



**NLBKA
RESEARCH COMMITTEE
REPORT**

Preliminary Analysis of the 2017 NL Colony Loss and Management Survey (2016-2017)

Survey Return Rate of 67% Is Outstanding!

Our inaugural Colony Loss and Management Survey collected information about many aspects of beekeeping to determine how many colonies (hives) were kept and lost throughout the beekeeping season (June 2016-June 2017). The objective of the survey is to build a database for assessing health of NL honeybees, and the management practices which may affect their health. A census survey consisting of 43 questions covering demographics, hive design, forage-habitat, summer period (June 1-October 31 2016), winter period (November 1 2016- May 31 2017), queen practices and geographic location was mailed to 45 persons: 38 current, 6 former and 1 non-member. Only beekeepers who had apiaries > one year were included; no beekeepers were listed in Labrador. To ensure confidentiality and anonymity of respondents, the results are presented here in aggregated form.

Hive Design and Habitat

Twenty-eight out of 30 beekeepers were using a Langstroth or a modified Langstroth design, and 2 were using a top bar design. Plastic foundation was the most preferred foundation used. Thirty-three percent of beekeepers were entering their second calendar year, 30% had kept bees for 2-4 years, 30% for 5-10 years and 7% for greater than 10 years. Table 1 gives the breakdown by federal electoral districts.

Beekeepers ranked the description of the habitat within a 5 km radius of their apiary as follows; natural landscape, 1st; agricultural, 2nd; disturbed and urban landscape either 3rd or 4th depending on apiary location. It indicates many of the apiaries are in rural areas of the Island. Surrounding agricultural crops for bees consisted predominately of flowering vegetables, fruit trees/bushes and wild fruit areas. Many areas reported an abundance of wild deciduous trees/bushes, heathers, wild roses and fireweed as sources of nectar and pollen. The majority (56%) were unaware if any pesticides were being used in their areas.

Table 1. Number & percent of beekeepers by region.

Region	# Respondents	% Respondents
Avalon	19	63
Bonavista-Burin	7	23
Coast of Bays-Central Notre Dame	2	7
Long Range Mountains	1	3
Blank/prefer not to say	1	3
TOTAL	30	100



Summer-Fall Colony Loss Pattern in 2016 Was Similar to 2015

The Loss Survey is designed to capture information on colony losses in 2016 and 2017 covering the following bee seasons in NL: summer-fall (June 1-October 31, 2016); and winter-spring (November 1, 2016 to May 31, 2017). After the winter-spring period of 2016, respondents increased the number of colonies from 76-119 during the summer-fall period (Table 2). When time came for winter, beekeepers reported getting 108 colonies ready, indicating a 9% loss during the summer-fall period. Most of these losses were associated with weak colonies after winter-spring, poor weather conditions in early June, and “natural disasters” (such as wasps, shrews, and swarm losses). Those who

had bees in 2015, reported the 2016 summer-fall loss pattern was either higher (39%), same (28%) or lower (28%). Thirteen percent of all beekeepers had to replace their queen during the summer-fall period. Twelve beekeepers were new-bees (keepers) in 2016.

Hive Size	No. colonies on June 1 2016	No. Colonies +splits made Jun 1-Oct 1	Total	No. of Colonies on Oct 31 2016
1-4 hives	23	27	50	45
5-9 hives	20	12	32	31
10+ hives	33	4	37	32
Total	76	43	119	108

9% colony loss during summer period, June 1—October 31, 2016

Summer Management in 2016



The majority of beekeepers in the survey

are hobbyist (less than 20 hives).

27% of beekeepers harvested honey, while most others either left their honey for winter feeding or removed it for spring feeding.

No virus symptoms were reported. Only one beekeeper reported using fumagillin to treat Nosema fungus in 10% of the colonies.

2016 Fall Management for Winter

In preparation for winter of 2017, beekeepers in late October 2016, all reported providing their hives with sufficient food stores, e.g., sugar syrup after fall nectar flow, adding extra honey frames to the hive, etc. Other winter preparations reported in rank order were installation of: shrew guards; insulation - consisting of wood chips, straw, foil mats, etc., on top of hives (inside of cover); wrapping exterior of hives with tar paper or other sleeve material with or without insulation material; and building wind breaks. Only 12% reported ensuring their colonies were strong enough to face the winter by making sure that each hive box had 4 or more full frames of bees, and 4% reported cutting their losses by eliminating weak hives before the start of winter.





