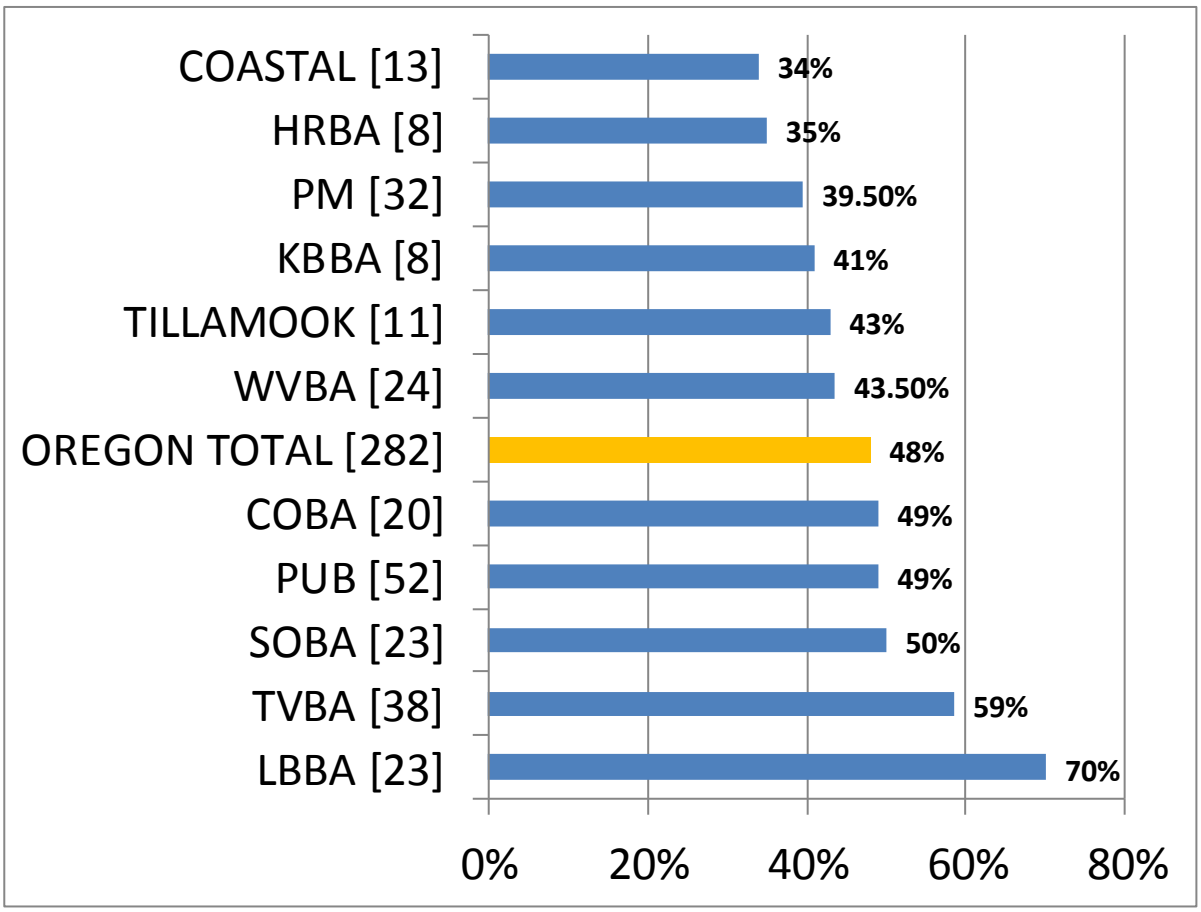
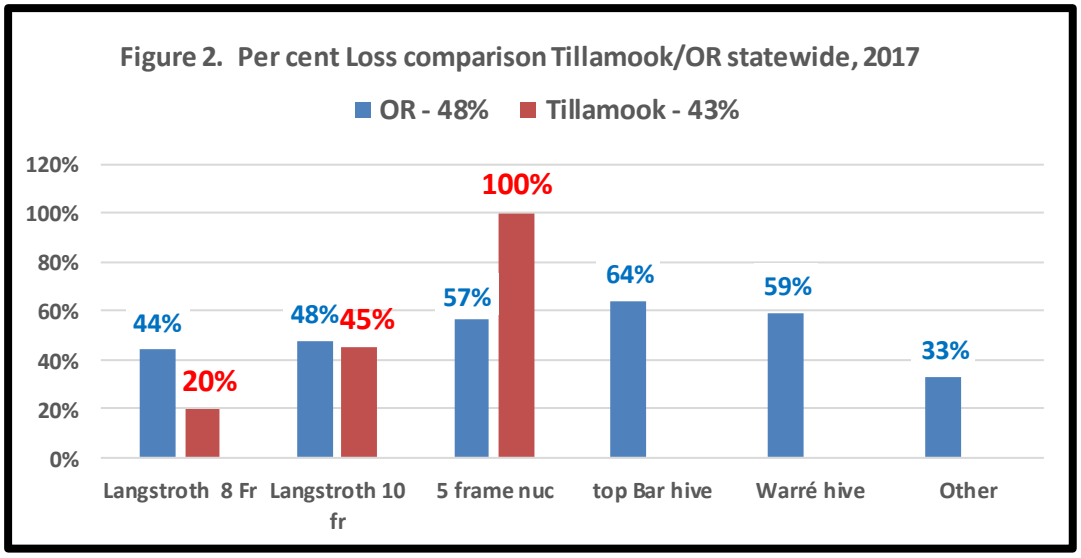
2016-17 Tillamook Winter Loss by Dewey M. Caron

