Canadian Association of Professional Apiculturists
Statement on Honey Bee Wintering Losses
in Canada (2018)

Prepared by CAPA National Survey Committee and Provincial Apiculturists: Julie Ferland (chair), Shelley Hoover (President), Melanie Kempers, Karen Kennedy, Paul Kozak, Rheal Lafreniere, Chris Maund, Cameron Menzies, Medhat Nasr, Steve Pernal, Jason Sproule, Paul van Westendorp and Geoff Wilson

Summary

The Canadian Association of Professional Apiculturists (CAPA) coordinated the annual honey bee wintering loss report for 2017-2018. As in previous years, harmonized questions based on the national beekeeping industry were used. Provincial Apiarists collected the survey data. All provinces were included in the national survey this year. The respondents operated 502,764 honey bee colonies across Canada. This represents 63.9% of all colonies operated and wintered in the country in 2017-2018. The national winter loss, including non-viable bee colonies was 32.6% with provincial losses ranging from 18.4% to 45.7%. The overall national colony loss reported in 2018 is the highest reported loss since 2009. Through the hard work of beekeepers replacing loses and making increases, Statistics Canada reports show that the total colony count has increased by 34.1% during the period between 2007 and 2017.

Respondents reported some variation in identifying and ranking the top four possible causes of colony losses across the country. The most frequently cited causes in order from high to low were: weather, poor queens, weak colonies in the fall and starvation.

Beekeepers also responded to questions on the management of three serious parasites and pathogens to beekeeping: Varroa mites, nosema and American foulbrood. The majority of beekeepers in most provinces reported that they monitored for Varroa mites. The most commonly reported Varroa treatments were Apivar® in spring, Apivar® or formic acid (Mite Away Quick Strip® (MAQS), repeated 40 ml of 65% formic acid treatments, or flash treatments) in the summer or fall and oxalic acid in late fall. Many beekeepers reported using spring and fall applications of Apivar® or Apivar® plus formic acid to keep mites under control in 2017. Nosemosis and American foulbrood were treated by many Canadian beekeepers. Across the country commonly used treatments were registered antibiotics; but methods and timing of application varied from province to province.

Provincial Apiculturists, Tech-transfer agents and researchers have been working with beekeepers across Canada to encourage them to monitor honey bee pests, especially Varroa mites and nosema, and adopt proven integrated pest management practices to keep these pests under control. Through various working groups within the association and with various stakeholders CAPA members continue to work on development and improving management options for beekeepers to keep healthy bees. CAPA members are also actively involved in the Federal Bee Health Roundtable to develop strategies that work toward addressing risks and opportunities for developing sustainable industry.

Introduction

Over the last decade, many countries, including Canada, have surveyed beekeepers and reported overwintering mortality of honey bee colonies and management practices used for Varroa mites, nosema and American foulbrood. The Canadian Association of Professional Apiculturists (CAPA) has reported on wintering losses of honey bee colonies and possible causes of bee mortality in Canada since 2007. The objective of this national report is to consolidate provincial honey bee losses across the country based on data collected through harmonized survey questions. The possible causes of winter loss and information on pest surveillance and control are also reported. The survey results aid in identifying gaps in current management systems, developing strategies to mitigate colony losses and improving bee health, biosecurity practices, and industry sustainability.

Methodology

In 2018, the Provincial Apiculturists and the CAPA National Survey Committee members reviewed the questions used in the 2017 survey and made necessary revisions. The result was a harmonized set of questions to be used in the 2018 survey (Appendix A). These questions took into account the large diversity of beekeeping industry profiles, management practices and seasonal activities within each province. Some provinces also included supplementary regional questions in their provincial questionnaire. Results of these regional questions are not included in this report but it can be accessed by contacting the Provincial Apiculturist of the province in question (Appendix B).

Commercial beekeepers and sideliners that owned and operated a specified minimum number of colonies (Table 1) were included in the survey. The survey reported data from full-sized producing honey bee colonies that were wintered in Canada, but not nucleus colonies. Thus, the information gathered provides a valid assessment of commercial wintering honey bee losses and management practices.

The common definitions of a honey bee colony and a commercially viable honey bee colony in spring were standardized as follows:

- Honey Bee Colony: A full-sized honey bee colony either in a single or double brood chamber, not including nucleus colonies (splits).
- Viable Honey Bee Colony in Spring: A honey bee colony that survived winter, in a standard 10-frame hive (Langstroth box), with a minimum of 4 frames with 75% of the comb area covered with bees on both sides on May 1st (British Columbia), May 15th (New Brunswick, Nova Scotia, Ontario, Prince-Edward-Island and Quebec) or May 21st (Alberta, Manitoba, and Saskatchewan).