Winter Losses: Nov. 1, 2016 to May 31, 2017 Period

The Canadian Association of Professional Apiculturists (CAPA) uses the following formula to calculate the percentage of winter loss as follows: ***(Sum of estimated colony losses in spring 2017/Sum of colonies wintered in 2016) x 100.***

Table 3. Number of hives by region wintered from Nov 1, 2016-May 31, 2017

Region	Number Respondents	Full Sized colonies wintered on Nov 1 of 2016	Viable Overwintered colonies as of May 31, 2017	Non-Viable colonies as of May 31, 2017	Winter Loss (%)
Avalon	19	67	54	13	19
Bonavista-Burin	7	27	21	6	22
Coast of Bays-Central Notre Dame	1	9	9	0	0
Long Range Mountains	1	4	4	0	0
Blank	1	1	1	0	0
Coast of Bays Not Applicable	1				
TOTAL	30	108	89	19	18

Our survey beekeepers reported 18% overall honey bee colony loss during the winter of 2016-2017 winter. Table 3 shows that some beekeeping regions have greater beekeeping activity and losses than others.

Estimating Winter Colony Losses

In our survey, three questions were directed towards estimating colony loss.

Beekeepers were asked to provide the total number of living colonies that were viable on October 31, 2016. They were asked to provide the total number of living colonies on June 1, 2017. And finally the last question asked how many of these surviving colonies on June 1, 2017 were very weak (not viable).

The CAPA definition of a viable colony is one where there are 4 or more frames being 75% of comb covered on both sides in a standard 10 frame hive. In NL, it is recommended that a two deep hive is needed to get through the winter. When checking the hive after winter, anything less than 4 frames per deep covered in bees is deemed a non-viable or “dead” colony. Those are the colonies in the spring that you either will merge with another, replace the queen or both; otherwise that colony will not survive.

How Did We Compare to Beekeepers in Atlantic Canada?

The 2017 CAPA survey statement for all provinces reported winter loss in the other Atlantic provinces as follows: 13% in NS, 18% in NB and 42% in PEI. No data was listed for NL.

Poor queens, weak colonies in the fall, and starvation were the top three ranked contributing causes to honey bee mortality, respectively, in the Atlantic provinces.



Winter Loss Rate May Not Be Related to Beekeeper Experience.

Most of the beekeepers who responded to the survey have been keeping bees for 1-5 years. It appears that colony loss was the highest for the group with greater than 6 years of experience. However, on further analysis, it became apparent that the size of the apiary, rather than experience, seems to have been a more discernible effect. Eleven beekeepers with only one hive experienced 36% colony loss; in contrast to 18 beekeepers who either had 2 to 4 hives, 5 to 9 hives or 10+ hives with winter losses, of 15%, 16% and 19%, respectively. Upon removing the estimate for those

beekeepers having only 1 hive, the overall colony loss dropped to 16%. In contrast Ontario beekeepers with < 10 colonies reported 35% winter loss for the 2016-2017 period.

Full Sized colonies wintered in fall of 2016	Full Sized Colonies	Winter Loss (%)
1-2 year (n=11)	18	17
3-5 years (n=10)	29	7
6-10 yrs (n=5)	33	21
>10 yrs (n=2)	25	28
TOTAL	105	18

Table 4. Winter loss (%) based on experience of beekeepers

Why Did Our Over-wintering Colonies Die?

Honey bee health is a complex issue with many factors contributing to the colony performance. Here on the Island, we are free of the Varroa, tracheal mites, small hive beetles and wax moths that weaken or kill colonies elsewhere in Canada; and viral and fungal diseases are at a very low level. Nevertheless, one beekeeper reported treating 10% of colonies for Nosema in the summer-fall of 2016 and 6% in the spring of 2017 with fumagillin.

Survey beekeepers ranked poor winter conditions and queen failure as the primary contributing factors for colony loss, with “natural disasters” (shrews, blown over hives, etc.) and weak colonies in the fall being ranked second. Only 1 beekeeper reported colony loss due to starvation.

Severe weather conditions cannot be directly controlled but may be mitigated with some good fall management practices such as strapping down each beehive, erecting wind-breaks, etc. Some of the bee colonies survived the winter only to die due to a long, cold, and wet spring especially in the eastern areas of the Island.

Poor fall management practices in 2016, such as ignoring weakened and/or old queens and small cluster sizes in each deep, can be controlled by the beekeeper; e.g., replacing queens early in the summer, and merging weak colonies in the early fall.

