CANADIAN NATIONAL HONEY BEE HEALTH SURVEY

Photo Credit: Carlos Castillo

2015 REPORT

British Columbia, Alberta, Manitoba & Ontario

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2015 Canadian National Honey Bee Health Survey

BRITISH COLUMBIA, ALBERTA, MANITOBA & ONTARIO

Summary

The National Honey Bee Health Survey is a four year, nation-wide project established to index the health of honey bee colonies in Canada. This initiative is similar to multi-year projects that are in progress within the European Union, Australia, New Zealand and the United States. The National Survey began in 2014 and is designed to be fully national in scope by 2017.

The purpose of this project, the first of its kind in Canada, is to document the prevalence, intensity and distribution of pests and pathogens in Canadian apiaries. The study proposes to analyze 0.5% of all registered hives in Canada. During the inaugural year (2014), 163 samples were collected from Alberta and Manitoba; by 2017, the survey aims to collect over 350 samples from all provinces.

Personnel employed or contracted by the National Bee Diagnostic Centre - Technology Access Centre (NBDC-TAC) and Agriculture & Agri-Food Canada (AAFC) collect samples beginning in July until the end of August. Sampling must be completed before fall treatment of colonies for *Varroa* or *Nosema*.

Each apiary-level sample is gathered from 10 randomly selected colonies (~100 bees/colony) for a total of ~1000 bees. Samples are analyzed for American Foulbrood (AFB) and antibiotic-resistant strains, European Foulbrood (EFB), *Nosema* infection level and species identification, *Varroa* mites, tracheal mites as well as exotic pests (*Tropilaelaps* mites). In addition, samples are tested for 7 honey bee viruses including: Acute Bee Paralysis Virus (ABPV), Black Queen Cell Virus (BQCV), Chronic Bee Paralysis Virus (CBPV), Deformed Wing Virus (DWV), Israeli Acute Bee Paralysis Virus (IAPV), Kashmir Bee Virus (KBV), and Sacbrood Virus (SBV). Field evaluations also take place at the 10 colonies to identify the following brood and adult clinical disease symptoms or other colony conditions: small hive beetle, AFB, EFB, Sacbrood, Chalkbrood, deformed-winged bees, black shiny bees, wax moth, queen cells and drone-laying queens.

The information generated by this survey will establish a record of pests, diseases and parasites affecting honey bees in Canada. This will play a central role in developing regional colony health management practices and will provide the best opportunity to identify exotic organisms before they establish themselves within Canadian bee populations.

This project will help beekeepers secure better production practices and ensure that Canada, as a country, has robust data to establish a bee health database- similar to other leading beekeeping countries in the world.

Table of Contents

Glossary

AAFC	Agriculture & Agri-Food Canada
AB	Alberta
ABPV	Acute Bee Paralysis Virus
AFB	American Foulbrood
BC	British Columbia
BQCV	Black Queen Cell Virus
CBPV	Chronic Bee Paralysis Virus
CFU	Colony Forming Unit
CRI	Centre for Research and Innovation
DNA	Deoxyribonucleic Acid
DWV	Deformed Wing Virus
EFB	European Foulbrood
GPRC	Grande Prairie Regional College
IAPV	Israeli Acute Paralysis Virus
KBV	Kashmir Bee Virus
MB	Manitoba
NBDC	National Bee Diagnostic Centre
ON	Ontario
PCR	Polymerase Chain Reaction
RNA	Ribonucleic Acid
SBV	Sacbrood Virus
TAC	Technology Access Centre

Survey Methodology

During the summer of 2015, 212 apiary samples were taken, representing 2,118 colonies from British Columbia, Alberta, Manitoba and Ontario.

All diagnostic tests were performed at the NBDC-TAC in Beaverlodge, Alberta.

Year Two: The survey expanded to the provinces of British Columbia and Ontario in 2015, in addition to Alberta and Manitoba, surveyed in 2014. Beekeepers included in the survey chose to participate on a voluntary basis; the survey targeted 0.5% of registered hives within provincial beekeeping regions.

Apiary Sampling: samples were taken between the beginning of July and the second week of September in 2015 before fall treatments for *Varroa* and *Nosema* were applied. Results were obtained from three types of composite samples that were collected from 10 randomly-chosen colonies at each apiary:

- **A live bee sample was collected and shipped directly to the NBDC.**
  The sample was immediately put into a -80^{0}C freezer to maintain the integrity of the RNA and DNA for further disease and pest analysis using molecular biology techniques.
- **Bees were submerged in 70% ethyl alcohol to determine *Varroa* mite levels.**
- **Material was collected from the "knock test" of a brood frame to identify the presence of *Tropilaelaps* spp. mites.**

Sample Distribution: see **Provincial Map Section** for detailed Figures outlining sample regions.

British Columbia	**30 Total Samples**
Fraser Valley	9 Samples
Kootenay	3 Samples
Northwest	3 Samples
Okanagan	5 Samples
Peace	3 Samples
Thompson/Cariboo	4 Samples
Vancouver	3 Samples
Alberta	**127 Total Samples**
Central	13 Samples
Northeast	14 Samples
Northwest	29 Samples
Peace	33 Samples
South	38 Samples
Manitoba	**40 Total Samples**
Central	10 Samples
Eastern Interlake	10 Samples
Northwest	10 Samples
Southern	10 Samples
Ontario	**15 Total Samples**
Central	1 Sample
Southeast	3 Samples
Southwest	11 Samples

Visual Inspection: The 3 central brood frames were examined for brood and adult clinical disease symptoms or other colony conditions in each of the 10 colonies sampled per apiary. Results were scored for the presence or absence of a symptom or condition.

