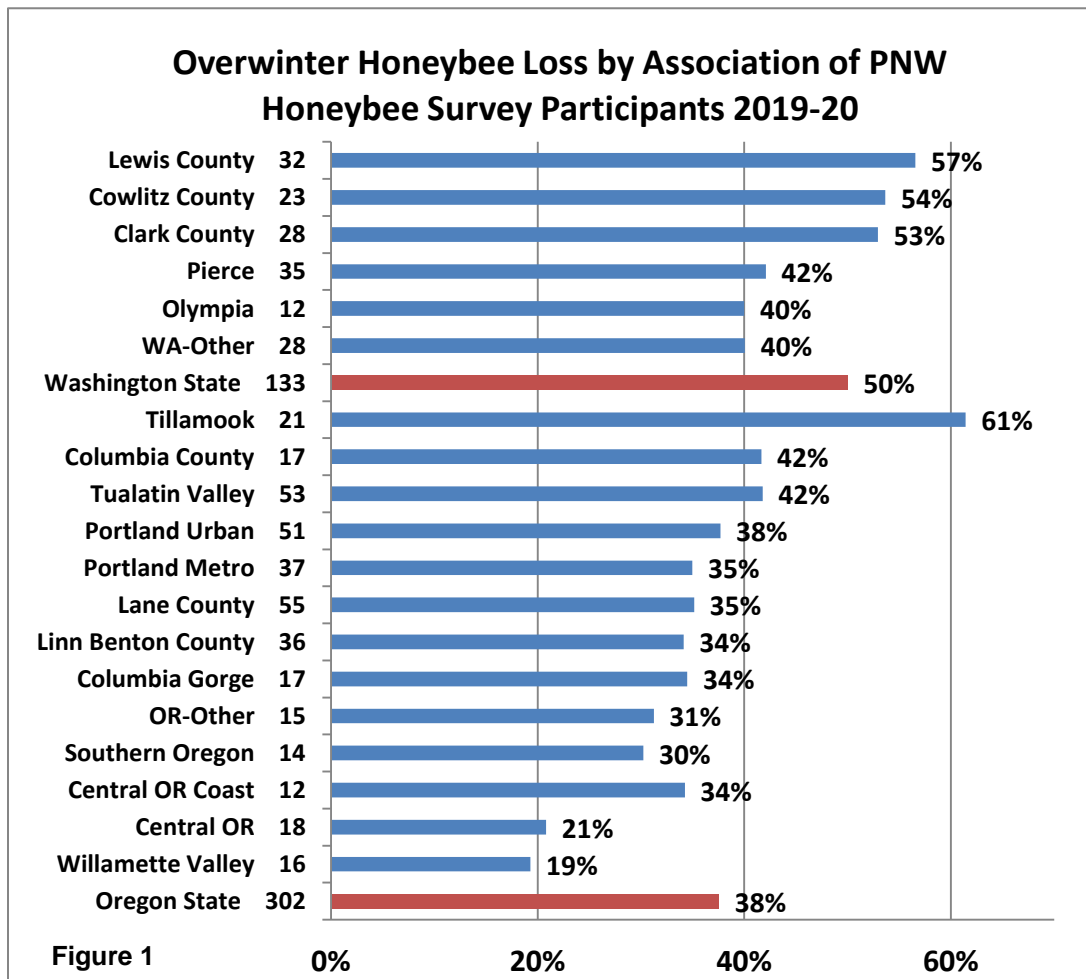
Winter Bee Losses of Southern Oregon Beekeepers 2019-20

by Dewey M. Caron

Overwintering losses of small-scale Oregon backyard beekeepers decreased to 38% this winter after the disastrous level of 48% colony losses the previous winter. This report presents the results of our 11th season of Oregon hobbyist/backyard beekeeper surveys. This annual survey is conducted at www.pnwhoneybeesurvey.com. Herein we discuss the data provided by 302 Oregon beekeepers, which were 114 fewer respondents than last year.

Characterization of Survey Respondents

Club results of 12 local Oregon associations and 5 Washington associations are shown in Figure 1. Colony numbers ranged from 1 to 45 colonies. The number of respondent individuals is listed next to the association name. There were only 14 Southern Oregon respondents to the most recent survey down significantly from 37 last year. The bar length is the average club loss percentage for the year.

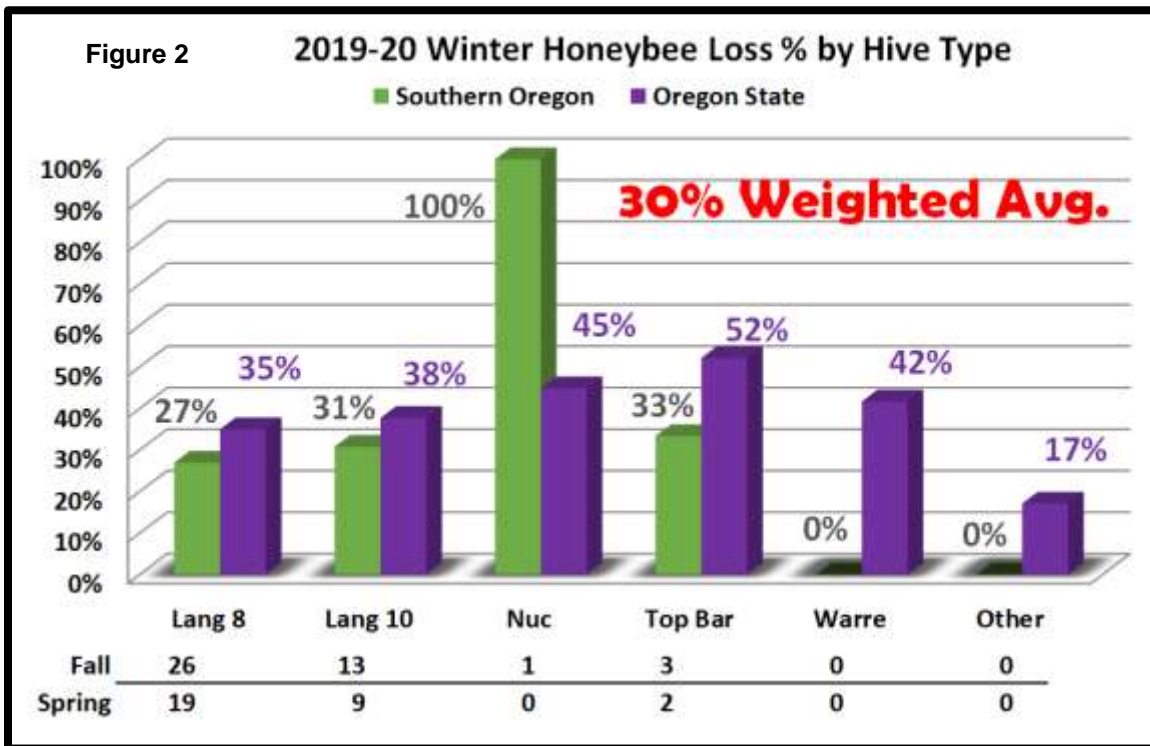


2019-2020 Overwinter Losses by Hive Type

The loss statistic was developed by asking number of fall colonies and surviving number in the spring by hive type. Respondents statewide had 1,353 fall colonies of which 845 colonies survived

to spring equating to a 62% survival or 38% loss. **The loss rate for Southern Oregon was 30%.** Losses of Langstroth 8 and 10 frame colonies were lower but comparable to statewide 35% winter losses of PNW 8-frame Langstroth hives and 38% loss rate of 10-frame Langstroth hives; the 6-year average is 38% and 40% loss respectively.. The single nuc did not survive. Nuc losses are typically higher than Langstroth - 6-year average of 53%.