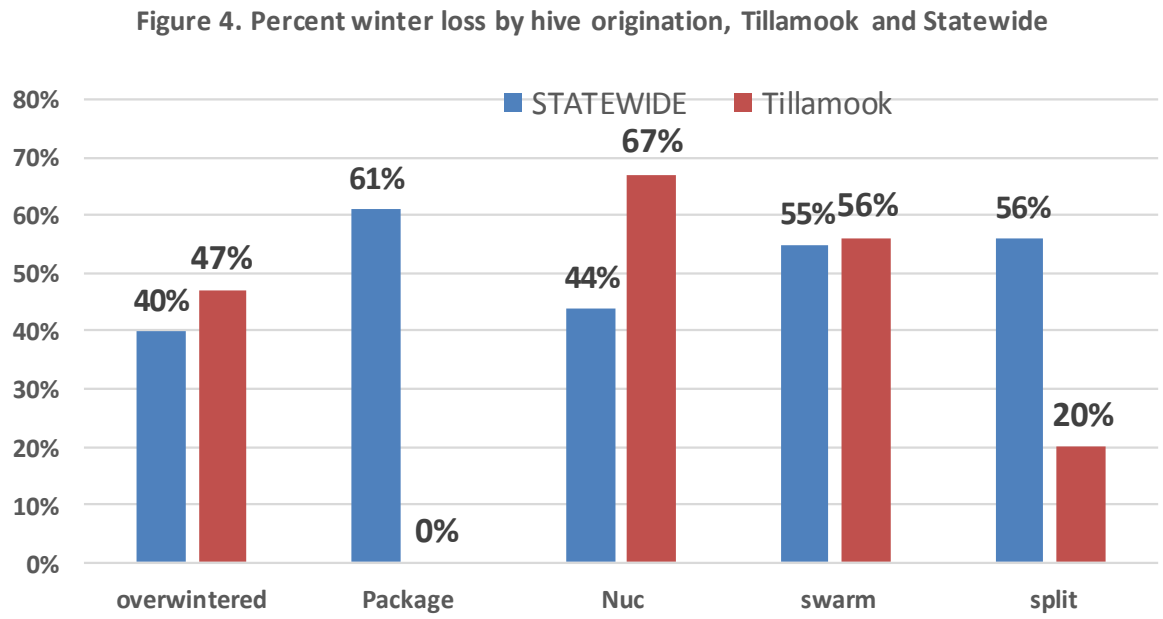
Oregon beekeepers were directed to a web-based survey document in a continuing effort to define overwintering losses/successes. This was the 9th year of such survey activity but the first to include Central Coastal beekeepers. I received 282 responses from Oregon backyarders and 52 from Washington beekeepers keeping anywhere from 1 to 48 colonies. Eleven Tillamook Association members completed a survey listing a total of 45 Langstroth fall colonies, one a nuc, was reported by these individuals.



Overwintering losses of Coastal respondents was 43%. This loss is 5 percentage point lower than the statewide loss of 48% (database of 282 OR backyarders). Percent losses, determined for 5 hive types, is shown in Figure 1 comparing Tillamook with the statewide backyarders. Tillamook member respondents started winter with 30 Langstroth 10-frame and 15 Langstroth 8-frame hives plus one 5-frame nuc (which did not survive), There were no Top bar or Warré or other hives listed by Tillamook beekeepers.



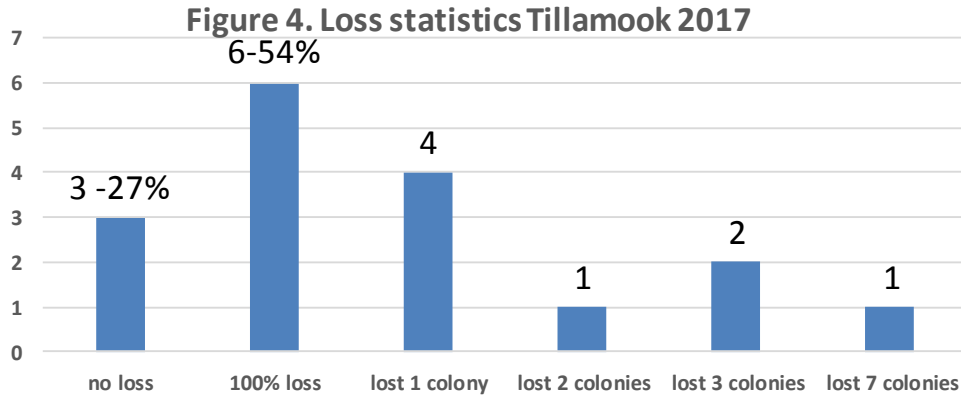
The survey also asked for hive loss by hive origination. Eight of 15 overwintered Tillamook beekeeper colonies were alive in the spring (47% loss rate), seven percentage points higher than statewide. Both of two packages survived, 1 of 3 nucs (67% loss), 7 of 16 swarm captures and 12 of 15 splits (20% loss) were survivors. See Figure 3 for Tillamook and statewide comparisons.