The colony loss and management questionnaire was provided to producers using various methods of delivery including mail, email, or an online option or a telephone survey; the method of delivery varied by jurisdiction (Table 1). In each province, data was collected and analyzed by the Provincial Apiculturist. All reported provincial results were then analyzed and summarized at the national level. The national percent of winter loss was calculated as follows:

$$\text{Percentage Winter Loss} = \left(\frac{\text{Sum of the estimated total colony losses per province in spring 2018}}{\text{Sum of total colonies in operation in each province for 2017}}\right) \text{x } 100$$

Results

Throughout Canada, a total of 582 sideline and commercial beekeepers responded to the 2018 survey. These respondents represented 46.6% of the all surveyed targeted beekeepers. They operated nearly 63.9% of all registered colonies that were put into winter in 2017. This year the province of Newfoundland and Labrador participated in the survey as it did in 2016. It is worth noting that British Columbia and Prince Edward Island reported a higher number of colonies went into winter than the total number of bee colonies they had reported to Statistics Canada in 2017, beekeepers reported that they were anticipating losses so they produced additional colonies to their production colonies to put into winter.

The survey delivery methods, operation size of surveyed beekeepers, and response rate of beekeepers in each province are presented in Table 1. Survey results showed that the national level of wintering loss including nonviable colonies was 32.6% with individual provincial percentage ranging from 18.4% to 45.7%. The overall winter loss percentage for 2017-2018 was greater than 2016-2017 which had a loss rate of 25.1%.

The level of winter loss varied from province to province, and among beekeeping operations within each province. In general, most provinces reported higher mortality in 2017-2018 than the previous year, the exception being Prince Edward Island reporting similar mortality to last year. In areas with higher winter mortality beekeepers cited weather as a more prominent concern than previous years. Ontario reported the highest winter losses of 45.7% in 2018 with weather cited as being the most frequent cause contributing to colony mortality. The lowest winter loss (18.4%) was reported by Nova Scotia.

Overall 73% of the colonies owned by respondents were wintered outdoors in fall 2017. The rest of the colonies (27%) were wintered indoors (Table 2). The highest percentage of bee colonies wintered indoors was in Nova Scotia (74%), closely followed by Quebec (73%).

For detailed information about the winter losses in each province, please contact each province directly for a copy of its provincial report where available.

Table 1: Survey parameters and honey bee colony mortality by province

Province	**Total number of colonies operated in 2017**	**Estimated number of colony lost based on the estimated provincial winter loss**	**Type of data collection**	**Number of beekeepers targeted by survey**	**Number of respondents (% of participation)**	**Size of beekeeping operations targeted by survey**	**Number of respondents' colonies that were wintered in fall 2017**	**Number of respondents' colonies that were alive and viable in spring 2018**	**Percentage of surveyed colonies to the total number of colonies in the province**	**Provincial Winter Loss including Nonviable Colonies**
Newfoundland and Labrador	354	91	email / telephone / fax	5	4 (80%)	20 col. and more	244	181	68.9	**25.8**
Prince Edward Island	6 300	2 633	email / telephone / post	50	20 (40%)	All PEI beekeepers	6 580	3 830	104.4*	**41.8**
Nova Scotia	26 360	4 850	email	41	19 (46%)	50 col. and more	16 279	13 284	61.8	**18.4**
New Brunswick	12 761	3 865	email / telephone / post	48	23 (48%)	30 col. and more	10 169	7 089	79.7	**30.3**
Quebec	57 743	17 737	post / email	129	106 (82%)	50 col. and more	53 840	37 302	93.2	**30.7**
Ontario	105 244	48 113	online / post / telephone	186	117 (63%)	50 col. and more	63 236	34 327	60.1	**45.7**
Manitoba	111 802	27 940	email / post	212	67 (32%)	50 col. and more	57 810	43 363	51.7	**25.0**
Saskatchewan	115 000	32 162	online	120	53 (44%)	100 col. and more	43 161	31 090	37.5	**28.0**
Alberta	311 000	105 491	post / email / telephone	109	63 (58%)	400 col. and more	203 337	134 365	65.4	**33.9**
British Columbia	40 275	13 828	online	350	110 (31%)	10 col. and more	48 108	31 591	119.4*	**34.3**
Canada	**786 839**	**256 711**		**1250**	**582 (47%)**		**502 764**	**336 422**	**63.9**	**32.6**