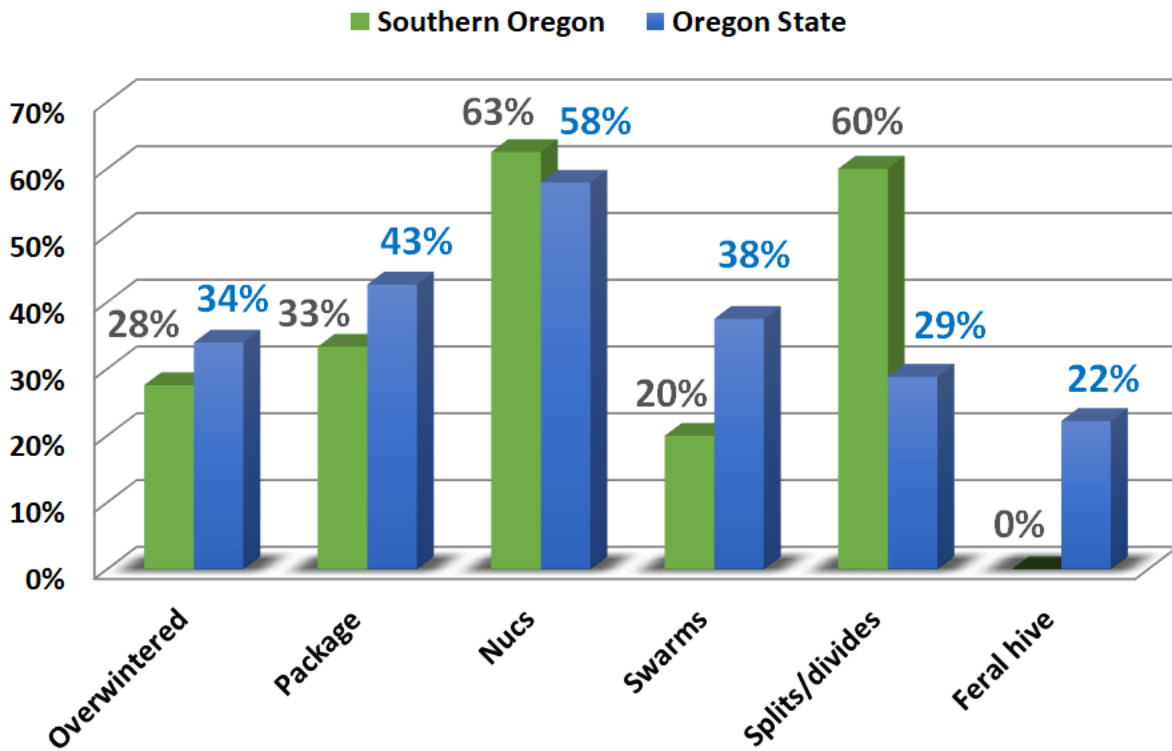
Figure 3



Survival Based on Hive Origination

We also ask survey respondents to characterize their loss by hive origination. Southern Oregon results compared to Oregon state averages graphically presented below in Figure 3. Overwintered colonies, packages and swarms all survived at lower than the state average. Southern Oregon beekeeper losses were 1/2rd those of the club with heaviest losses. For the past 5 years statewide overwintered hives show lowest loss level (36%) while both packages and nucs average 52% loss for past 5 years. Losses of swarms (45%) and splits (41%) are intermediate.

Figure 3 2019-20 Winter Honeybee Loss % by Origination



Fall	29	3	8	10	5	0
Spring	21	2	3	8	2	0

A third (99 individuals) of Oregon respondents had NO LOSS overwinter, whereas slightly more than a quarter (78 individuals) lost 100% of fall colonies. Five individuals in Southern Oregon (36%) had no loss. Two individuals had total loss. Figure 4 below shows loss of the 11 individuals who had some loss. Highest loss was 1 colony (6 individuals), 2 individuals lost 2 and one lost 3.

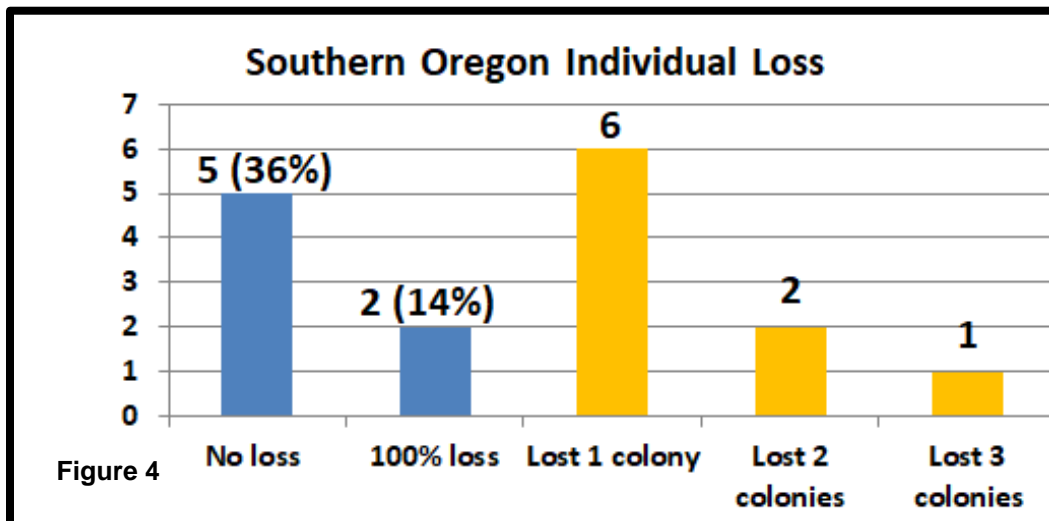
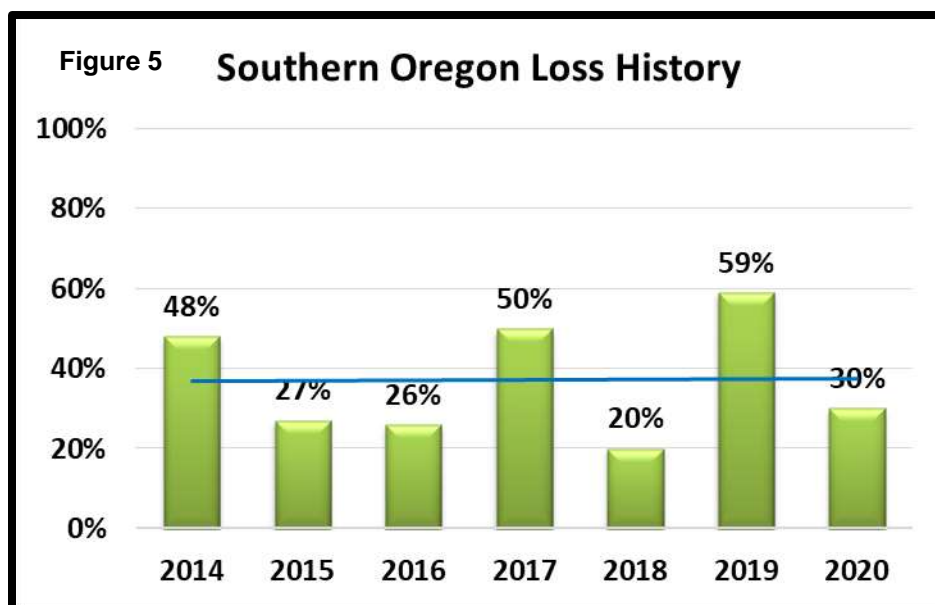


Figure 4

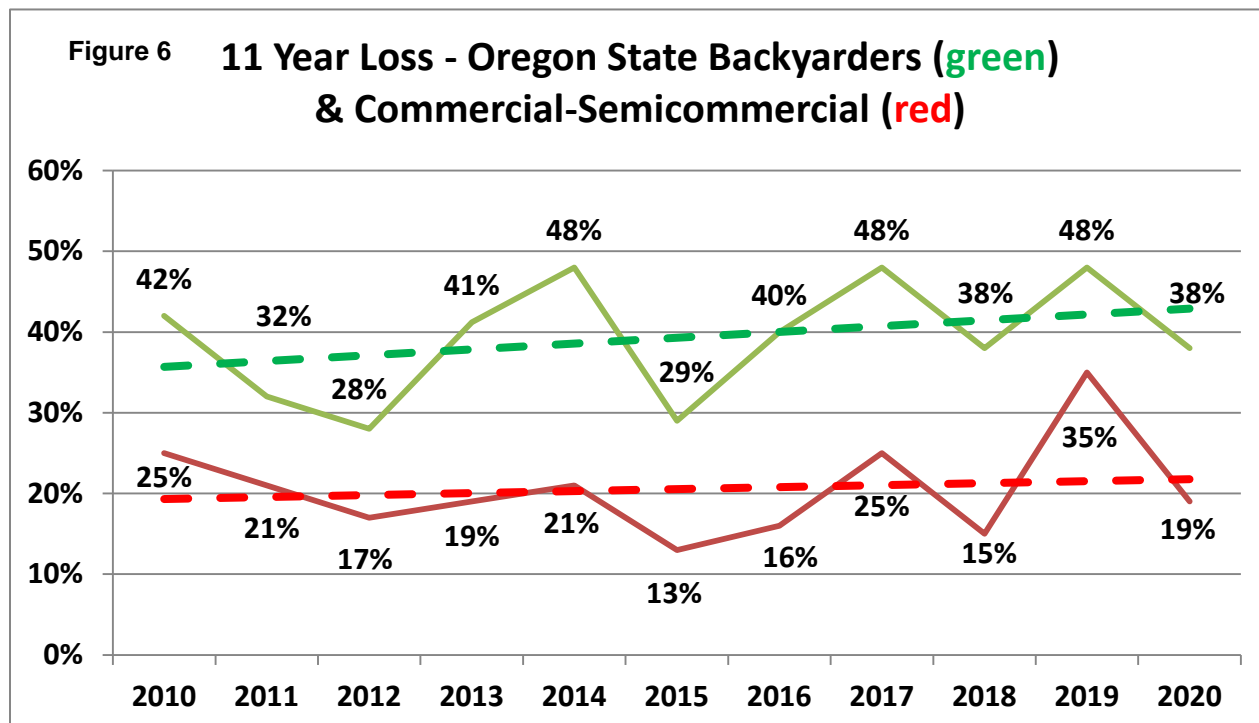
Loss History of Southern Oregon Beekeepers