The Tillamook survey respondents were a mixture of new beekeepers and older, more experienced individuals. Three Tillamook respondents had 1 fall colony, 3 had 2 and 2 had 3 (73% of individuals), while 3 (27%) had 5+ colonies (largest number was 16). Seven individuals

(63.5%) had 1, 2 or 3 year of experience, had 4 to 7 years' experience and 1 had 20 years' experience.

Not everyone had loss. Three coastal respondents had NO LOSS (23%) but an equal number had total loss. Seven individuals lost 1 colony, two individuals lost 2 colonies and one lost 5 colonies, the largest loss. See Figure 4 for graphic of loss rates.



Two individuals had two apiaries; loss at 2nd apiary was lower (17%) than the primary apiary. One individual said they moved colonies during the year for better nectar location.

When asked to indicate where the majority of their beekeeping education was received, 9 of 11 Tillamook (82%) listed Mentors, 7 listed Bee club meetings and Online including videos, 4 indicated Books, journals and magazines and another 4 the Master Beekeeping program. All eleven Tillamook respondents said they had a mentor available as they were learning beekeeping; statewide 65% said they had a mentor available.

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). Of 276 statewide responses, 79 chose poor wintering conditions and 78 (18% each of respondents) chose varroa. Sixty-eight individuals (16%) indicated weak in the fall, 57 said starvation and 55 queen failure (13% each). I don't know was indicated by 25 (8%). The 11 Tillamook beekeeper responses (total =18) were 5 weak in fall, 3 each (17% of total responses) of starvation and poor wintering conditions. Two individuals said varroa mites and queen failure. For "other" one listed CCD, another absconding and the third beekeeping mistake. Tillamook and statewide comparison in table below.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	starvation	I don't know	Other
Tillamook #	2-(12%)	3–(17%)	5-(28%)	2–(12%)	3-(17%)	0	3
Statewide %	18%	18%	16%	13%	13%	8%	16%

Survey individuals are asked to indicate what might be an acceptable loss level. Among Tillamook responses were zero (2 individuals), 10% loss acceptable (3 individuals), 25% (3 individuals), 33% (2 individuals and one said 50% loss level 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. Colony forensics on dead colonies is, at best, confusing and, although some options may be ruled out, we are often still left with two or more possible reasons for possible reasons why a colony (ies) died.

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. Statewide, 47% felt 10% or less was acceptable while 10.5% statewide stated 50% or higher was acceptable. Forty-five and a half percent of Tillamook individual choices (5 individuals) chose 10% or less as acceptable.

Major factors in colony loss are thought to be mites and their enhancement of viruses such as DWV (deformed wing virus), pesticides, declining nutritional adequacy/forage and diseases, especially viruses and Nosema. Management, especially learning proper bee care and how to best use chemicals for varroa control, remain a factor in losses. What effects our changing environment such as global warming, contrails, electromagnetic forces, including human disruption of it, human alteration to the bee's natural environment and other factors, play in colony losses are not at all clear.

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

Management selections and losses

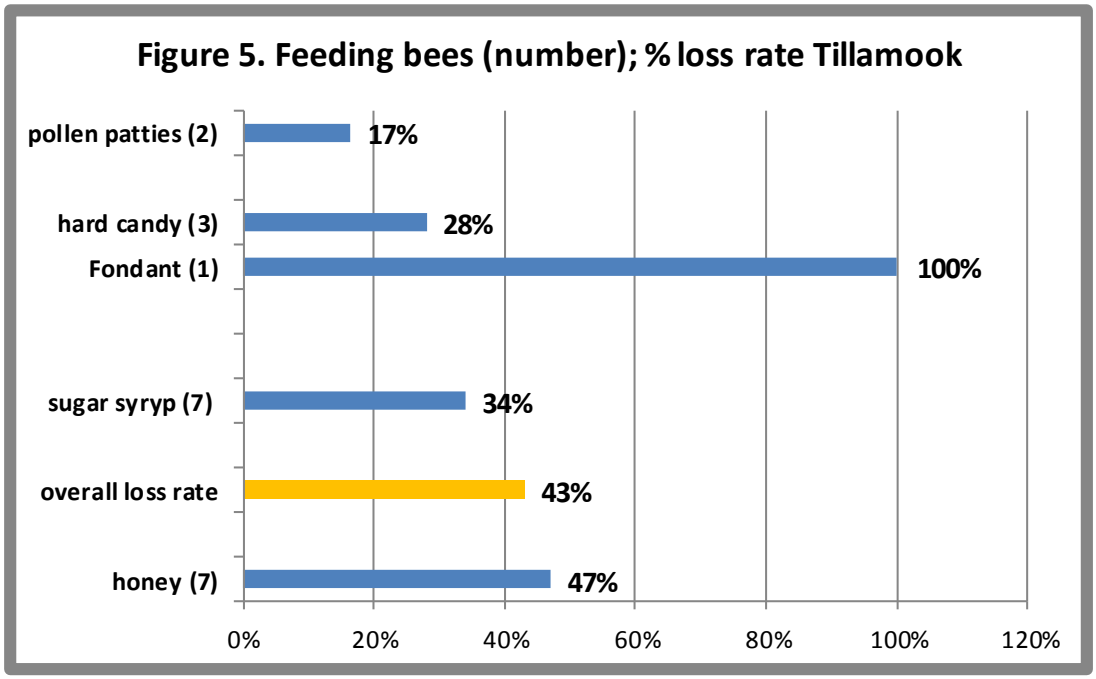
The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring techniques and non-chemical and chemical mite controls used. Individuals could check none or more than one response; most beekeepers often do not do just one thing/management to their colony (ies) to control mites. It takes effort to improve overwintering success.