Nosema Counting/Identification: Sixty bees were macerated and analyzed for *Nosema* spp. infections. Samples were examined using a haemocytometer under light microscopy (400x) to calculate a *Nosema* spore count. Additionally, DNA was extracted from the same maceration and a PCR protocol performed to identify *Nosema* species (*N. apis*, *N. ceranae,* or both).

Varroa Counting: Bees (~1,000) were collected in 70% ethyl alcohol and agitated with a laboratory bench-top shaker to dislodge mites for the *Varroa* mite analysis. Dislodged mites were counted to provide an infestation level of the apiary, expressed as the number of mites per 100 adult bees.

AFB Bacterial Culture: One hundred and twenty adult bees were tested for the presence or absence of *Paenibacillus larvae*, the bacterium that causes AFB. Each sample was cultivated in triplicate on diagnostic media plates that supported the growth of the bacterium. If present, the number of bacterial colonies that grew was scored as the number of colony forming units (CFU). Samples that tested positive for *Paenibacillus larvae* were further analyzed for resistance or sensitivity towards the antibiotics Oxytetracycline (Oxytet) and Tylosin, which are registered for the control of AFB in Canada.

AFB Risk: Apiaries were categorized into 4 nominal groups for their propensity to develop clinical symptoms of AFB. Risk categories were designated based on the average number of bacterial colony forming units (CFUs) that were cultivated on diagnostic media plates: *Not Detected, Possible Risk* (any apiary with 1-99 CFUs), *Moderate Risk* (any apiary with 100-999 CFUs) *and High Risk* (any apiary with >1,000 CFUs).

EFB PCR Detection: DNA was extracted from samples and a PCR protocol was applied to detect the presence or absence of EFB (*Melissococcus plutonius)*.

Tracheal Mites: PCR was used to detect the presence or absence of tracheal mites (*Acarapis woodi)* from extracted DNA. Samples positively identified with *Acarapis woodi* were further investigated; 20 bees from the apiary sample were dissected for tracheal mite identification.

Tropilaelaps Detection: Debris was collected by knocking an unsealed brood frame into a metal collection pan. The debris was screened for the presence of *Tropilaelaps* spp. mites under a dissecting microscope.

Viral Detection: RNA was extracted from 60 bees and analyzed for 7 viruses (ABPV, BQCV, CBPV, DWV, IAPV, KBV, and SBV) by PCR. Apiaries were scored as "Positive" for any detection level of the virus or "Negative" for the absence of the virus.

Provincial Maps

BRITISH COLUMBIA

Figure 1. Provincial map of British Columbia, includes 7 Regions: Fraser Valley, Kootenay, Northwest, Okanagan, Peace, Thompson/Cariboo, and Vancouver Coast.

ALBERTA

Figure 2. Provincial map of Alberta, includes 5 Regions: Central, Northeast, Northwest, Peace and South.

MANITOBA

Figure 3. Provincial map of Manitoba, includes 4 Regions: Central, Eastern Interlake, Northwest and Southern.

ONTARIO

Figure 4. Provincial map of Ontario, includes 4 Regions: Northern, Central, Southwest and Southeast.

Results

Visual Inspection

BRITISH COLUMBIA DISEASE/CONDITION INCIDENCE: 298 COLONIES*

DISEASE/ CONDITION	FRASER VALLEY	KOOTENAYS	NORTHWEST	OKANAGAN	PEACE	THOMPSON/ CARIBOO	VANCOUVER	PROVINCIAL AVERAGE
AFB	0%	0%	0%	0%	3.3%	0%	3.3%	0.7%
EFB	3.3%	0%	0%	0%	3.3%	0%	3.3%	1.7%
Sacbrood	0%	0%	0%	4.0%	0%	0%	0%	0.7%
Chalkbrood	6.7%	3.3%	13.3%	22.0%	6.7%	0%	0%	8.1%
Deformed Winged Bees	12.2%	13.3%	0%	2.0%	0%	13.2%	0%	7.1%
Black Shiny Bees	25.6%	0%	0%	6.0%	6.7%	0%	0%	9.4%
Small Hive Beetle	0%	0%	0%	0%	0%	0%	0%	0%
Wax Moth	0%	0%	0%	0%	0%	0%	0%	0%
Queen Cells Present	3.3%	0%	6.7%	2.0%	13.3%	0%	0%	3.4%
Drone-Laying Queen	1.1%	0%	0%	0%	0%	0%	0%	0.3%

Table 1. Visual inspection results for BC, identifying the presence or absence of brood and adult clinical disease symptoms or other colony conditions. The three central brood frames from the ten colonies sampled per apiary were inspected.

*2 colonies were unable to be inspected due to inclement weather conditions.

Visual Inspection

ALBERTA DISEASE/CONDITION INCIDENCE: 1,270 COLONIES

DISEASE/ CONDITION	CENTRAL	NORTHEAST	NORTHWEST	PEACE	SOUTH	PROVINCIAL AVERAGE
AFB	0%	0%	0%	1.8%	0%	0.5%
EFB	1.5%	0%	0%	0.6%	0.8%	0.6%
Sacbrood	0.7%	0%	0%	0%	1.1%	0.4%
Chalkbrood	2.3%	8.6%	3.1%	4.2%	7.9%	5.4%
Deformed Winged Bees	3.1%	0%	2.4%	0.6%	0.8%	1.3%
Black Shiny Bees	0%	0%	0.3%	0.9%	0.3%	0.4%
Small Hive Beetle	0%	0%	0%	0%	0%	0%
Wax Moth	0%	0%	0%	0%	0%	0%
Queen Cells Present	8.5%	9.3%	10.7%	4.6%	1.1%	5.8%
Drone-Laying Queen	2.3%	0%	0.7%	0.3%	1.3%	0.9%

Table 2. Visual inspection results for AB, identifying the presence or absence of brood and adult clinical disease symptoms or other colony conditions. The three central brood frames from the ten colonies sampled per apiary were inspected.