The loss history of the Southern Oregon beekeepers has been unusual the last 4 years reflective of the weather. Years of heavy losses followed by lower losses. This seems strongly weather related. Winter of 2017 remembered as especially cold and snowy and fall of 2018 was short and cold and spring 2019 was “reluctant”. The high losses realized by Southern Oregon beekeepers in 2017 and 2019 were actually close to the average losses for the state (48% both years). The trend line is showing slight improvement, one of the few clubs where trend line is not an up-slope.



Comparison to Larger-Scale Beekeeper Losses

A different (paper) survey instrument was mailed to select Pacific Northwest (PNW) semi-commercial (50-500 colonies) and commercial beekeepers (500+) asking about their overwintering losses. Seven Oregon commercial and six semi-commercial beekeepers (35,068 colonies, about 40% of the estimated total number of colonies in the state) reported overwinter losses of 19%. Small scale (backyard) beekeeper losses have ranged from fifteen to 20 percentage points greater compared to losses of commercial/semi-commercial beekeepers over the last 11 years as shown in Figure 6. (11 year average Backyard=39.3% loss and 11 year commercial/semi-commercial loss = 20.7%). Dashed lines are loss trend. The national losses for those respondents from OR completing a BeelInformed survey essentially mirror losses of the commercial-semi-commercial losses.



Who are Survey Respondents?

To better characterize the survey population, we tallied individual number of fall colonies for the 14 Southern Oregon respondents. All were single digit beekeepers. Two individuals had 1 colony they had 50% loss, 5 had 2 colonies with 40% loss level, two had 3 colonies with 18% loss level 9 SOBA individuals with 1, 2 or 3 colonies collectively had 33% loss level). The 5 individuals that had 4 to 6 colonies had a 28% winter loss.

We also asked how many years of beekeeping experience survey respondents had. **The medium years of beekeeping experience for Southern Oregon beekeepers was 5 years, same as statewide.** Two individuals each had 2, 3 and 4 years of experience; losses were 29%, 40% and 20% respectively. Five individuals indicating 5 years experience had 28% loss. I doubt that this respondent base truly reflects beekeeping in Southern Oregon.

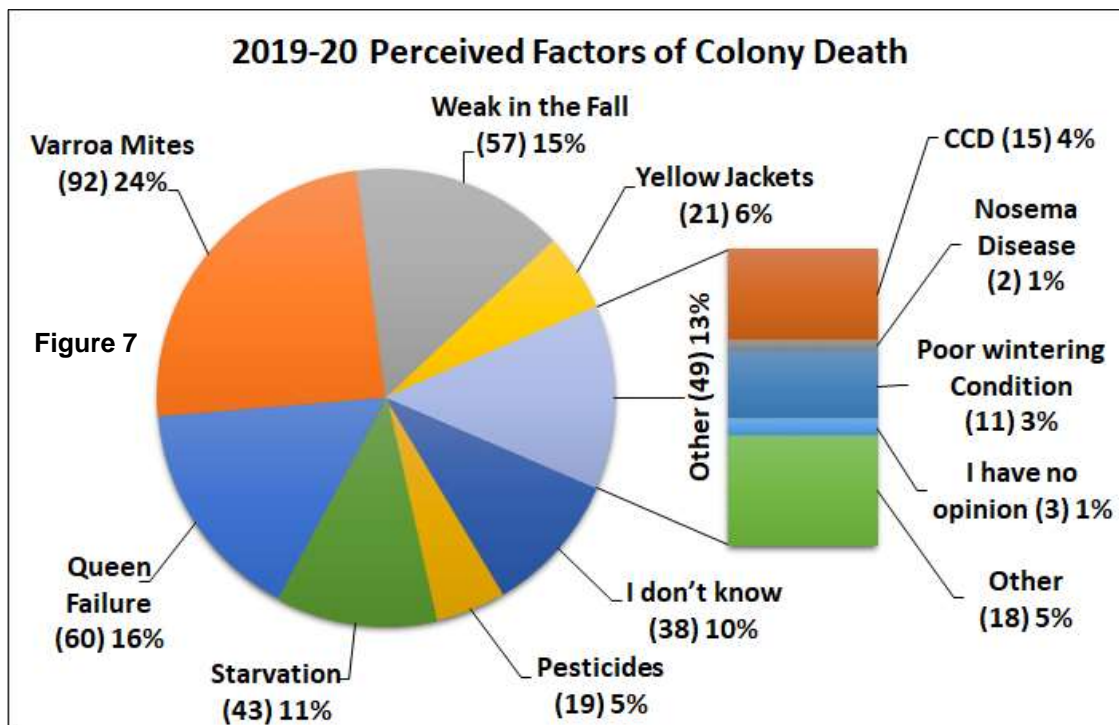
Three quarters of Oregon beekeeper respondents indicated they had a mentor available for the first years of beekeeping. This is an increase of 5% over last year’s survey. For Southern Oregon 64% said they had mentor.

Colony Movement

One individual moved there 2 colonies during the year and one individual had 2 apiary sites.

Colony Death Perceived Reason and Acceptable Level

We asked individuals that had colony loss (99 individuals statewide, 5 in Southern Oregon had no loss) to estimate what the reason might have been for their loss (multiple responses were permitted). Four individuals said they didn't know. There were 8 total listings from Southern Oregon. Starvation (3 individuals) was the most common response, followed by Varroa mites (2 individuals) and one each of queen failure, weak in fall and moisture. Data shown in pie chart (Figure 7) is response statewide.



Acceptable loss: Survey respondents were asked reason for loss. Three said none, 5 said 10% (medium), two said 15%, one said 20 and 3 indicated 25%. Statewide 67 (17.5%) indicated zero (no loss). Forty five percent of individuals indicated 15% or less. 20% was medium choice. Thirteen percent said 50% of greater was an acceptable loss level.

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. A dead colony necropsy can be of use. Opinions vary 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. Individual choices varied from zero to 33%, with medium of 10%, the lowest acceptable level of any of the OR clubs – but this is still ½ the actual average loss.

Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus), VDV (Varroa destructor Virus (also termed DWV B) and chronic paralysis virus. Declining nutritional adequacy/forage and diseases, especially at certain apiary sites, are additional factors resulting in poor bee health. 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 them, 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 our and their 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. More attention to colony strength and possibility of mitigating winter starvation will help reduce some of the losses. Effectively controlling varroa mites will help reduce losses.

Colony Managements

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. Respondents could select multiple options and there was always a none and an other selection possible. This analysis seeks to compare responses of this past season to previous survey years.