For the larger data base of OR beekeepers, feeding dry sugar or candy board, as well as adding top insulation, a moisture absorbent feature at top of colony and/or an upper entrance resulted in significantly fewer losses. Screen bottom board usage, monitoring with alcohol wash or powdered sugar for mites and use of several of the chemical mite control options did likewise. See this analysis in the OR beekeeper report; www.pnwhoneybeesurvey.com

FEEDING: There were 22 total Tillamook responses to the inquiry on feeding colonies (2/individual), with all but two beekeepers listing at least one management. One listed 4

selections and 3 listed 3 choices with remainder listing 2 choices. Statewide, eighteen (18) individuals (10%) managing Langstroth hives did not do any of the options offered; they had a 75% loss of colonies (compared to 48% overall losses). The two Tillamook beekeepers without any selections had 100% loss.

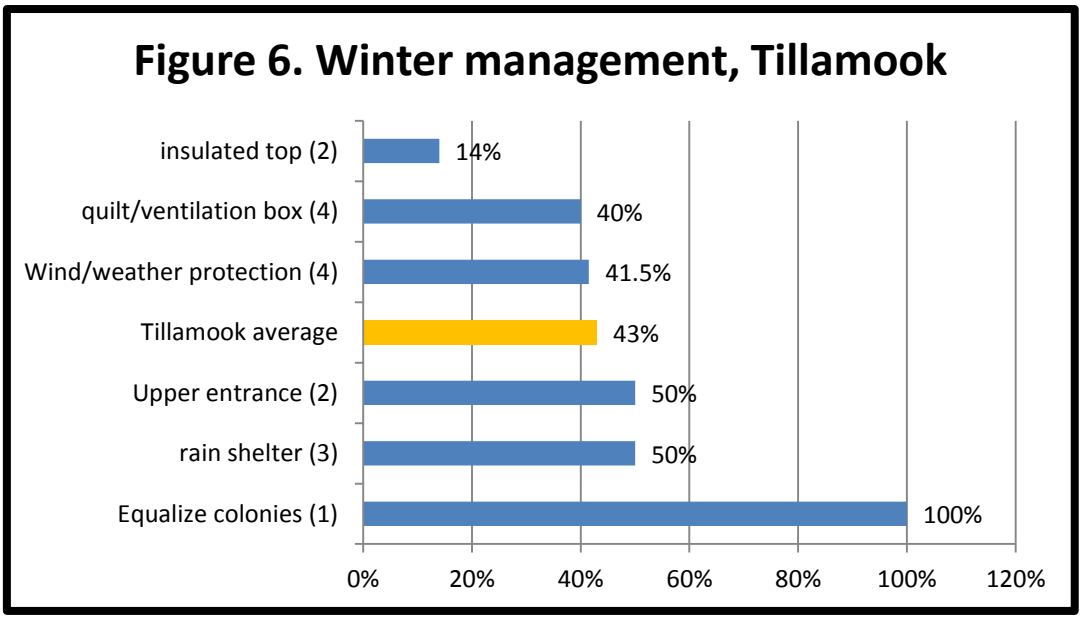
There is general consensus that feeding bees carbohydrate and protein can be useful. The choices of Tillamook beekeepers are shown in bar graph below (Figure 5) with number of selections in ( ) and % the percent loss of individuals with that selectin (remember all individuals had a minimum of 2 choices). Sugar syrup (7 individuals) and frames of honey/liquid honey (6 individuals with 2 additional liquid honey feeding included with frames of honey). There were 2 who fed pollen patties, three using hard sugar candy and one fondant. Statewide, hard sugar candy and dry sugar users showed greater survivorship as did those feeding pollen patties and dry pollen. Tillamook beekeepers also that fed sugar syrup also had slightly lower losses.