* Beekeepers in Prince Edward Island and British Columbia increased the number of colonies above the number of production colonies in an anticipation of winter losses

Table 2: Overwintering method by province

Province	Total number of colonies owned by responded beekeepers wintered outdoor in fall 2017 (% of colonies)	Total number of colonies owned by responded beekeepers wintered indoor in fall 2017 (% of colonies)
Newfoundland and Labrador	163 (73%)	61 (27%)
Prince Edward Island	6 578 (100%)	2 (0%)
Nova Scotia	4 246 (26%)	12 033 (74%)
New Brunswick	4 734 (47%)	5 435 (53%)
Quebec	14 290 (27%)	39 475 (73%)
Ontario	44 100 (82%)	9 636 (18%)
Manitoba	28 890 (50%)	28 920 (50%)
Saskatchewan	34 495 (80%)	8 666 (20%)
Alberta	179 949 (88%)	23 388 (12%)
British Columbia	39 501 (92%)	3 530 (8%)
Canada	**356 946 (73%)**	**131 146 (27%)**

Contributing factors as cited by beekeepers

Beekeepers were asked to rank possible contributing factors to colony losses. These responses are summarized in Table 3. Weather was considered a major factor for winter loss across the country, likely reflecting the extended cold weather well into April through most of the beekeeping areas. In nine provinces, weather was considered the number one (eight provinces) or number two (one province) factor contributing to reported winter losses. Beekeepers reported that most bee colonies died in April which was one of the coldest, snowiest and wettest Aprils in years.

Poor or failing queens were also another commonly cited as a cause of winter loss across Canada. Poor queens can result in weakened colonies entering the winter this causes an insufficient number of bees in the colony to survive. If a queen fails or dies over the winter the colony will die as well because there is no opportunity for the beekeeper to replace the queen and the bees cannot rear a new queen during the winter season. The poor and failing queens can be caused by many factors, including, inadequate rearing conditions, poor mating weather, age of the queen or exposure to pesticides in hive and in the environment. The recent increase of queens as a reported cause for winter mortality is a concern that should be investigated further.

Starvation was the second or third possible cause of winterkill reported by beekeepers in several regions across Canada. Starvation can be the result from the inability of bees in weak colonies to store enough stored food during the fall, the inability of bees to move to new resources within the hive during winter, the rapid consumption of stored food because of early brood production, or insufficient feed provided by the beekeeper in the fall or spring. During the winter of 2017-2018, starvation may be associated with the long cold winter and extended cold through the spring.

Another contributing factor identified across Canada was weak colonies in the fall. This can be caused by a variety reasons including: making late splits (nuclei), underlying pest and disease issues, exposure to pesticides, or poor foraging and nutrition.

Ineffective Varroa control was reported as the fourth possible contributing factor to winter colony loss specifically in three Eastern provinces, this is a very different pattern than in previous years. While the Varroa mites and their impacts on the honey bee health are still a serious issue for Canadian beekeepers, it may indicate that most beekeepers are treating in a timely manner to keep mite population under control and are doing a better job in monitoring for the mites. Many beekeepers across the country are relying on multiple Varroa treatments in a year that better enables beekeepers to protect their bees in the winter. Unfortunately, some individual producers that treated Varroa too late reported winter mortality greater than 30% and frequently reported mites as a primary concern.

Several beekeepers in different provinces reported that they did not know why their colonies perished. Inability to identify a possible cause for colony mortality may be associated with lack of monitoring for pests, diseases and other general colony health parameters during the season, or a multitude of underlying problems that cannot be identified without specialists.

Operations that reported higher than 25% winter loss were asked to rank the top four possible causes of bee colony mortality in the 2017-2018. These data are summarized in Table 4. It is notable that weather was the number one cause of winter losses in these operations as reported across the following provinces New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and Alberta. Ineffective Varroa control was number one cause of high losses in Prince Edward Island, number two in Quebec and Saskatchewan, and number three in Ontario. Overall, there were not striking differences between reported causes of winter losses across the provinces and operations that reported 25% or more winter losses. These results reflect that these higher reported losses are influenced by management practices in the operation in addition to local environmental factors.

Table 3: Top four ranked possible causes of honey bee colony mortality by province, as cited by beekeepers who responded to the 2017-2018 winter loss survey.