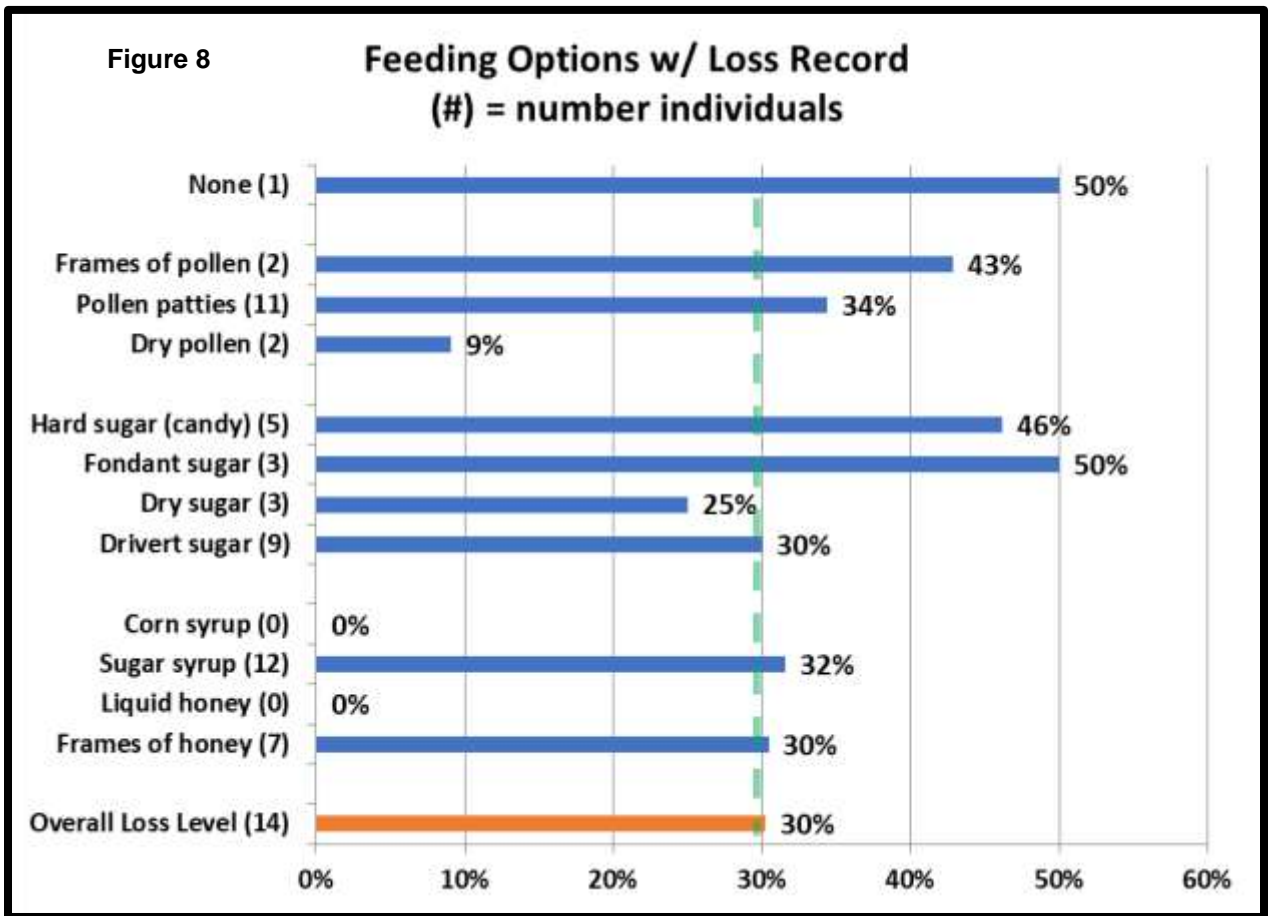
Most Oregon beekeepers do not perform just one management to their colony (ies) toward improving colony health and overwintering success. This analysis however is mainly of a single factor equated with loss level of those same individuals. Such analysis is correlative - doing a similar management as a fellow beekeeper does not necessarily mean you too will improve success.

FEEDING: Oregon survey respondents checked 878 feeding options = 2.9/individual; 54 choices were made by Southern Oregon respondents, 4/individual. The choices, with number of individuals making that selection is in () in Figure 8; bar length indicates loss level of individuals doing this management. Those bar lengths to left of 21% **green dashed** marker had better survival while those to right had greater loss level.

Twenty-two individuals statewide, one in Southern Oregon, said they did NO FEEDING. They had 52 fall colonies and realized a 51% loss, 8 percentage points higher than overall loss level; the single Southern Oregon individual lost ½ of their colonies. For individuals indicating one or more feeding managements, feeding sugar syrup was the most common feeding option of respondents (12 individuals, all but 2 SOBA beekeepers. Statewide loss rate of syrup feeders was 37%, essentially same

as overall average as was case for Southern Oregon beekeepers. Eleven individuals fed protein as pollen patties and 2 each as dry pollen and frames of pollen; the dry pollen feeders had only 9% loss.

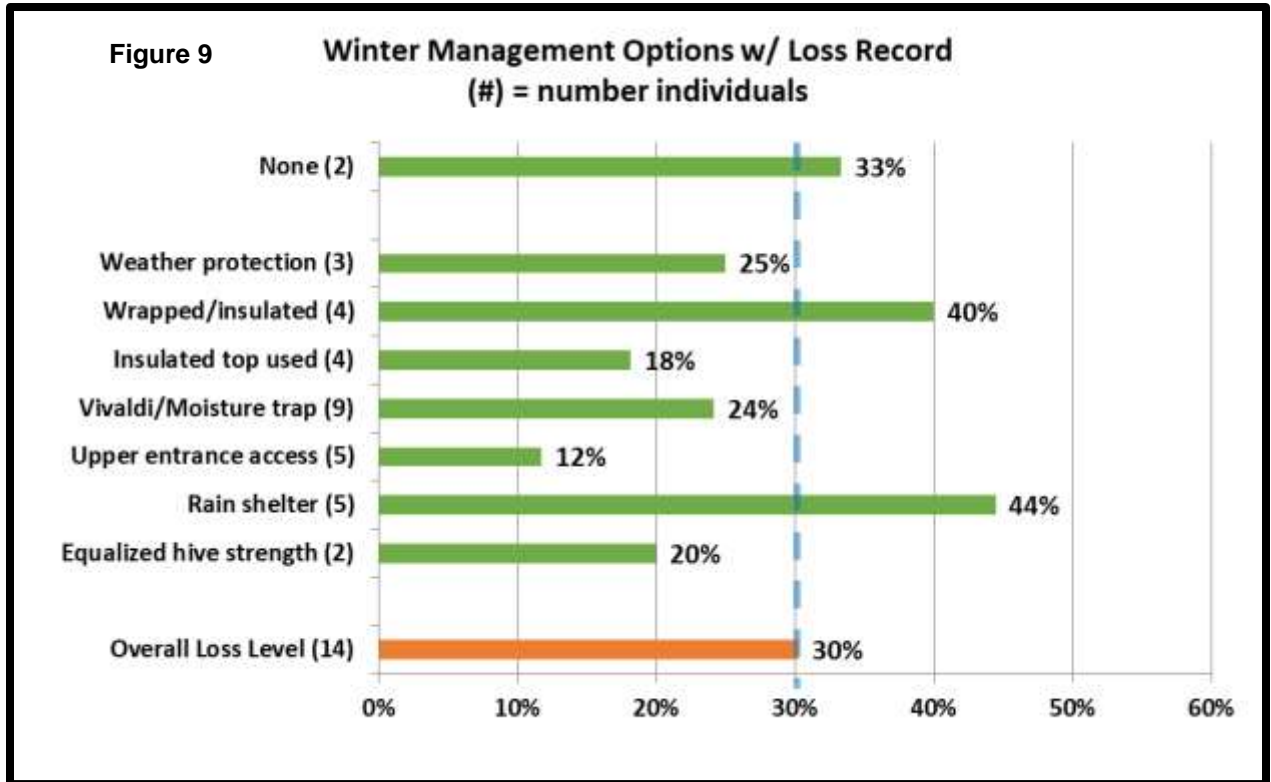
Summary: For the last 4 years statewide (average loss rate =43%), **individuals doing no feeding had 13 percentage points higher losses (poorer survival) all 4 years (AVERAGE PERCENT DOING NO FEEDING = 8% of individuals, AVERAGE STATEWIDE LOSS 4 YEARS = 55.6%).**



Individuals statewide that fed sugar syrup had a 7% lower loss level (average for the 4 years). Those feeding honey (as frames or liquid) had lower loss only during the 2018 and this past winter overwinter period. Individuals feeding non-liquid sugar (in any of the forms) had lower losses all four past winter seasons, with 5 or 6 percentage point improvement from overall losses. Dry sugar feeders had slightly better survival all 4 winters (average= 39%) 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% losses, 4-year average).