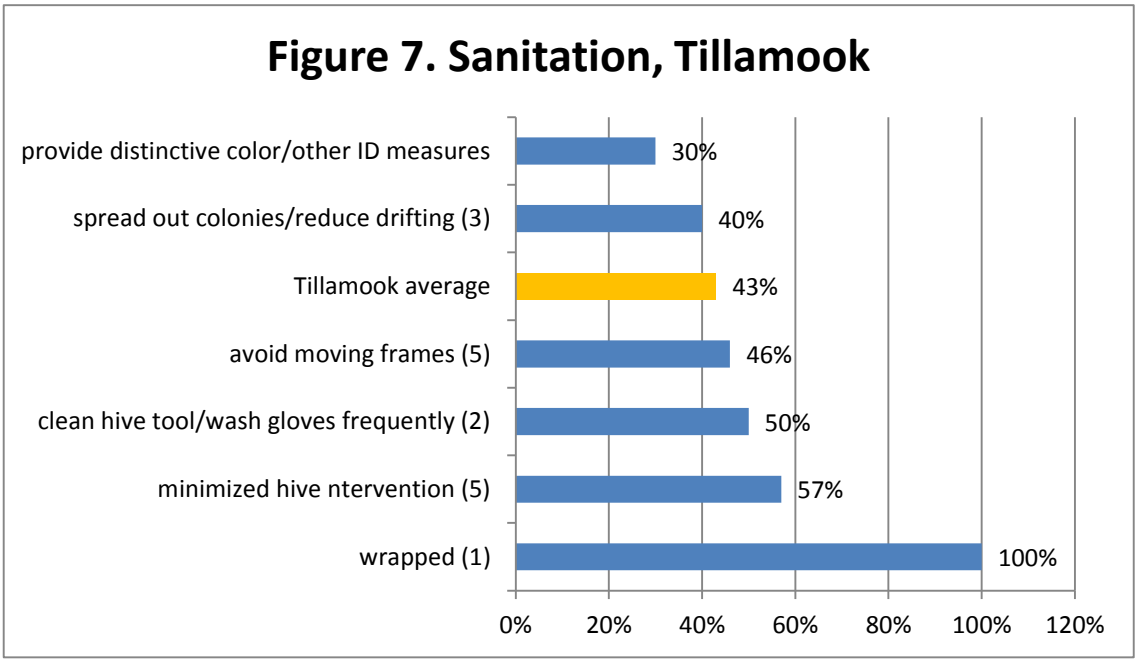
Wintering Practices: Statewide, OR beekeepers selected 538 responses about wintering management practices (1.9 average/individual) - more than one option could be chosen. Forty-six individuals, 17.5% of the respondents, indicated not doing any of the several listed wintering practices; these individuals had a 49.5% winter loss compared to overall of 48%. Among the Tillamook respondents there were 15 selections (1.7/individual; one individual chose 4 managements while 4 listed 2; 5 individuals had a single selection. Two Tillamook individuals did NOT do any of the Wintering practices; their loss rate was 100%.

The most common wintering management selected by Tillamook beekeepers was wind/weather protection and ventilation/quilt box (4 members each) followed by rain shelter (3 individuals). A single individual used an insulated top. As is evident in Figure 6, graphing

number of individuals ( ) and percent loss %, wind/weather protection and a rain shelter might help winter survival; use of an insulted top and quilt box/insulated box at colony top was helpful for Tillamook beekeepers.



SANITATION PRACTICES: Although critical that we practice some basic sanitation in our bee care, we probably do too little to help insure healthy bees. Three Tillamook survey respondents said they did not practice any of the several alternatives. The two most common selections were minimal hive intervention and painting hives a color/other distinctive ID



measures (5 individuals each). Both distinctive hive address and spreading out colonies managements had slightly better winter survival but avoiding moving frames or cleaning hive tool/frequent glove washing or minimized hive intervention did not.

Apiary site selection and colony configuration within the apiary, although not commonly used, are additional important sanitation choices. Anything we might do to give the colonies distinctive "addresses" has been shown to reduce drifting of adult bees and helps to reduce incidence of disease and mites.

SCREEN BOTTOM BOARDS: In the survey we asked what percentage of hives had screen bottom boards and whether they were blocked during the winter. Statewide 21% said they did not use screened bottoms and 66% indicated they used them on all their colonies; all but two Tillamook beekeepers said they did not use them on all their colonies (and those two indicted use on some of their colonies. The majority statewide (51%) and for coastal beekeepers (50%) left them open over the winter period (never response). 18% statewide and 40% of Tillamook beekeepers closed them during the winter and experienced an elevated loss rate of 63.5%. One individual sometimes closed them.

There is no good science on whether open or closed bottoms make a difference in overwintering success but some beekeepers "feel" bees do better with them closed overwinter. An open bottom, at least part of the year, can assist the bees in keeping their hive cleaner. When SBB use is correlated with colony losses, a small (5 percentage points) advantage is gained with their use but this did not occur for Tillamookl beekeeper respondents.

Managements 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 frequently do only a single management nor do they necessarily do the same thing to all the colonies in their care. Smaller numbers, as in local associations, are sometimes widely skewed and it is more difficult to show significance of different numbers.