Visual Inspection

MANITOBA DISEASE/CONDITION INCIDENCE: 400 COLONIES

DISEASE/CONDITION	CENTRAL	EASTERN INTERLAKE	NORTHWEST	SOUTHERN	PROVINCIAL AVERAGE
AFB	1.0%	0%	1.0%	0%	0.5%
EFB	0%	0%	0%	0%	0%
Sacbrood	4.0%	0%	1.0%	0%	1.3%
Chalkbrood	0%	2.0%	12.0%	6.0%	5.0%
Deformed Winged Bees	1.0%	3.0%	0%	0%	1.0%
Black Shiny Bees	8.0%	0%	0%	0%	2.0%
Small Hive Beetle	0%	0%	0%	0%	0%
Wax Moth	0%	0%	0%	0%	0%
Queen Cells Present	0%	1.0%	0%	0%	0.3%
Drone-Laying Queen	0%	0%	0%	0%	0%

Table 3. Visual inspection results for MB, identifying the presence or absence of brood and adult clinical disease symptoms or other colony conditions. The three central brood frames from the ten colonies sampled per apiary were inspected.

Visual Inspection

ONTARIO DISEASE/CONDITION INCIDENCE: 150 COLONIES

DISEASE/CONDITION	CENTRAL	SOUTHEAST	SOUTHWEST	PROVINCIAL AVERAGE
AFB	0%	0%	0%	0%
EFB	0%	0%	0.9%	0.7%
Sacbrood	0%	0%	3.6%	2.7%
Chalkbrood	20.0%	0%	12.7%	10.7%
Deformed Winged Bees	0%	3.3%	4.6%	4.0%
Black Shiny Bees	0%	0%	7.3%	5.3%
Small Hive Beetle	0%	0%	0%	0%
Wax Moth	0%	0%	3.6%	2.7%
Queen Cells Present	0%	6.7%	1.8%	2.7%
Drone-Laying Queen	0%	0%	0%	0%

Table 4. Visual inspection results for ON, identifying the presence or absence of brood and adult clinical disease symptoms or other colony conditions. The three central brood frames from the ten colonies sampled per apiary were inspected.

Nosema (Provincial Incidence)

	Nosema Incidence
BC Fraser Valley	3 of 9 Apiaries
BC Kootenays	Not detected
BC Northwest	2 of 3 Apiaries
BC Okanagan	2 of 5 Apiaries
BC Peace	2 of 3 Apiaries
BC Thompson/Cariboo	Not detected
BC Vancouver	Not detected
BC Provincial Total	9 of 30 Apiaries
BC Provincial Incidence	30%
AB Central	9 of 13 Apiaries
AB Northeast	7 of 14 Apiaries
AB Northwest	12 of 29 Apiaries
AB Peace	13 of 33 Apiaries
AB South	30 of 38 Apiaries
AB Provincial Total	71 of 127 Apiaries
AB Provincial Incidence	56%
MB Central	7 of 10 Apiaries
MB Eastern Interlake	8 of 10 Apiaries
MB Northwest	7 of 10 Apiaries
MB Southern	8 of 10 Apiaries
MB Provincial Total	30 of 40 Apiaries
MB Provincial Incidence	75%
ON Central	1 of 1 Apiaries
ON Southeast	1 of 3 Apiaries
ON Southwest	3 of 11 Apiaries
ON Provincial Total	5 of 15 Apiaries
ON Provincial Incidence	33%

Table 5. *Nosema* incidence per provincial region and provincial total, identified by DNA extraction and PCR.

Nosema (Counting)