For individuals feeding protein, 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.

WINTERING PRACTICES: We received 32 Southern Oregon responses (2.7/individual – same ratio as statewide) about OR beekeeper wintering management practices (more than one option could be chosen). The choices, with number of individuals making that selection is in () in Figure 9; bar length indicates loss level of individuals doing this management. Those bar lengths to left of 21% **green dashed** marker had better survival while those to right had greater loss level.



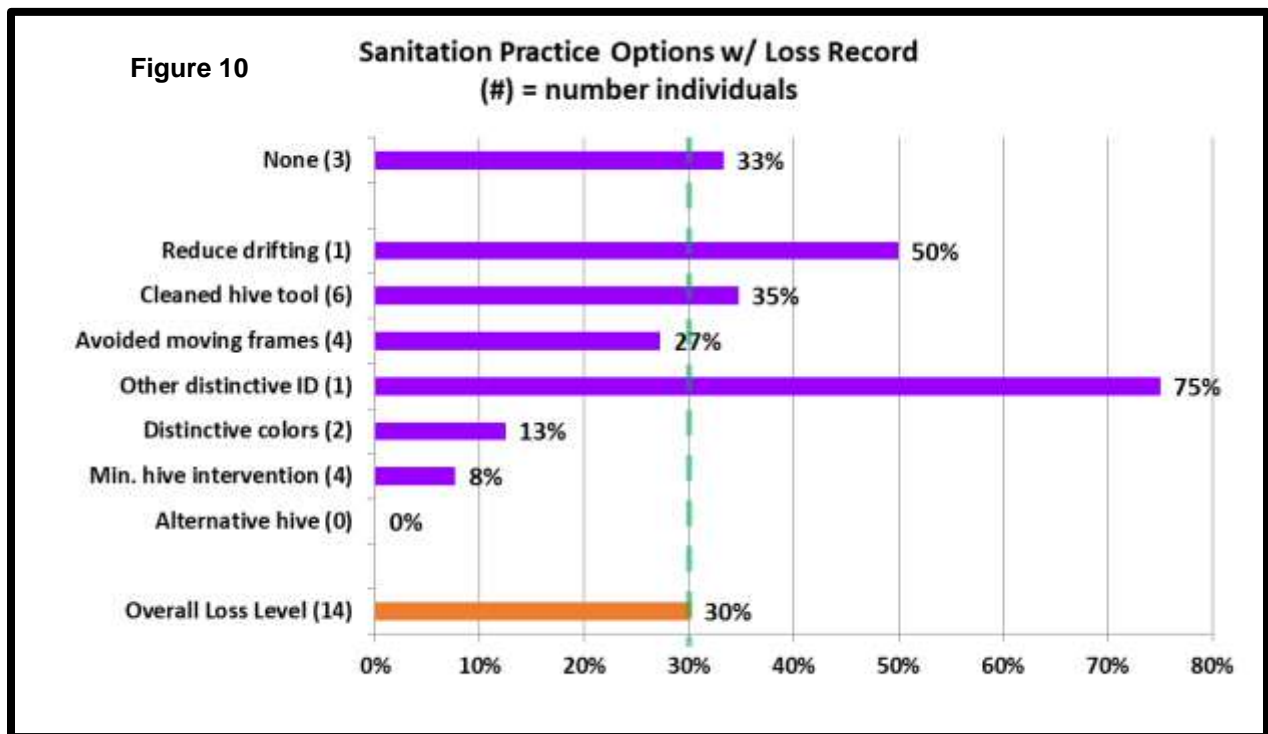
The most common wintering management selected was ventilation/use of a quilt box at colony top (9 individuals – 24% loss. Insulated top, upper entrance and 3 additional winterizing managements all improved winter survival for SOBA beekeepers. Only wrapping (4 persons) and rain shelter (5 individuals) did not improve loss rate.

Only 2 winterizing managements improved survival all 3 past years statewide – these were wrapping (30% lost rate, an 11 percentage point improvement) and upper insulation (32%, a 9 percentage point improvement). Vivaldi (38%), upper entrance, also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (also 38%) had only slightly improved survival rates – 3 percentage points.

SANITATION PRACTICES: It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care to help insure healthy bees. We received 18 responses for this survey question 1.6/individual. Statewide, individuals who said they did not practice any of the 6 offered alternatives had a loss rate of 52% compared to overall rate of 38%. For Southern Oregon, 3 did none of these and had 33% losses.

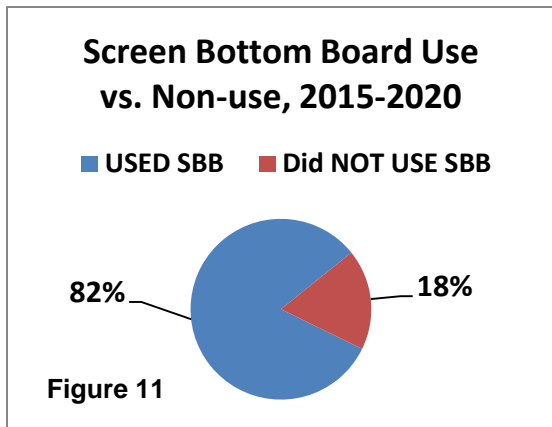
While it appears doing several sanitation managements helped insure successful overwintering most of these over the years have been only minimal toward better survival, both for Southern Oregon beekeepers and statewide.

Avoiding moving frames and reducing drifting were the two sanitation choice that demonstrated better average survival statewide the past three years – 4 year loss rate was 35% for not moving frames and 37% for reducing drifting compared to overall rate of 41%, both relatively minor 6 and 3 percentage point differences. 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. Sanitation measures appear to be relatively minor toward improving 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 this recent survey 30 individuals statewide (10%) 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 the 6 year period. Figure 11 statewide. For Southern Oregon 10 used on all, 1 did not use, and 3 used on some.

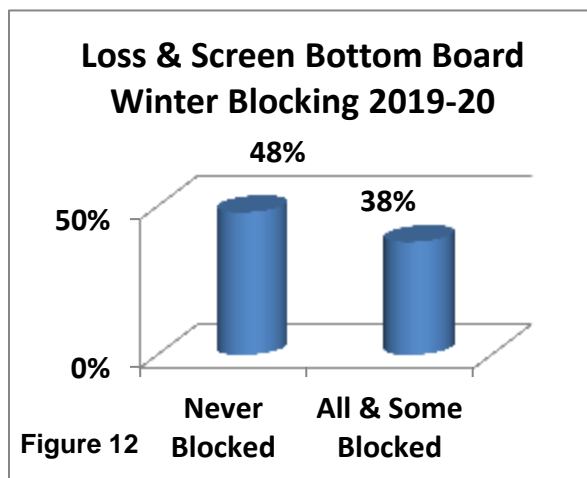


Losses were 26% for 10 individuals using on all, 36% for 4 using SBB on some and 40% for the one not using.

This past overwintering season, the 30 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 loss level difference between non-users and users in past 5 years. **Examining the five year average of SBB use, loss level of the 82% using SBB on all or some**

of their colonies had a 36% loss level whereas the 18% not using SBB had loss rate of 41% (a 5 percentage point positive survival gain for those using SBB versus those not using them). Screen bottom boards offer a very minor improvement for overwinter survival.

We asked if the SBB was left open (always response) or blocked during winter. This past season 6 Southern Oregon (46%), always blocked SBB during winter and 4 said they never blocked. Statewide the 48% who always blocked had a 38% loss rate while those who never did had 48% loss rate. Figure 12 compares those who never blocked loss rate with those who did block some or all bottoms. **Comparing the always and sometimes left open with the closed in winter to all closed reveals a 10 percentage point difference in favor of closing the SBB over the winter period to improve survival.** Difference was even more dramatic for Southern Oregon respondents. The 6 who blocked had 24% loss while the 4 who did block or close not lost 38% of their colonies.



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 screen 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. 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 moisture kills bees, not cold, 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 common management appears to be of some help 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 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 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. 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 a moisture trap (Vivaldi board or quilt box) and upper 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.

It is clear that doing no feeding, winterizing or sanitation resulted in the heaviest overwinter losses.