Beekeepers, who had hives in 2014-15 winter period, reported that the 2016-17 loss pattern was the same or lower when compared to the previous year.

Spring Management, March 1– June 1, 2017

A section of the questionnaire focused on management practices during the transition period between winter and summer beekeeping seasons. Spring arrives late in Newfoundland, being latest on the eastern side of the island. While waiting for the willow and alder buds, and crocuses to appear, beekeepers must check the food reserves in the hives on a fine, warm day. If honey frames have been stripped bare after winter feeding then it is critical to introduce food to the hive. Pollen reserves may also be needed to promote egg laying to replace the winter bees.

Beekeepers ranked their use of feed items as follows: sugar syrup (1st); candy (fondant) (2nd); and capped honey frames (3rd). Pollen patties were the preferred protein followed by pollen substitute powder. Some beekeepers used more than one type of feed. At least 3 beekeepers felt the reserves were still sufficient and didn't add anything. Most beekeepers ensured feed and pollen were available, on average, for 3 to 8 weeks depending on the area and weather conditions.



“ You can get your bees through the winter, only to have them die during the infamous long, cold, wet springs the Island is known for” (Gerard Smith, G& M Farms, Freshwater, Placentia Bay).

Hive Manipulation and Requeening

Hive manipulation is a standard practice to equalize hive strength in the spring. Yet, only 23% of beekeepers reported doing this in the spring of 2017.

Queen-less colonies or those with failing queens should also be combined with stronger colonies. Ninety-two percent of beekeepers reported their queens were 6-24 months in age and 8% the beekeeper had queens older than 2 yrs. Thirty percent of beekeepers reported requeening their colonies during the 2017 summer period.

When asked about overall replacement rate, 38% said they never replaced their queens. Note, older queens may often show declines in egg

-laying, produce poor brood patterns, become drone layers or may suddenly be superseded by the colony.

Beekeepers reported their main sources of queens were from local NL breeders, followed by queens made from splits, and third from swarm capture.

Although some of the queens were being used to rebuild colony strength others were being used to expand size of the apiaries (Table 5).

Will Increase by	# Respondents	%	Rank
0 hives	9	32	2
1-4 hives	12	43	1
5-9 hives	3	11	4
10+	4	14	3
Total	28	100	



NLBKA Research Committee

Our committee is mandated to work with both commercial and hobby beekeepers to better understand which management practices, climatic and forage conditions affect honey bee health. One way to improve our understanding is to conduct annual surveys and share the results with the beekeeping community.

Beekeeping Is a Year Round Process

From the results from our first survey we see moderate colony loss (9%) occurring during the summer-fall of 2016, and after the winter-spring period in 2017 (~18%). The winter preparation, beekeepers do in the fall will determine the condition and viability of colonies in the spring. Spring management will affect colony health and honey production during the summer and into the fall season.

As we gather more data each year from beekeepers in various regions of the province we will be able to extend our analyses of the data to further understand what combination of management practices works best at keeping colonies alive from season to season, and whether these practices vary from region to region. An analysis of seasonal colony losses may help beekeepers throughout the province adjust their beekeeping practices and reduce such losses.

Tremendous thanks to all survey respondents whose efforts made this survey such a success!

NLBKA Research Committee

We are excited about doing this survey! The survey will help the Association anticipate beekeeper training and educational needs from one year to the next, and provide other benefits to the beekeeping community. Sharing the results with the beekeeping community can help beekeepers improve their best practices for raising healthier honey bees in their area. As we build our database, we may make it accessible to other bee researchers who wish to study ecology, diseases, and pest profiles of our honey bees. We will never release any personal identification information with the database.

POST-SCRIPT

After the NLBKA Conference and AGM in November 2017, three other surveys were received, bringing the new total to 33 returns out of 45 mailouts. The return rate is now 73%. The data from all 33 respondents will be entered later into a new online database being developed during the winter of 2018.

In late October, 2017 the link to a short electronic survey, using Survey Monkey software, was mailed out to the original 45 members in the Loss survey. Three questions were asked 1) would you prefer the 2018 survey to be completed electronically or by mailout; 2) would you enter some contact information on the survey; and 3) how easy was it to complete the 2017 survey. Overall response rate was 47%. Ninety-six percent preferred to complete surveys online; 84% were in favour of leaving some contact information in the survey; and 16% found the survey hard to complete.

At the January 2018 meeting of the Research Committee, it was agreed that the 2018 Annual Colony Loss and Management Survey will be delivered online.