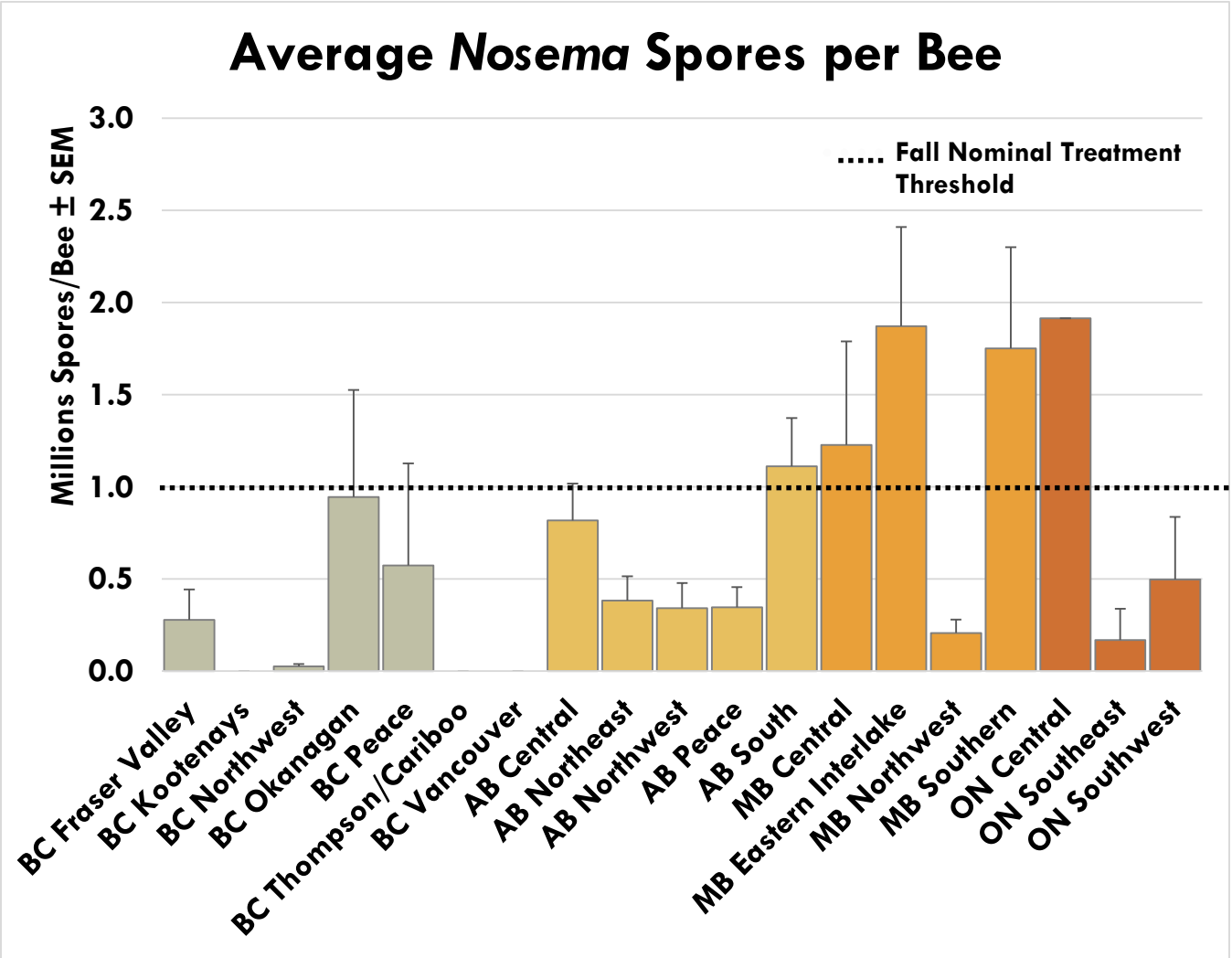

Figure 5. Average *Nosema* spore count per bee, enumerated with a haemocytometer under light microscopy (400x); reported per provincial region and quantified in the millions of spores per bee.

Nosema (Counting)

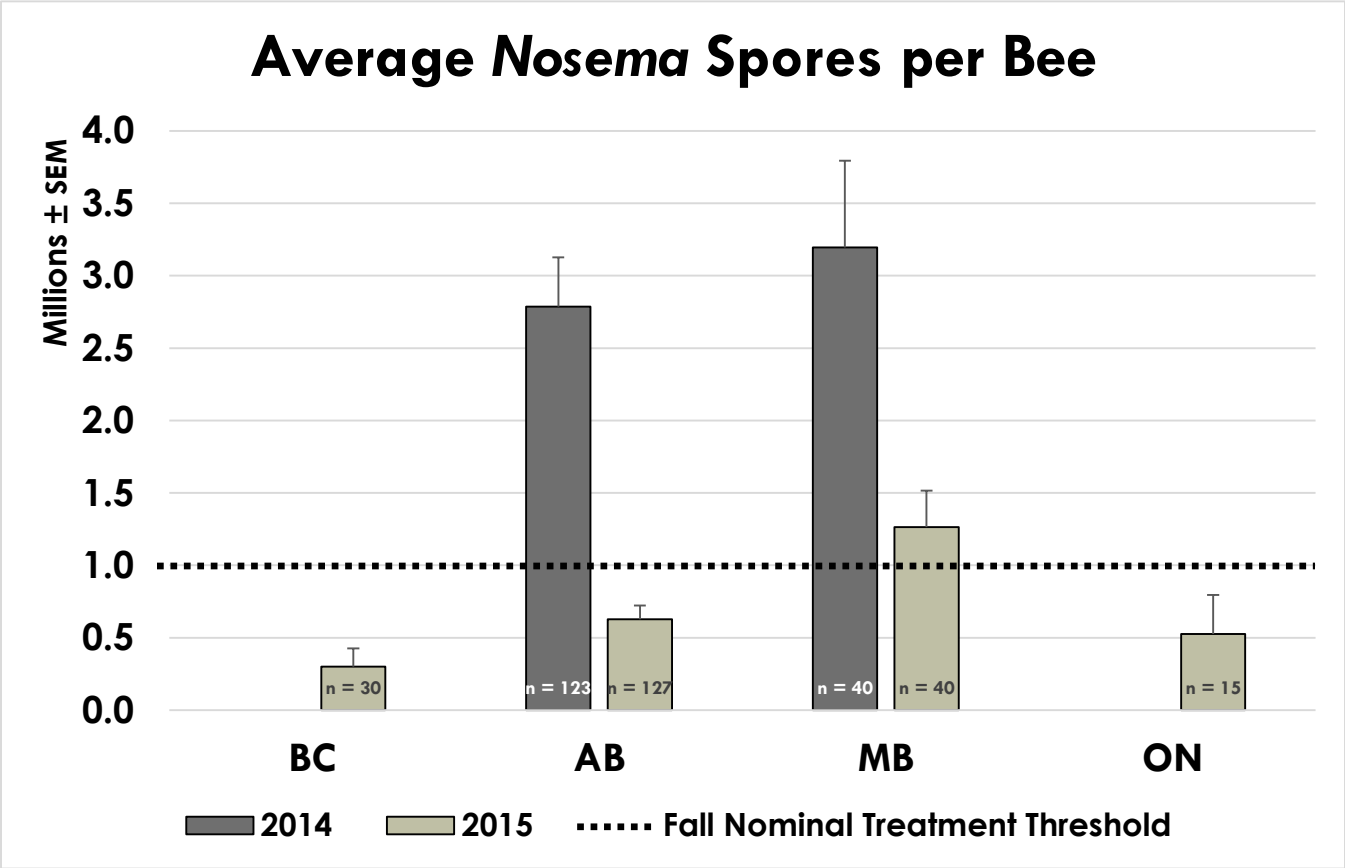

Figure 6: Average *Nosema* spore count per bee, enumerated with a haemocytometer under light microscopy (400x); reported by provincial average for 2014 and 2015. The average *Nosema* spore count is represented in millions of spores per bee. The total number of samples taken from each province (n) is noted within each bar.