We do know moisture kills bees, not cold, so we recommend hives be located in the sun out of the wind and, when exposed, provided with some extra wind/weather/rain protection to improve survival. Using screened bottom boards and leaving them open (or closed) as per your preference for ventilation helps too. Use of insulted tops/quilt box with moisture collector such as burlap, straw, old towels, etc. with extra top ventilation and a top entrance, especially as it may help vent excess moisture, is also of potential benefit in reducing winter losses.

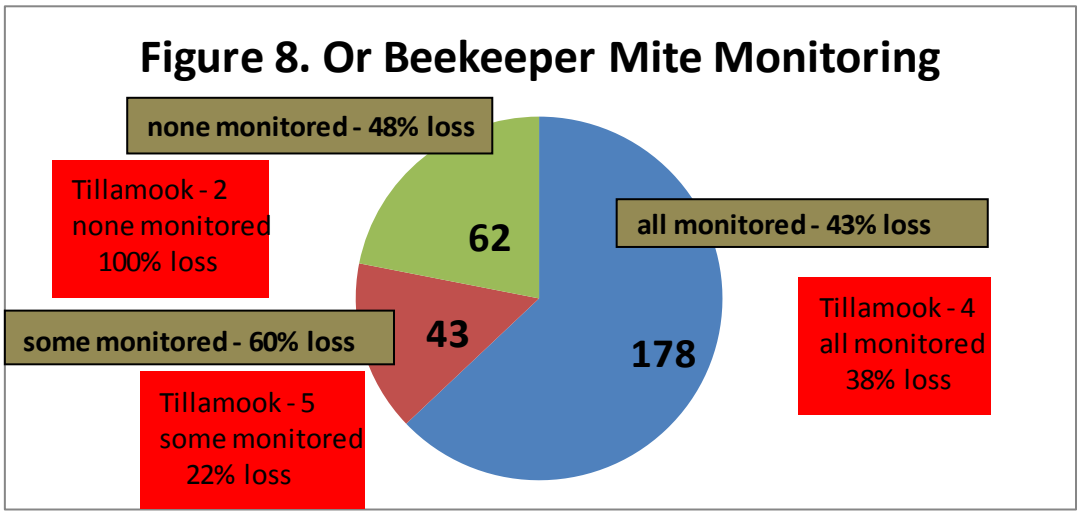
Feeding bees either sugar syrup or honey from other disease-free hives, helps insure enough food stores during early fall management. Once fall rains start, halt syrup feeding and switch to feed dry sugar or a hard sugar candy to avoid adding additional moisture stress to colonies. Finally, it would seem prudent to review basic sanitation measures, as anything we can do to help reduce sick bees and improve colony health, will improve overall survival.

Mite monitoring/sampling and control management

All OR bee hives have or will have varroa mites. It is important to know **how many mites are present.** Knowing how many mites provides an estimate of approximate risk of mites elevating colony losses for the time of year the sampling is done and, when sampling is started in July and continued into October, for the overwintering period. Mites are not the only pest/predator/pathogen than can seriously weaken or kill colonies but studies point to their being the most significant.

MITE MONITORING: To know how many mites, beekeepers need monitor/sample hives for mites. The PNWhoneybeesurvey asks percentage of OR hives monitored for mites during the 2016 year and/or 2016-17 overwinter, whether sampling was pre- or post-treatment or both and, of the five possible mite sampling methods, what method was used, including when (month) it was employed. Statewide, 178 individual respondents (63%) said they monitored all their hives. Comparing losses of those individuals monitoring all their hives, alongside those not monitoring, as well as those who indicated they monitored some of their hives, reveals a 43% loss of those 178 individuals monitoring all their hives, the 62 individuals (22%) who reported they did no monitoring had the statewide average loss of 48% loss while the 43 individuals who monitoring some of their colonies had a 60% loss. **Monitoring helps!**

The comparable numbers for Tillamook respondents was 4 individuals (58%) monitored all their hives and had a 38% loss rate. Five individuals monitored some of their hives and had 22% loss while the two individuals that did NO monitoring had a 100% loss rate. Figure 8 below illustrates the statewide numbers data with loss % in gray boxes; Tillamook numbers and % loss data in red boxes.



When asked how they monitored hives, the 6 Tillamook individuals who indicated they did monitor had five choices. Four of the 6 individuals selected more than a single method. None indicted use of alcohol wash. Most popular was sticky boards (5 individuals 83% total monitoring beekeepers), followed by visual examining of adults in the colony (4 individuals). Two individuals used powdered sugar had 100% survival. Statewide, individuals who used powdered sugar monitoring had lower loss level (30%) and those using alcohol even lower losses (20%). Sampling both pre and post (2 individuals) had an 83% survival rate (lost 1 of 6 six colonies) while those 4 individuals who did not sample or treat lost all 7 colonies (100% loss). 0ne individual sampled only post treatment – had 44% loss rate and the one individual who sampled but did not treat had 100% survival (no loss of 2 colonies).

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 seeing number of mites collected can be difficult). Visual sampling of adults is not accurate: most mites present in the colony are not phoretic on the adult bees, but are reproducing within capped brood cells. Likewise looking at drone brood for mites is not effective to determine how many mites are present but looking at some drones during colony exam can be useful if, when we see mites in drone brood, it triggers use of a more reliable adult washing technique.