Province	**1st.**	**2nd.**	**3rd.**	**4th.**
NL	Weather	Starvation	Weak colonies in the fall	Poor queens
PE	Weather	Poor queens	Don't know	Ineffective Varroa control
NS	Weak colonies in the fall	Poor queens	Weather	Starvation
NB	Weather	Weak colonies in the fall	Starvation	Poor queens
QC	Weather	Poor queens	Weak colonies in the fall	Ineffective Varroa control
ON	Weather	Poor queens	Weak colonies in the fall	Ineffective Varroa control
MB	Weather	Poor queens	Starvation	Weak colonies in the fall
SK	Weather	Poor queens	Starvation	Weak colonies in the fall
AB	Weather	Starvation	Poor queens	Nosema
BC	Weak colonies in the fall	Weather	Starvation	Don't know

Table 4: Top four ranked possible causes of bee colony mortality by province, as cited by beekeepers who reported higher than 25% losses in the 2017-2018 winter loss survey.

Province	1st.	2nd.	3rd.	4th.
NL	Starvation	Weather	Nosema	Poor queens
PE	Ineffective Varroa control	Weather	Don't know = Poor queens	Don't know = Poor queens
NS	Don't know	Poor queens	Starvation = Other (overfeeding)	Starvation = Other (overfeeding)
NB	Weather	Weak colonies in the fall	Starvation	Don't know
QC	Weather	Ineffective Varroa control	Nosema	Don't know
ON	Weather	Poor queens	Ineffective Varroa control	Weak colonies in the fall
MB	Weather	Poor queens	Weak colonies in the fall	Starvation
SK	Weather	Ineffective Varroa control	Poor queens	Starvation
AB	Weather	Starvation	Poor queens	Nosema
BC	Weak colonies in the fall	Weather	Starvation	Don't know

Bee Pest Management Practices

In recent years, integrated pest management has become the most important practice to maintain healthy honey bees. To successfully manage bee health, beekeepers must identify and monitor pests and diseases to take timely action in accordance with approved methods. This survey focused on asking beekeepers questions about their management of three serious threats that may impact bee health, survivorship and productivity (Appendix A).

A. Varroa monitoring and control[1]

The Varroa mite continues to be considered by beekeepers and apiculture specialists as one of the main causes of honey bee colony mortality.

During the 2017 production season, a large majority of surveyed beekeepers monitored for Varroa mite infestations (for more details, check Table 5). The alcohol wash of a sample of 300 bees per colony was the most preferred technique in all provinces, except Quebec and British Columbia where beekeepers favoured the use of sticky boards. The frequency of use for the alcohol wash technique in various provinces ranged from 21% to 92%. The frequency of use of the sticky board method ranged from 10% to 41%. Some beekeepers used both sticky boards and alcohol wash methods to evaluate the levels of mites.

[1] Newfoundland and Labrador is not included in this part of the report because no Varroa mites are found in the province.

These results demonstrate that most Canadian beekeepers recognize the value of surveillance and monitoring of Varroa mites. The education and extension programs delivered to beekeepers in Canada have helped in adoption of proper management practices for Varroa mites. Monitoring Varroa mite populations, determining the right timing and selecting the best treatment options for Varroa mite control have become frequently used practices in day to day beekeeping management. Survey results show that most beekeepers in Canada manage Varroa mites using a combination of chemical and non-chemical control measures. Non-chemical methods include: trapping Varroa using drone combs, trapping Varroa using screened bottom boards fitted with sticky boards, using Varroa tolerant bee stocks, or division of colonies (e.g. splits) at the right time of the season.

There are a variety of registered miticides available to beekeepers for mite control. Beekeepers are encouraged to use the most effective miticide that fits their region, season and operation. They are also encouraged to rotate miticides to prevent the development of resistance to these products. In the current survey of bee winter losses, beekeepers were asked "what chemical treatment was used for Varroa control during the 2017 season". The beekeepers' response is summarized in Table 5. In the spring of 2017, the percentage of beekeepers that treated with chemical methods ranged from 43% in New Brunswick to 95% in Saskatchewan. Throughout Canada, the main miticide used for spring Varroa control was Apivar® (a synthetic miticide with the active ingredient amitraz). The second most common treatment is formic acid in late spring, followed by oxalic acid. In fall of 2017, most Canadian beekeepers ranging from 67% in Alberta to 100% in New Brunswick treated their colonies for Varroa. The main miticides used at this time of the year were oxalic acid, Apivar® and formic acid. It was noted that there some beekeepers used Apivar® twice in the same year in 2017, once in spring and again in fall. Most beekeepers did not use Apistan® (a synthetic miticide with the active ingredient fluvalinate) and Checkmite™++ (a synthetic miticide with the active ingredient coumaphos). Beekeepers may be leery of these products because of previously reported resistance to these active ingredients in Canada.