Nosema (Identification)

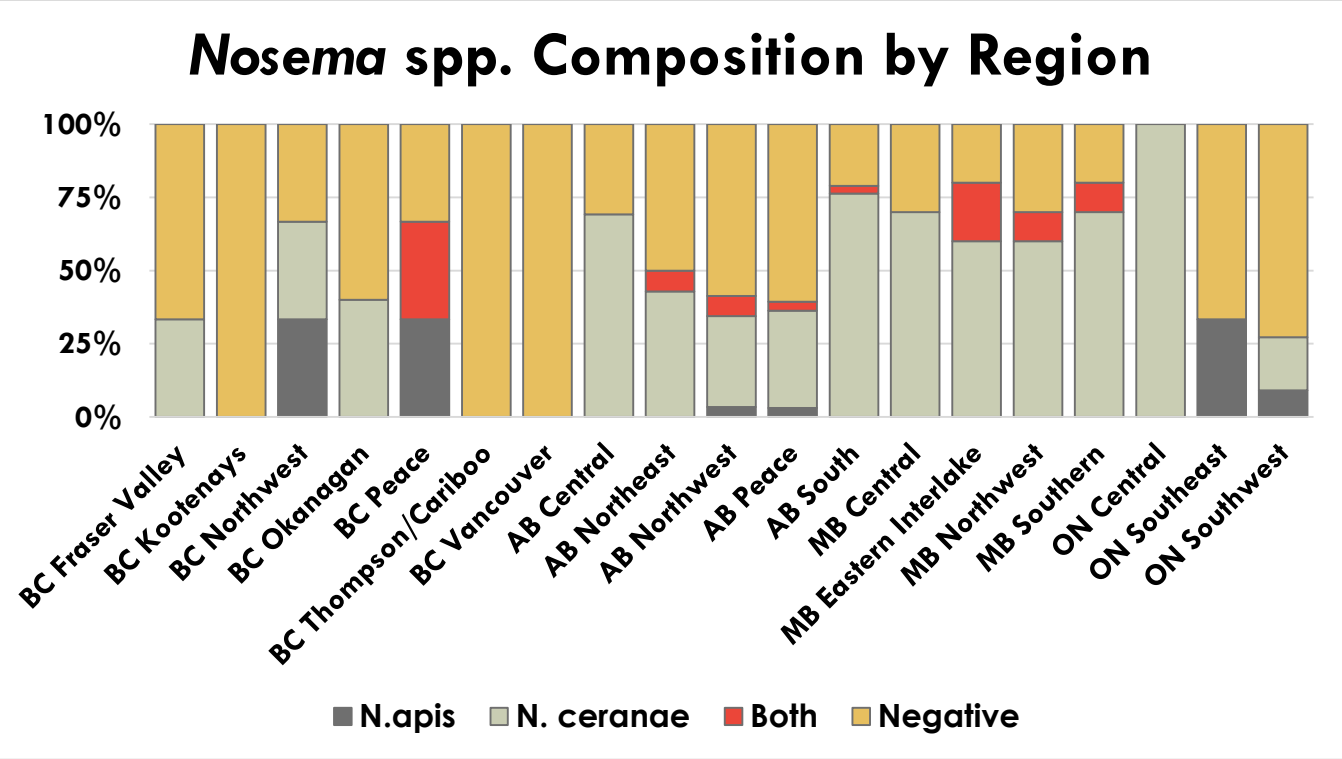

Figure 7. *Nosema* spp. composition by provincial region in 2015 detected by DNA extraction and PCR.

Varroa (Provincial Incidence)

	Varroa Incidence
BC Fraser Valley	9 of 9 Apiaries
BC Kootenays	3 of 3 Apiaries
BC Northwest	2 of 3 Apiaries
BC Okanagan	4 of 5 Apiaries
BC Peace	1 of 3 Apiaries
BC Thompson/Cariboo	4 of 4 Apiaries
BC Vancouver	3 of 3 Apiaries
BC Provincial Total	26 of 30 Apiaries
BC Provincial Incidence	87%
AB Central	10 of 13 Apiaries
AB Northeast	8 of 14 Apiaries
AB Northwest	20 of 29 Apiaries
AB Peace	27 of 33 Apiaries
AB South	21 of 38 Apiaries
AB Provincial Total	86 of 127 Apiaries
AB Provincial Incidence	68%
MB Central	9 of 10 Apiaries
MB Eastern Interlake	8 of 10 Apiaries
MB Northwest	7 of 10 Apiaries
MB Southern	6 of 10 Apiaries
MB Provincial Total	30 of 40 Apiaries
MB Provincial Incidence	75%
ON Central	1 of 1 Apiaries
ON Southeast	3 of 3 Apiaries
ON Southwest	11 of 11 Apiaries
ON Provincial Total	15 of 15 Apiaries
ON Provincial Incidence	100%

Table 6. *Varroa* incidence per provincial region and provincial total, detected using laboratory alcohol washes of adult bees.