See Tools for Varroa Monitoring Guide www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of and 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% in spring (i.e. 2 mites/100 adult bees) and below 5% (no more than 5 mites to 100 adults) when at its largest size during nectar flow following buildup. 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.

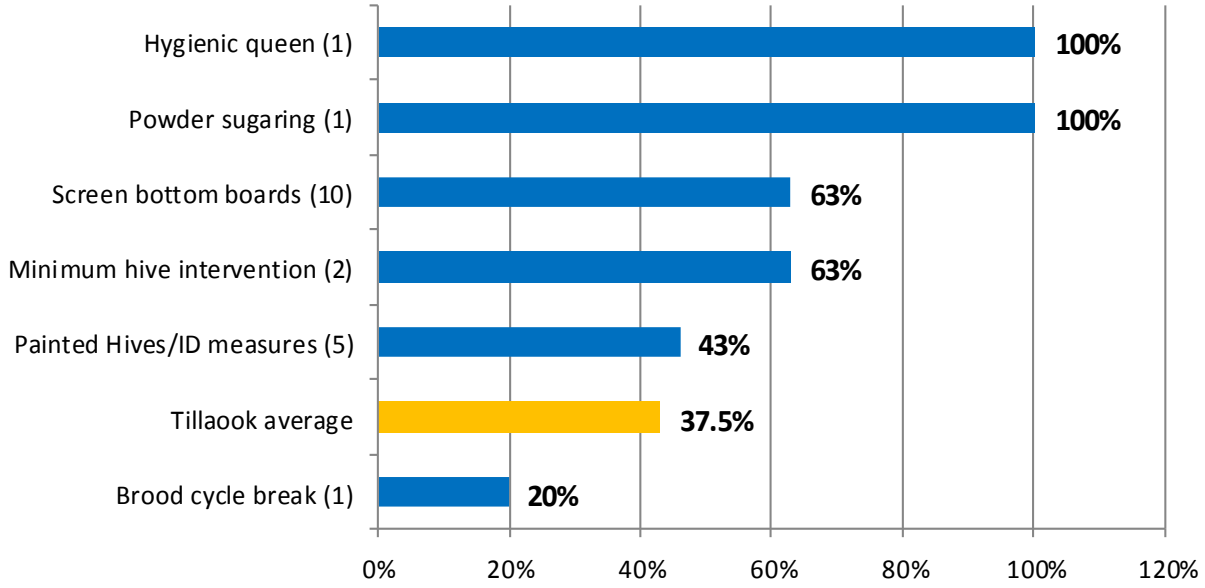
MITE CONTROL: The survey asked about use of several non-chemical mite treatments and also about use of chemicals for mite control. All Tillamook individuals did at least one control although two did no non-chemical technique and 4 used no chemical controls.

NON-CHEMICAL CONTROL: Respondents were offered 7 alternative, non-chemical mite treatments and could use a blank "other' to indicate any additional techniques used. Of the alternatives offered on the survey, use of screened bottom board was listed by 200 individuals (71%) statewide and these individuals had slightly lower overwinter loss (46%). Eight of 9 Tillamook respondents indicated use of SBB but their loss rate was 63% higher than the average of 43%.

Tillamook beekeepers checked 20 selections (2.5/individual); one individual made 4 selections, 3 had 3 selections and none made a single selection. Painting hives a distinctive color/other hive ID measures were selected by 5 members and minimal hive inspection/intervention by 4 members. One individual each checked powder sugaring, use of hygienic queen and brood cycle interruption. See Figure 9 for number of individuals ( ) and the

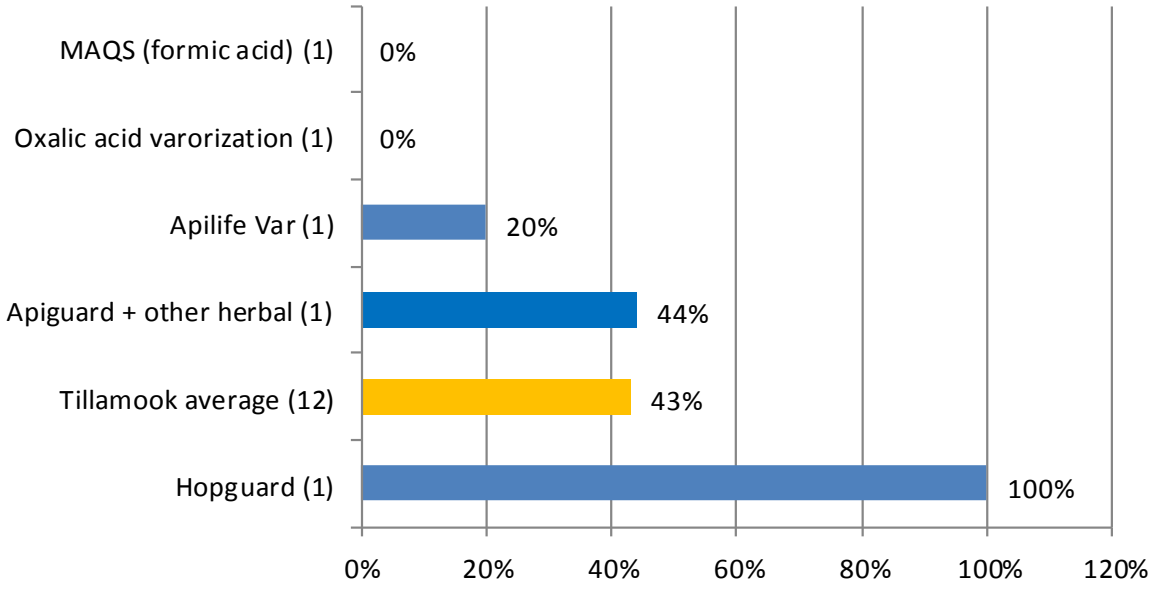
loss rate for those with each selection. It is evident only brood cycle break of the non-chemical controls improved survival for Tillamook beekeepers.