Once again, these surveys show that Apivar® (amitraz) is one of the most commonly used miticides for treating Varroa in Canada. Through the repeated use of Apivar®, it is only a matter of time before we see the development of resistance to this miticide. Initial finding of few cases of low efficacy and resistance were observed in Alberta in 2016 and Saskatchewan in 2017. It is becoming increasing important that beekeepers become aware of the principles behind resistance development and the importance of monitoring the efficacy of all treatments, in particular Apivar. This will help to mitigate unforeseen failures of treatments. Beekeepers are encouraged to incorporate resistance management practices such as using appropriate thresholds for treatment, and alternating miticides with different modes of action in their Varroa treatment programs. Good biosecurity and food safety practices will also go a long way to ensure healthy bees and a safe quality product while reducing the disease pressure.

Table 5: Varroa monitoring and chemical control methods as cited by the respondents of the 2017-2018 winter loss survey. Chemical treatment is in order from most to least commonly used.

Province	Beekeepers monitoring varroa mites (%)		Beekeepers who treated varroa and method of treatment			
			Varroa treatment in Spring 2017		Varroa treatment in Summer/Fall 2017	
	Sticky boards	Alcohol wash	% of beekeepers	Methods of treatment	% of beekeepers	Methods of treatment
NL	0	0	NA	NA	NA	NA
PE	10	50	65	Apivar® (Amitraz), Formic Acid-40 ml multiple application = Formic Acid-250ml single application	95	Oxalic Acid, MAQS®, Apivar® (Amitraz)
NS	26	42	53	Apivar® (Amitraz), Oxalic acid, MAQS®	90	Apivar® (Amitraz), MAQS®, Oxalic Acid
NB	22	65	43	Apivar® (Amitraz), Formic Acid-250ml single application, Oxalic Acid	100	Oxalic Acid, Apivar® (Amitraz), Formic acid-250ml single application
QC	41	21	48	Formic acid-40ml multiple application, Apivar® (Amitraz), Oxalic acid	98	Formic acid-40ml multiple application, Apivar® (Amitraz), Oxalic acid
ON	17	59	74	Apivar® (Amitraz), Formic acid-40ml multiple application, MAQS	94	Apivar® (Amitraz), Oxalic Acid, Formic acid-40ml multiple application
MB	17	42	93	Apivar® (Amitraz), Oxalic Acid, MAQS®	91	Oxalic Acid, Apivar ® (Amitraz), MAQS®
SK	11	78	95	Apivar® (Amitraz), Apistan® (Fluvalinate), Oxalic Acid	91	Apivar® (Amitraz), Oxalic Acid, MAQS®
AB	24	92	92	Apivar® (Amitraz), Oxalic Acid, Formic Acid	67	Oxalic Acid, Formic Acid, Apivar® (Amitraz)
BC	37	25	64	Formic Acid, Apivar® (Amitraz), Oxalic Acid	88	Formic Acid, Oxalic Acid, Apivar® (Amitraz)

B. Nosemosis management practices:

Nosema is a fungal pathogen that infects honey bees. *Nosema ceranae* has become the most frequently found nosema species in Canada for some years after it had gradually replace *Nosema apis*. The real role of *N. ceranae* in honey bee colony survival during winter and spring build-up is still unclear but it could, in certain regions or in some circumstances have an impact and play a role in mortality. It was rarely cited by all surveyed beekeepers as a possible cause of colony mortality during the 2017-2018 winter loss survey, except in Alberta, Newfoundland and Labrador, and Quebec. In the survey, beekeepers reported their use of Fumagillin for the treatment of nosemosis in spring and/or in fall of 2017 (Table 6). The percent of beekeepers reporting using this drug varied widely from province to province.

C. American foulbrood management practices

American foulbrood (AFB) is a bacterial disease of brood caused by *Paenibacillus larvae*. AFB is considered endemic in Canada, and it has been of great concern to beekeepers. Oxytetracycline and more recently Tylosin are antibiotics registered for treating AFB in Canada. The pattern of use for these antibiotics, as reported by beekeepers is presented in Table 6. Oxytetracycline was more frequently used by beekeepers in spring and fall than Tylosin.

Table 6: Antibiotic treatments for nosemosis (fumagillin) and American foulbrood (oxytetracycline and tylosin) as cited by the respondents of the 2017-2018 winter loss survey.