Varroa (Counting)

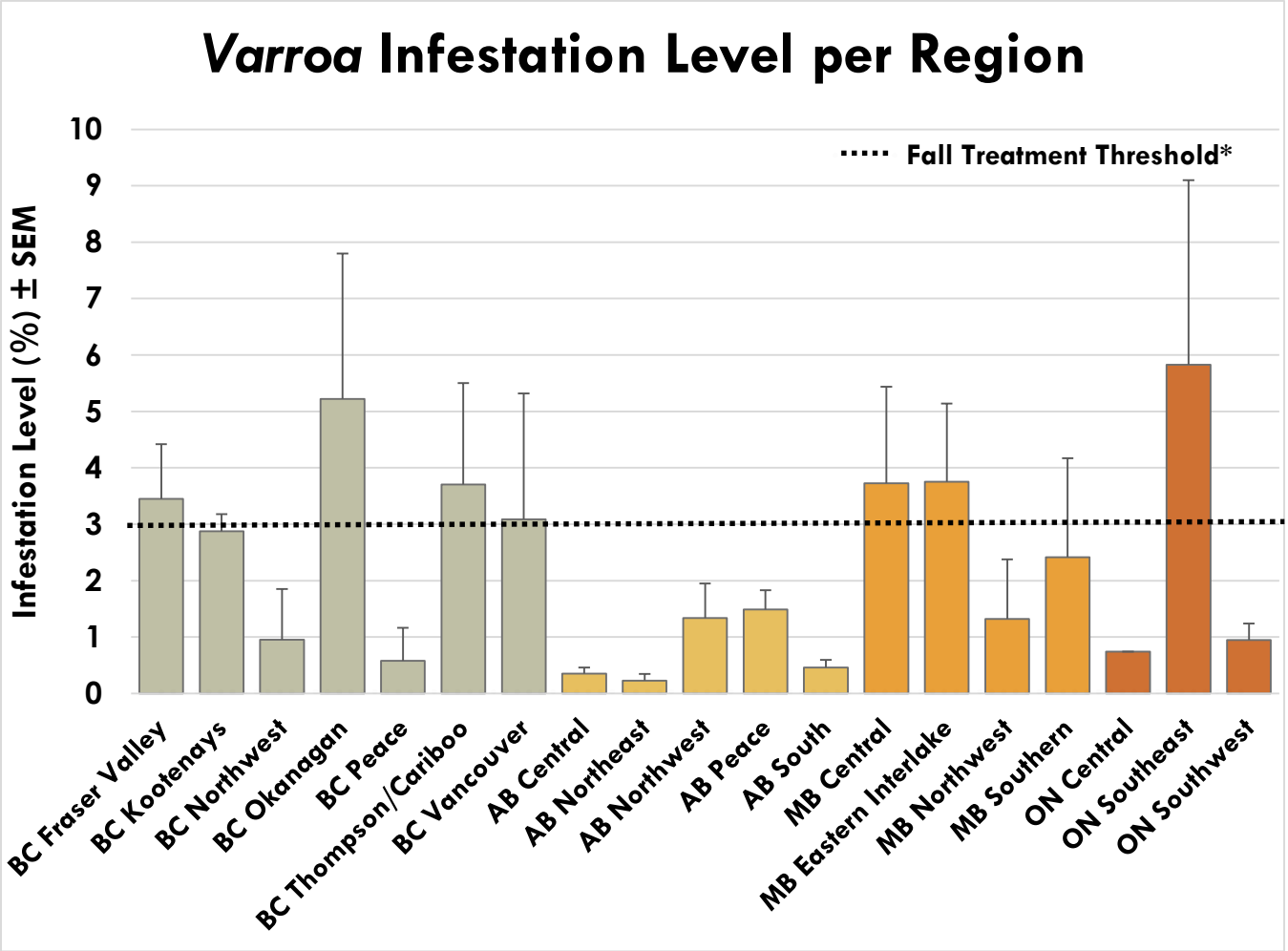

Figure 8. Average *Varroa* infestation level per provincial region, expressed as the number of mites per 100 adult bees.

*Currie, R.W. 2008. *Economic Threshold for Varroa on the Canadian Prairies*. University of Manitoba, Dept. of Entomology.

Varroa (Counting)