Figure 9. Tillamook Beekeepers Alternative mite controls



CHEMICAL CONTROL: Use of a chemical control was indicted by 215 (76%) statewide OR beekeepers, 5 of them Tillamook beekeepers. All five individuals had a single selection although one did add herbal treatment to Apiguard. Oxalic acid (evaporation) and MAQS (formic acid) were chemicals used by two individuals that had no loss. Statewide, beekeepers that used Apivar and Apilife Var had greater survival with Oxalic acid vaporization and MAQS users doing better than average loss.

Figure 10. Tillamook beekeeper Chemical mite controls



What works? The non-chemical alternative of drone brood removal can be used during spring buildup and breaking the brood cycle, with requeening, especially if hygienic queen stock or local selected stock is used to replace removed queens, also keeps mite numbers at manageable levels in most bee colonies. Both are a lot of work and new beekeepers should not seek to use such techniques until they have a better understanding of bee colony life cycles and queen event behaviors in colonies. Only brood cycle break resulted in loss rate below the average for coastal beekeepers, although used by only one individual respondent.

Among the chemical treatments available to treat varroa mites, use of MAQS, oxalic acid vaporization and Apilife Var resulted in lower overwinter losses by Tillamook beekeepers, as they did for OR beekeepers statewide (see www.pnwhoneybeesurvey.com 2017 report).

The chemical treatments, to a greater or lesser degree, have limitations that may affect usefulness, just as do the non-chemical treatments. We need to learn how to use such tools more effectively. Materials that can be used effectively include acids such as formic acid (Mite-Away Quick Strips, or MAQS – especially the ½ dose treatment) and Oxalic acid or the Hopguard II product when there is little or no brood present, essential oils Apiguard or ApiLife Var, under narrow temperature conditions and the highly effective synthetic miticide, Apivar (amitraz).

All have possible serious negative effects to the beekeeper applicator and they can contaminate the beeswax and honey of the hive. Only use of MAQS is permitted when supers are on colonies. It is important to follow label directions. There may be significant queen or brood losses with many of the chemicals and post treatment sampling is strongly recommended to insure a mite control, non-chemical as well as chemical, has worked as expected.

It is clearly evident that use of several chemical mite control materials reduced overwinter losses and improved survival. The non-chemical techniques may help reduce loses but to a lesser extent. As for using more than one, and which ones to use during a season, there appears to be NO one best combination. Control choices should be driven by monitoring, seasonal considerations and an estimation of size of mite population.

Queens

The PNW honey bee survey asks individuals with overwinter loss to what they attribute their loss. Fifty-five of the 282 OR respondents (13%) attribute at least some of the loss of their colonies to queen failure; among Tillamook respondents, two individuals listed queen failure as one of the contributing reasons for their losses.

However, with the health and welfare of the queen (the 'heart of the hive') critical to bee hive development and success, we also have a survey section just covering queens. We ask specifically what percentage of colonies might have been lost to queen related issues. For the total OR respondents, 127 (47%) said none and 66 respondents (24%) checked 'I don't know.'

Twenty-nine percent (29%), double the number who listed it as reason for winter loss, responded that queen loss might have been a factor in colony losses.

Among Tillamook respondents, 6 individuals (60%) said none of their losses were likely due to queen failure and 2 (25%) said they did not know. Two individuals (20%) did attribute possible winter losses to queen failure as previously reported when possible reason for loss were indicated. This last response required an estimate of the approximate percent of colony loss that might be attributable to queen failure; one individual said 10-30% and the second indicated 50-75%.

One non-chemical management technique to reduce mite buildup in a colony is to requeen/break the brood cycle so we also asked about how managed colonies are requeened. Six Coastal beekeepers said their colony (ies) did not requeen and 3 said they did not know if their colony (ies) requeened. Thus 3 individuals reported their colony (ies) did requeen. Loss level of this group was 55.5%.

Of the three individuals who said their colony did have queen replacement two were via introduction of a mated queen and the last via introduction of queen cells. Three individuals said they had marked queens.

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. Reports for individual bee groups are customized. As they are completed they will be posted by the name of the group. Additionally analysis will be performed and these reports will be posted to pnwhoneybeesurvey as they are completed.

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 2017