Province	Use of Fumagillin (% of respondents)		Use of American foulbrood treatments (% of respondents)			
	Spring	Fall	Spring treatment with Oxytetracycline	Spring treatment with Tylosin	Summer/Fall treatment with Oxytetracycline	Summer/Fall treatment with Tylosin
NL	0	10	0	0	0	0
PE	15	30	15	0	5	0
NS	26	68	58	0	32	0
NB	22	39	70	0	43	0
QC	2	16	10	0	5	0
ON	17	18	68	0	64	0
MB	26	37	78	0	59	5
SK	20	44	65	9	71	9
AB	87	100	75	5	64	8
BC	17	23	13	< 1	11	< 1

Honey Bee Winter Loss and Population in Canada Since 2007

There has been a lot of variation in winter losses in Canada since 2007 as reported in the national surveys. This year, the reported Canadian winter mortality averaged 32.6%. This is higher than the long term acceptable threshold of 15%. The national overwinter losses were highest in 2007, 2008, 2009 and 2018 and ranged from 29.0% to 35.0%, in those years but from 2010 to 2017, the national overwinter losses ranged from 15.3% to 29.3%, averaging 22.2%. Statistics Canada reports show that the total colony count has increased by 34.1% during the period between 2007 and 2017. This proves the resilience of beekeepers to maintain and increase their numbers despite difficulties keeping healthy viable bee colonies through winter.

Since the inception of this harmonized survey in 2007, beekeepers have been facing challenges keeping healthy bees. Causes for bee health concerns include pest management, climatic condition, bee nutrition, bee exposure to pesticides in hives and the environment. Another added challenge facing beekeepers is the economics of beekeeping this includes variable honey prices versus the cost of production. Even though responses from this annual survey have provided evidence that beekeepers from various regions are using recommended practices for monitoring and managing honey bee pests and diseases; there are always the opportunities to make further improvements.

It appears that stresses caused by parasites and a combination of other stressors warrants further studies to provide alternative management practices to maintain honey bee health. At this time, beekeepers have few products to control Varroa. New options are important to mitigate the risk of developing resistances. Additionally, the only product registered to treatment of nosema (Fumigillin) is currently unavailable. If there is resistance developed to the primary treatment for Varroa (Apivar®) and no available treatment for *Nosema* spp., beekeepers could suffer even greater difficulties keeping their bees alive. Ultimately, beekeepers will need more effective and additional options (miticides, antibiotics and non-chemicals) in their "tool box" if they are to continue effective integrated pest management to maintain healthy bees.