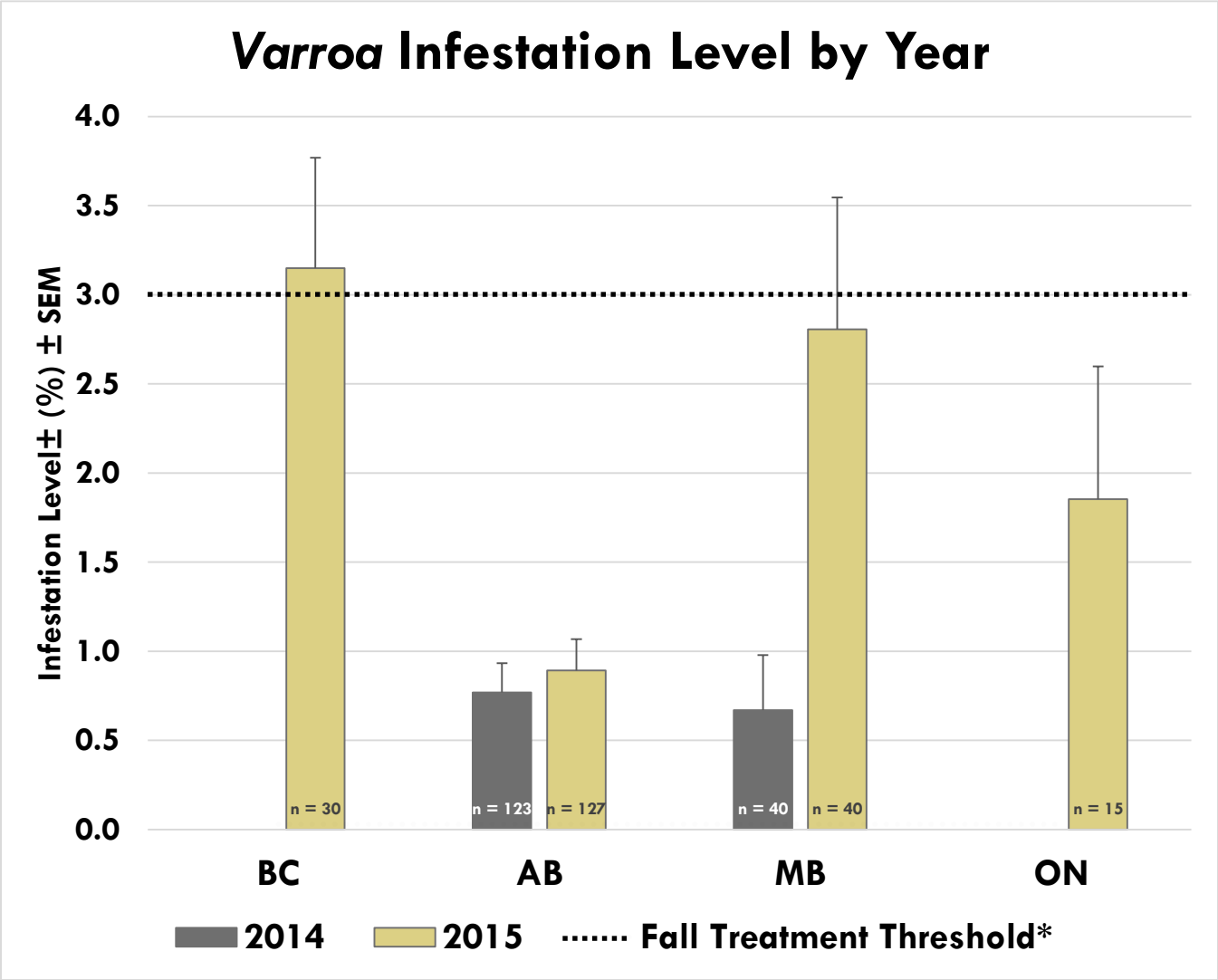

Figure 9. Average *Varroa* infestation level per province in 2014 and 2015, expressed as the number of mites per 100 adult bees. The total number of samples taken from each province (n) is noted within each bar.

*Currie, R.W. 2008. *Economic Threshold for Varroa on the Canadian Prairies*. University of Manitoba, Dept. of Entomology.

AFB (Bacterial Culture)

Region	AFB (+)	AFB (-)
BC Fraser Valley	1	8
BC Kootenays	1	2
BC Northwest	0	3
BC Okanagan	0	5
BC Peace	0	3
BC Thompson/Cariboo	0	4
BC Vancouver	1	2
AB Central	0	13
AB Northeast	0	14
AB Northwest	3	26
AB Peace	6	27
AB South	7	31
MB Central	1	9
MB Eastern Interlake	1	9
MB Northwest	2	8
MB Southern	0	10
ON Central	0	1
ON Southeast	0	3
ON Southwest	0	11

Table 7. Incidence of apiaries positive (AFB +) or negative (AFB-) for the presence of *P. larvae*, as determined by bacterial culture of adult bee samples, per provincial region.

AFB (Bacterial Culture)