Replacing standard bottom boards for screened bottoms marginally improved winter survival. It is apparently advantageous to close the bottom screens during winter.

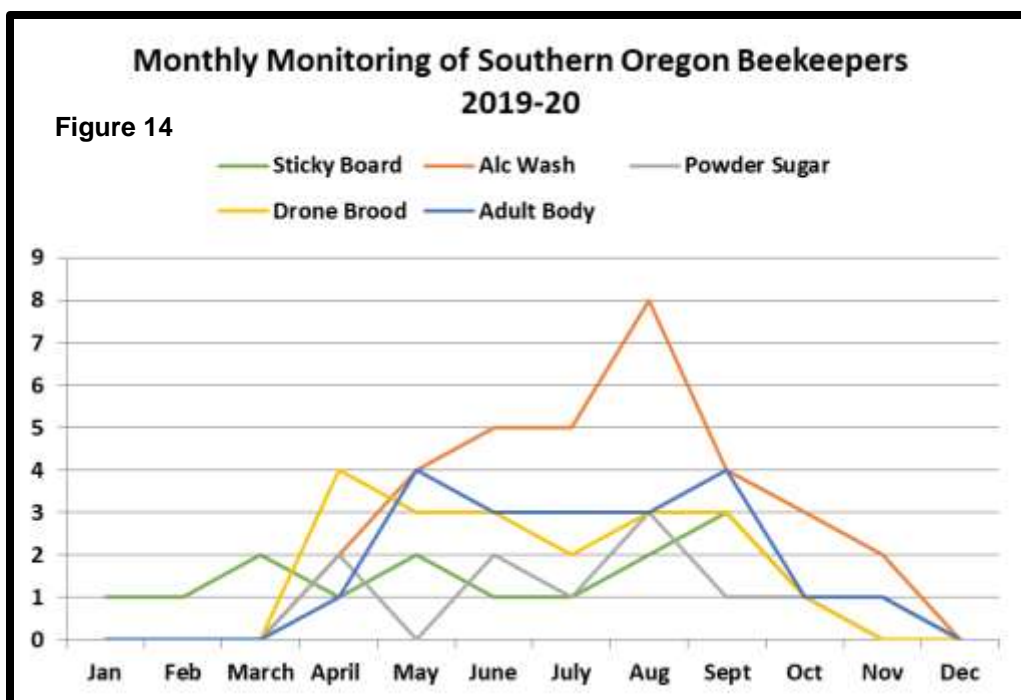
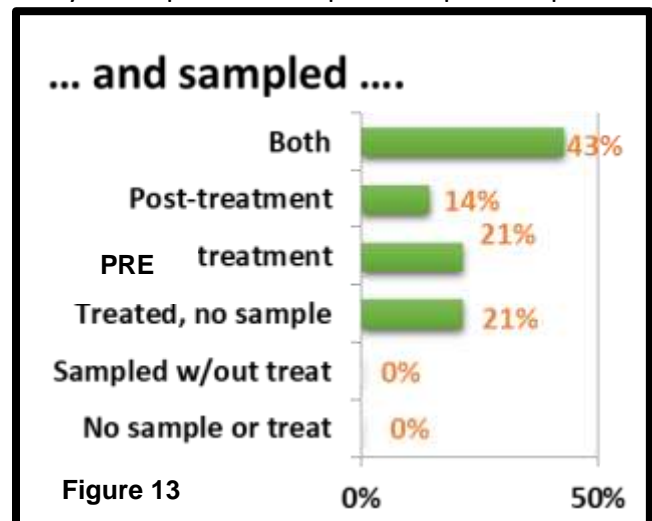
Mite monitoring/sampling and control management

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. Twelve individual Southern Oregon respondents (86%) said they monitored all their hives. Losses of those individuals monitoring was 19%. One (6%) did not monitor (and had no loss) while the 1 individual that monitored some had 40% loss. See Figure 13.

Monitoring alone is a means towards improved winter survival. The table below compares % individuals and % winter loss for individuals who monitored all colonies compared with those who monitored none. Difference is 10 percentage point better survival monitoring all colonies. The 13-15% who monitored some colonies was variable, high two years and lowest two other years (for unknown reasons) but 4 year average mirrors those who monitored all colonies.

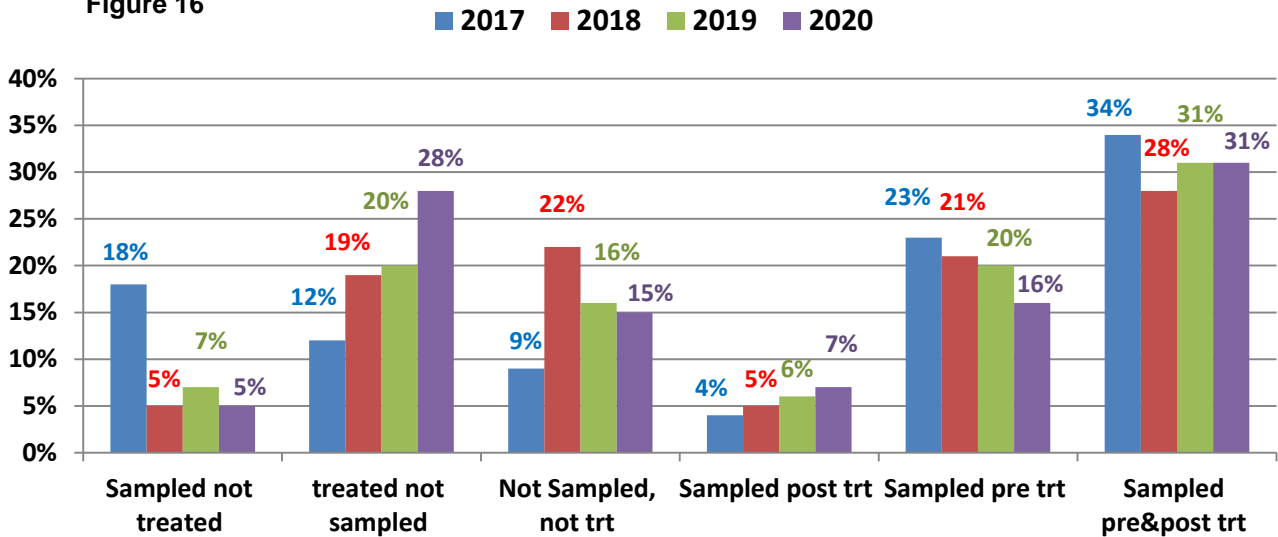
	ALL Colonies Monitored % individuals	% loss	SOME Colonies Monitored individuals	%	% loss	No colonies Monitored % individuals	% loss
2020	67%		33%	13%	16%	49%	20%
2019	67%		51%	15%	50%	59%	18%
2018	63%		38%	14%	26%	49%	26%
2017	63%		43%	15%	60%	48%	22%
4 year loss ave			41%		38%	51%	

Southern Oregon beekeepers made 1.8 selections per individual (of the 13 who monitored). Three individuals (23%) indicated use of sticky boards, nine (69%) used alcohol wash, 3 (23%) used powder sugar roll and 5 and 4 individuals respectively used the unreliable visual monitoring of looking at drone brood and looking for mites on adults bees. Forty three percent sample both pre and post treatment and another 3 individuals (21%) sample pre-treatment. Three individuals (21%) treated without sampling. Figure 14 shows the monthly sampling efforts. Whatever technique used, most sampling to monitor mites was done in July – September, as might be expected since mite numbers change most quickly during these months and sampling results key control decisions. Figure 16 shows 5 year record statewide of sampling methods. Unfortunately the unreliable methods of visual inspection remain popular.