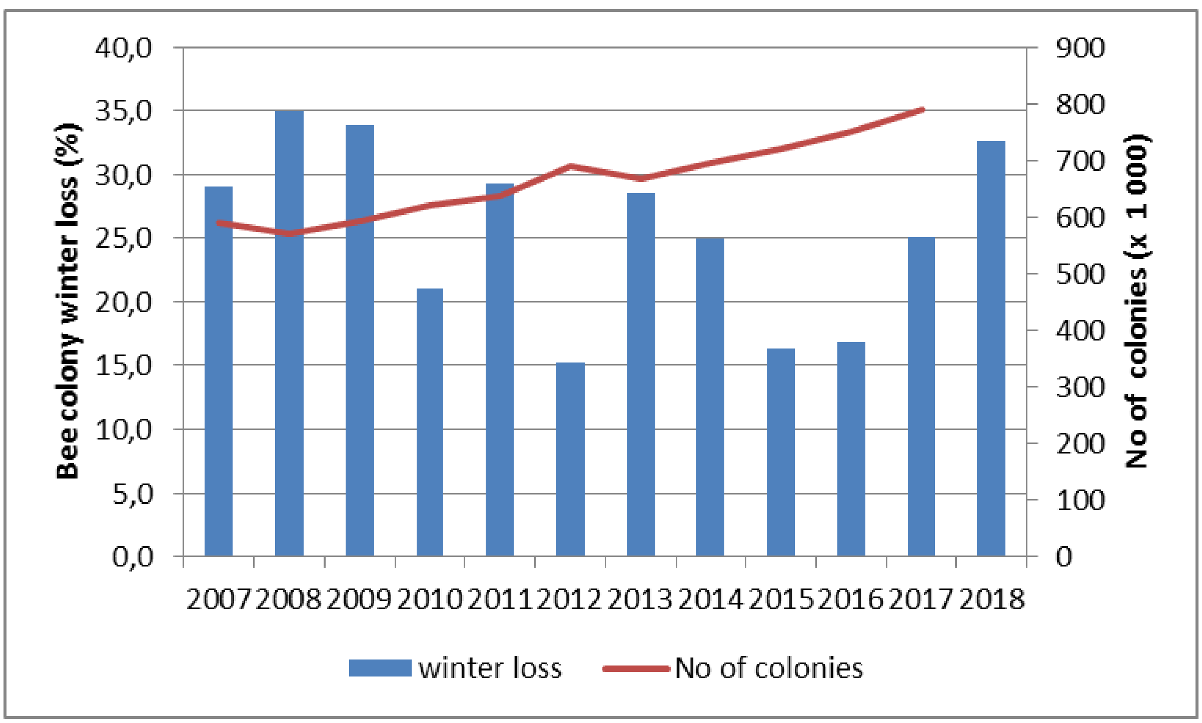

Figure 1.Summary of bee colony numbers and bee losses in Canada from 2007-2018.

Further Work

CAPA members continue to work closely with industry stakeholders, the Bee Health Roundtable and provincial working groups to address bee losses and bee health. Members of CAPA and Provincial Apiculturists have also been actively involved in conducting surveillance programs at the provincial levels and across the country to monitor the status of bee health including the emerging pest, the small hive beetle. CAPA and the Provincial Apiarists are also involved in developing policies for antimicrobial use in beekeeping and conducting outreach and extension programs to promote IPM and biosecurity practices to beekeepers. Researchers within CAPA are active in evaluating alternative control options for Varroa mites and nosema and developing genetic stocks more tolerant to pests which will hopefully enhance the integrated pest management (IPM) practices and address honey bee health sustainability.

For more information about this report, please contact:

Dr. Shelley Hoover, President of Canadian Association of Professional Apiculturists (CAPA)
shelley.hoover@gov.ab.ca Tel: 403 317-2170

Dr. Julie Ferland, Chair of CAPA National Survey Committee
julie.ferland2@mapaq.gouv.qc.ca Tel: 418 380-2100 Ext. 2067

Appendix A: CAPA - 2018 Core Winter loss survey questions

The followings are the core questions that will be used in 2018 by each provincial apiarist for reporting the colony winter losses at the national level. As it has been since 2007, the objective is to estimate the winter kills with a simple and standardized method while taking into account the large diversity of situations around the country. This is a survey so these questions are to be answered by the beekeepers.

1. How many full sized colonies[2] were put into winter in fall 2017?

Outdoor wintering	Indoor wintering	Total

2. How many full sized colonies[1] survived the 2017/2018 winter and were considered viable[3] on May 1st (British Columbia), May 15th (Ontario, Quebec and Maritimes) or May 21st (Alberta, Manitoba, Newfoundland and Saskatchewan)?

Outdoor wintering	Indoor wintering	Total

3. Which method of treatment did you use for Varroa control in **spring 2017**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	Percent of hives treated (%)
☐	Apistan (fluvalinate)	
☐	CheckMite+ (coumaphos)	
☐	Apivar (amitraz)	
☐	Thymovar (thymol)	
☐	65% formic acid – 40 ml multiple application	
☐	65% formic acid – 250 ml single application	
☐	Mite Away Quick Strips (formic acid)	
☐	Oxalic acid	
☐	Other *(please specify)* ________________________	
☐	None	

[2] Does not include nucleus colonies
[3] Viable : A viable colony, in a standard 10-frame hive, is defined has having 4 frames or more being 75% bee-covered on both sides.

4. Which method of treatment did you use for Varroa control in late **summer/fall 2017**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	Percent of hives treated (%)
☐	Apistan (fluvalinate)	
☐	CheckMite+ (coumaphos)	
☐	Apivar (amitraz)	
☐	Thymovar (thymol)	
☐	65% formic acid – 40 ml multiple application	
☐	65% formic acid – 250 ml single application	
☐	Mite Away Quick Strips (formic acid)	
☐	Oxalic acid	
☐	Other *(please specify)* ______________________	
☐	None	

5. Have you monitored your colonies for Varroa during the 2017 season?
   - ○ Yes – sticky board
   - ○ Yes – alcohol wash
   - ○ Yes – other (*please specify*) ____________________________
   - ○ No

6. Which method of treatment did you use for **nosema** control in **spring 2017**? What percent of hives were treated?

	Treatment	Percent of hives treated (%)
☐	Fumagillin	
☐	None	

7. Which method of treatment did you use for **nosema** control in **fall 2017**? What percent of hives were treated?

	Treatment	Percent of hives treated (%)
☐	Fumagillin	
☐	None	

8. Which method of treatment did you use for **American foulbrood** control in **spring** 2017? What percent of hives were treated? *(Choose all that apply)*

	Treatment	**Percent of hives treated (%)**
☐	Oxytetracycline	
☐	Tylosin	
☐	None	

9. Which method of treatment did you use for **American foulbrood** control in **fall 2017**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	**Percent of hives treated (%)**
☐	Oxytetracycline	
☐	Tylosin	
☐	None	

10. To what do you attribute the main cause of death of your colonies? (Please check every suspected cause and rank the causes according to their relative importance.)