Sampling & Treatment (trt) Record 2017-2020

Figure 16

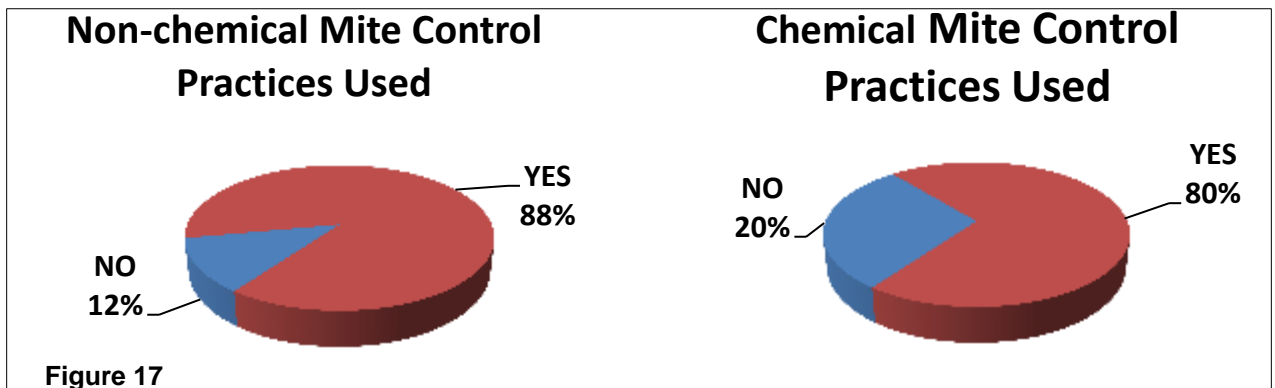


It is important to **KNOW** mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a single day pre and post 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. We are not certain why such sampling is indicated for August to December months – there simply is little drone brood to sample during these months.

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

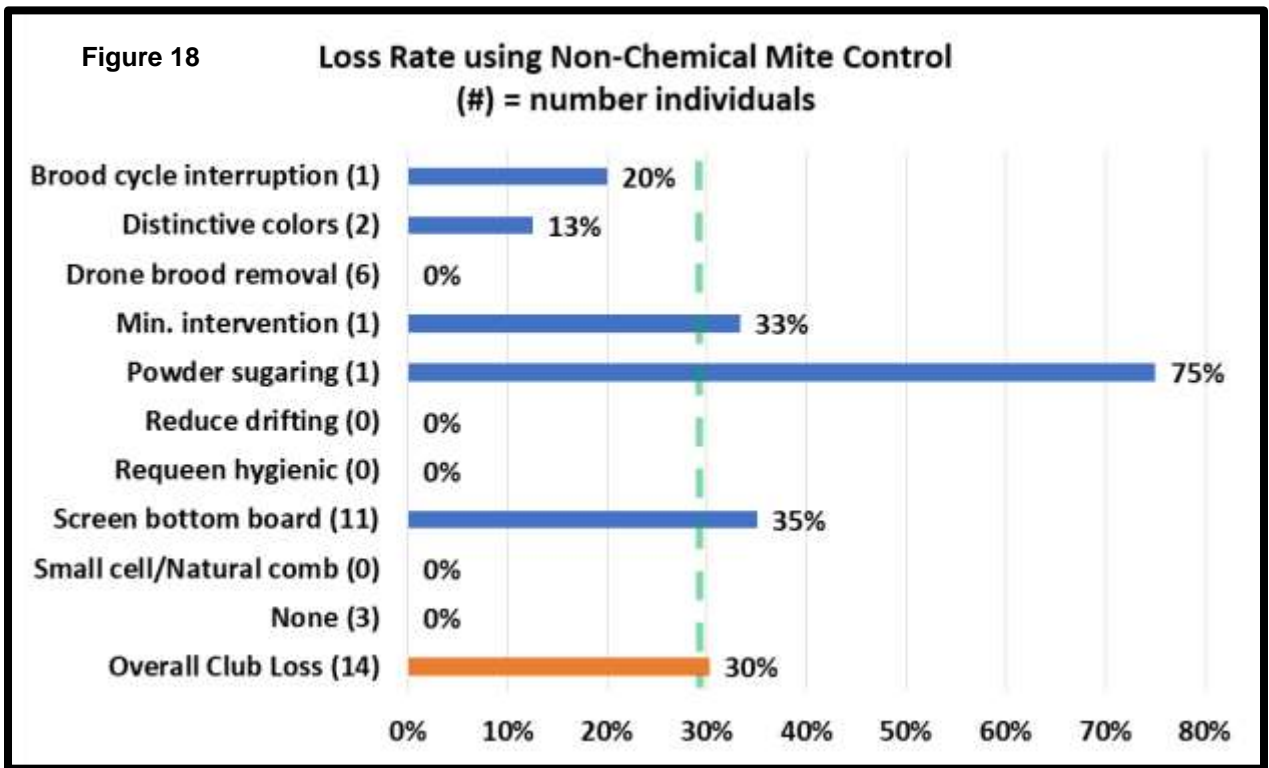
The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Thirty six individuals (12%), same percentage as last year, said they did not employ a non-chemical mite control and 60 individuals (20%), 4 percentage points fewer, did not use a chemical control. See Figure 20. Those 36 individuals who did not use a non-chemical treatment reported a 61% winter loss, while those who did not use a chemical control lost 57% of their colonies. For Southern Oregon 3 individuals did not use a non-chemical mite control – they had no loss. The 2 not using



any chemical intervention had a 50% loss. The individual options chosen for non-chemical and chemical control are discussed below.

Non-Chemical Mite Control: Of nine non-chemical alternatives offered on the survey (+ other category,) three individuals used none and had 50% loss. Use of screened bottom board was listed by 11 individuals (73%). The next most common selection was drone brood removal by 6 individuals. The use of the remaining selections are shown in Figure 18; number of individuals in (), bar length represents average loss level of those individuals using each method. Those left of green dashed line means better survival which shows for all options. This is largely an effect of small numbers.

Three of the non-chemical alternatives have demonstrated reduced losses 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 colony 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 on one or two years but overall no improvement.



Chemical Control: For mite chemical control, 60 individuals statewide (20% of total respondents) used NO chemical treatment. They had a loss level of 57%. Three Southern Oregon beekeepers also used none and they had a 42% loss. Those 15 individuals using chemicals used at rate of 2.1/individual. Five individuals (33%) used one chemical (had 8% loss level), five also used two (loss rate 5%) and 4 used 3 and 1 used 4 –they had 31% loss.