	Cause of death	**Rank (1 = the most important)**
☐	Don't know	
☐	Starvation	
☐	Poor queens	
☐	Ineffective Varroa control	
☐	Nosema	
☐	Weather	
☐	Weak colonies in the fall	
☐	Other (Please specify) ________________________	
☐	Other (Please specify) ________________________	
☐	Other (Please specify) ________________________	

Appendix B: List of Canada's Provincial Apiculturists

NEWFOUNDLAND AND LABRADOR
Karen Kennedy, M.Sc. P.Ag.
Fruit Crop Development Officer
Provincial Apiarist
Forestry and Agrifoods Agency
4 Herald Ave, Corner Brook
Newfoundland & Labrador, A2H 6J8
☎ 709-637-2662 / 706-640-4634
✉ karenkennedy@gov.nl.ca

NOVA SCOTIA
Jason Sproule
Bee Health Advisor / Minor Use Pesticide Coordinator
Nova Scotia Department of Agriculture
P.O. Box 890 Harlow Building
Truro, NS, B2N 5G6
☎ 902-890-1565
✉ sprouljm@gov.ns.ca

QUÉBEC
Julie Ferland, DVM
Provincial Apiarist
Direction de la santé animale
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation
200, chemin Sainte-Foy, 11e étage
Québec (Québec), G1R 4X6
☎ 418-380-2100, ext. 2067
✉ julie.ferland2@mapaq.gouv.qc.ca

MANITOBA
Rhéal Lafrenière M.Sc. P.Ag.
Business Development Specialist - Provincial Apiarist
Manitoba Agriculture, Food and Rural Initiatives
Ag. Services Complex Bldg. 204-545
University Cres.
Winnipeg, MB, R3T 5S6
☎ 204-945-4825
✉ Rheal.Lafreniere@gov.mb.ca

PRINCE EDWARD ISLAND
Cameron Menzies
Provincial Apiarist/
Berry Crop Development Officer
PEI Department of Agriculture and Fisheries
Jones Building, 5th Floor
11 Kent Street, Charlottetown PE, C1A 7N8
☎ 902 314-0816
✉ crmenzies@gov.pe.ca

NEW BRUNSWICK
Chris Maund
Integrated Pest Management Specialist (Entomologist) and Provincial Apiarist
New Brunswick Department of Agriculture, Aquaculture and Fisheries
Crop Sector Development
Hugh John Flemming Complex
1350 Regent Street, P.O. Box 6000
Fredericton, NB, E3C 2G6
☎ 506-453-3477
✉ chris.maund@gnb.ca

ONTARIO
Paul Kozak
Provincial Apiarist
Ministry of Agriculture, Food and Rural Affairs
Foods of Plant Origin
Food Inspection Branch
1 Stone Road West, 5th Floor NW
Guelph, ON, N1G 4Y2
☎ 519-826-3595 or 1-888-466-2372, ext. 63595
✉ Paul.Kozak@ontario.ca

SASKATCHEWAN
Geoff Wilson M.Sc. P.Ag.
Provincial Specialist, Apiculture
Saskatchewan Ministry of Agriculture
800 Central Ave, Box 3003
Prince Albert, SK, S6V 6G1
☎ 306-980-6198
✉ Geoff.Wilson@gov.sk.ca

ALBERTA
Dr. Medhat Nasr
Alberta Provincial Apiculturist
Pest Surveillance Branch
Research and Innovation Division
Agriculture and Rural Development
17507 Fort Road NW
Edmonton, AB, T5Y 6H3
☎ 780 415-2314
✉ medhat.nasr@gov.ab.ca

BRITISH COLUMBIA
Paul van Westendorp
Provincial Apiculturist
BC Ministry of Agriculture
1767 Angus Campbell Road
Abbotsford, B.C., V3G 2M3
☎ 604-556-3129
✉ Paul.vanWestendorp@gov.bc.ca