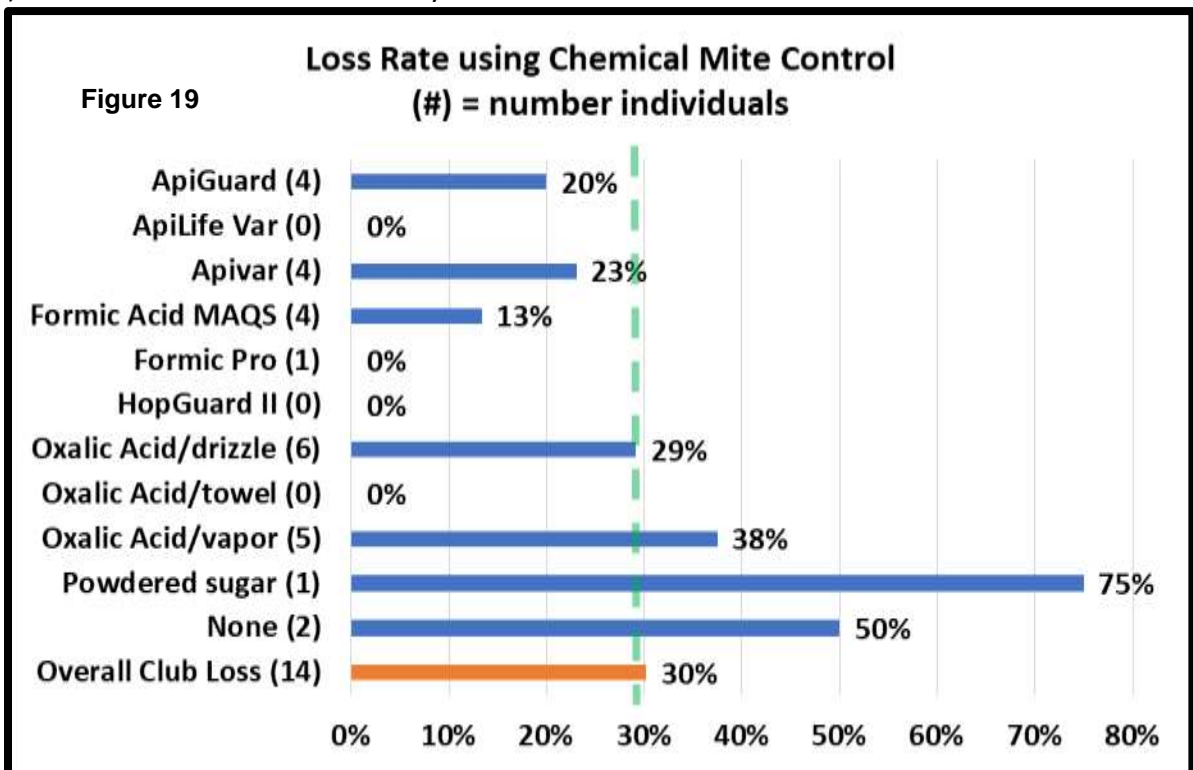
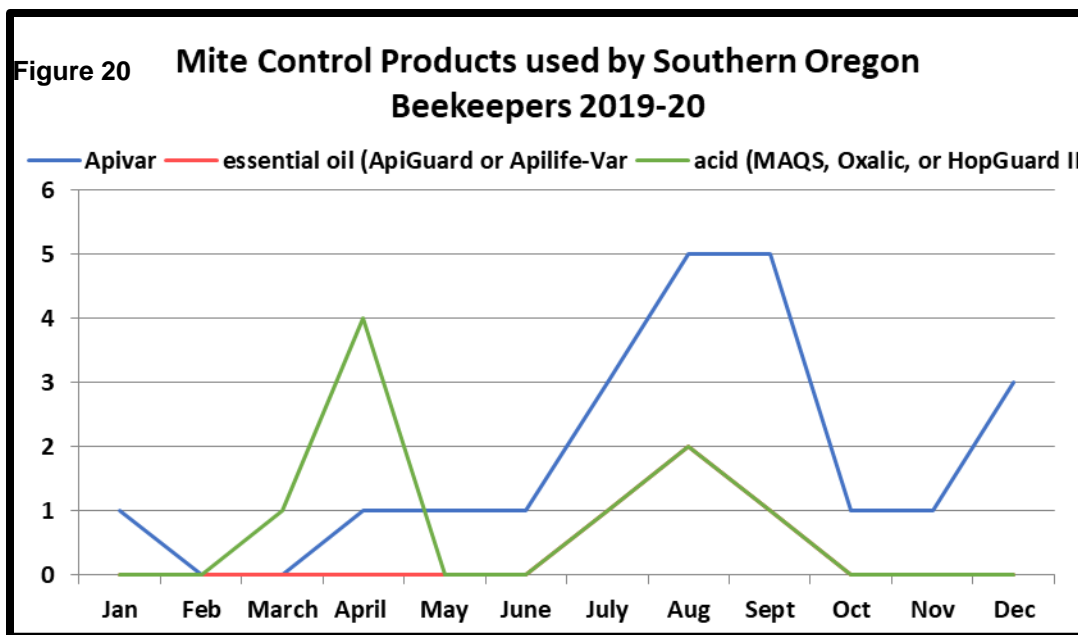


Figure 19 illustrates number of uses () and bar length indicates the loss rate for those using that chemical. Eleven utilized MAQS, formic acid with average loss of 22%. The two using oxalic drizzle and as shop towel had no losses while the 10 vaporizing had average losses. Apiguard and Apivar users had no losses while the single ApiLife Var user had 55% loss level.

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) and ApiLifeVar (36% average loss level over last four years). The formic acid MAGS formulation has same as average loss level (43%). Those who mix formic into shop towels have heavier losses. 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 23 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.



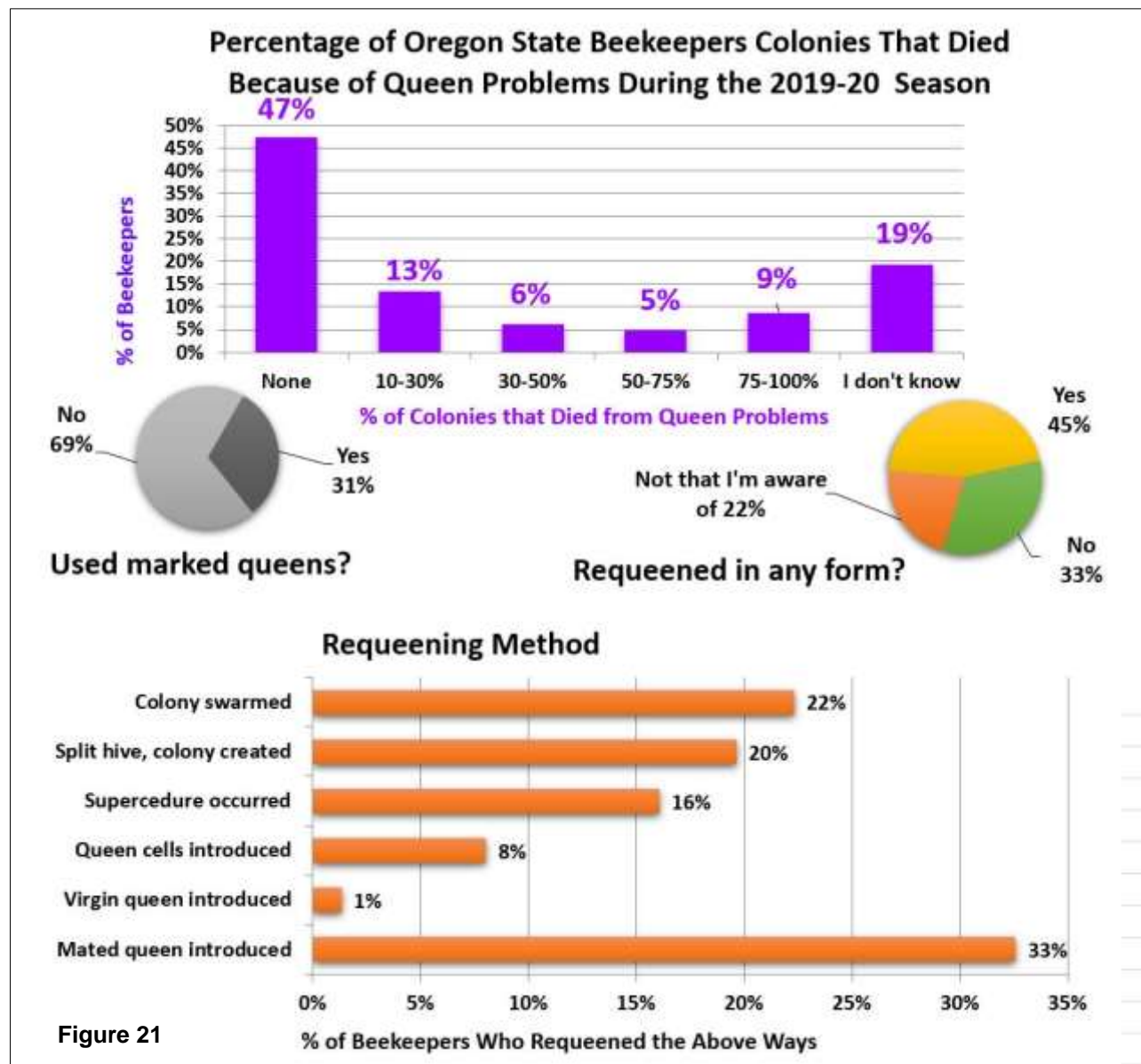
Antibiotic use

Three individuals (1%) used Fumigillan (for Nosema control) and 1 indicated use of nosevet; their loss rate was 50%. Three individuals indicated use of terramycin; they had a 66% loss. None of these materials were used in Southern Oregon

Queens

We hear lots of issues related to queen “problems”. Two individuals each in Southern Oregon said they did not have a queen problem or they didn’t know. Three did say they had queen problem at 10-30% level. Statewide ninety six individuals (32%) subdivided queen related issues from 10 to 100% of their hives. Figure 21 shows that one hundred and thirty-seven said none (47%); an additional 56 individuals (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. Ninety two individuals (31%), an increase of 3



percentage points from last year, said yes. For Southern Oregon 4 said they did have marked queens and 10 said they didn’t. The related question then was ‘were your hives requeened in any

form?’ to which 45% (135 individuals) said yes, 33% said no and the remainder ‘not that that I am aware of’: Southern Oregon 9 said yes, 1 no and 4 not that they were aware of.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. The question “How did bees/you requeen” received 224 responses One-third of respondents indicated their bees were requeened with a mated queen, nearly a quarter indicated it was the bees that requeened via swarming (22%), supersedure (16%) or emergency rearing (20%). For Southern Oregon 5 used Mated queens and the rest were requeened by the bees. 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 (See American Bee Journal April 2020 article). 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