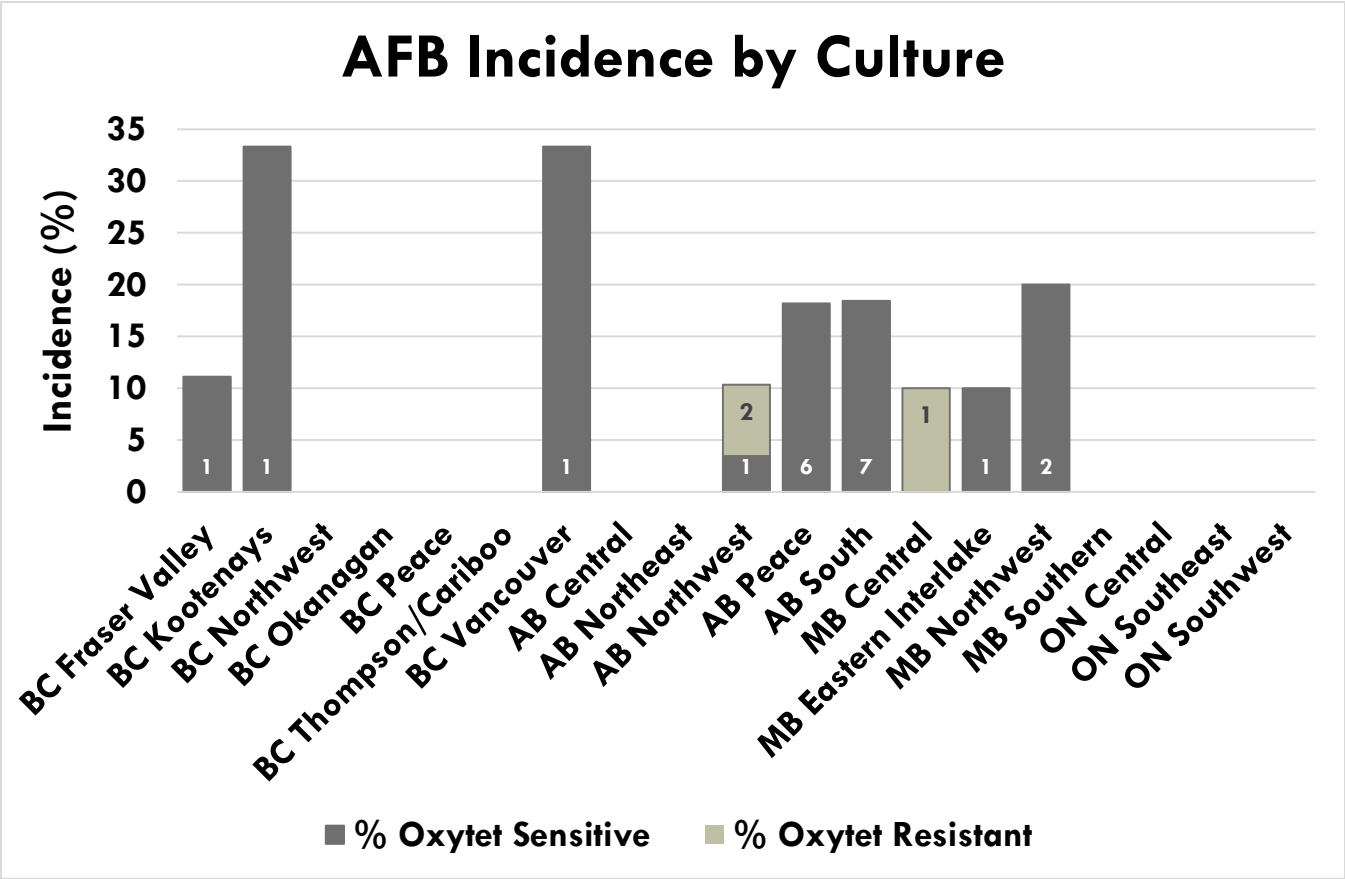

Figure 10. AFB incidence per apiary detected by bacterial culture of adult bees, summarized by provincial region. Samples for which AFB could be cultivated were further analyzed for resistance or sensitivity to Oxytetracycline (Oxytet) and Tylosin*. Only 2 apiaries in Northwest Alberta and 1 in Central Manitoba were Oxytet Resistant. The total number of AFB positive samples that were Oxytet sensitive or resistant per provincial region are listed within each bar.

*All samples positive for AFB were sensitive to Tylosin.

AFB (Bacterial Culture)

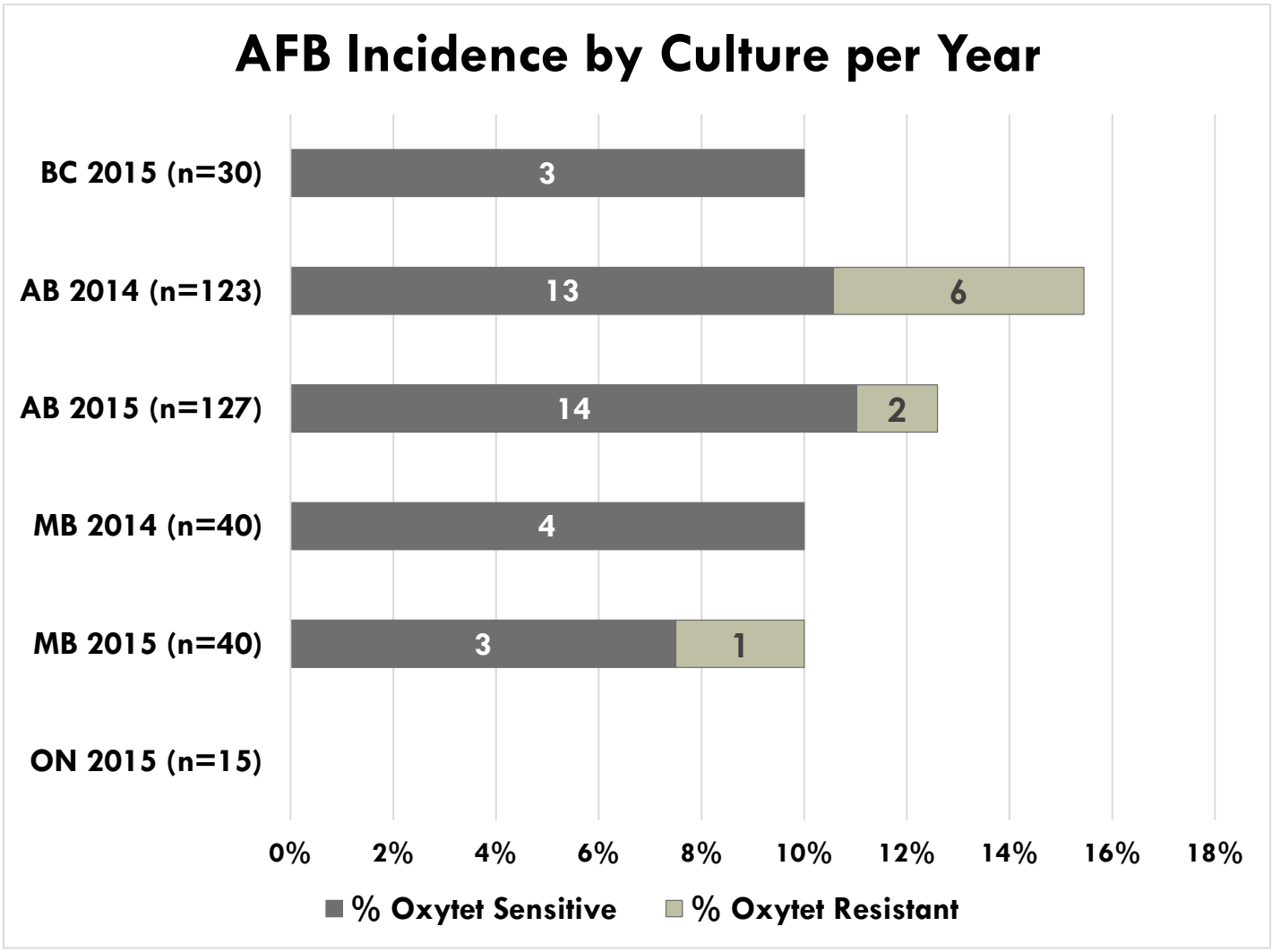

Figure 11. AFB incidence per province by bacterial culture in 2014 and 2015. The total number of AFB positive samples that were Oxytet sensitive or resistant per province are listed within each bar. The total number of samples taken from each province (n) is listed.

AFB (Bacterial Culture)

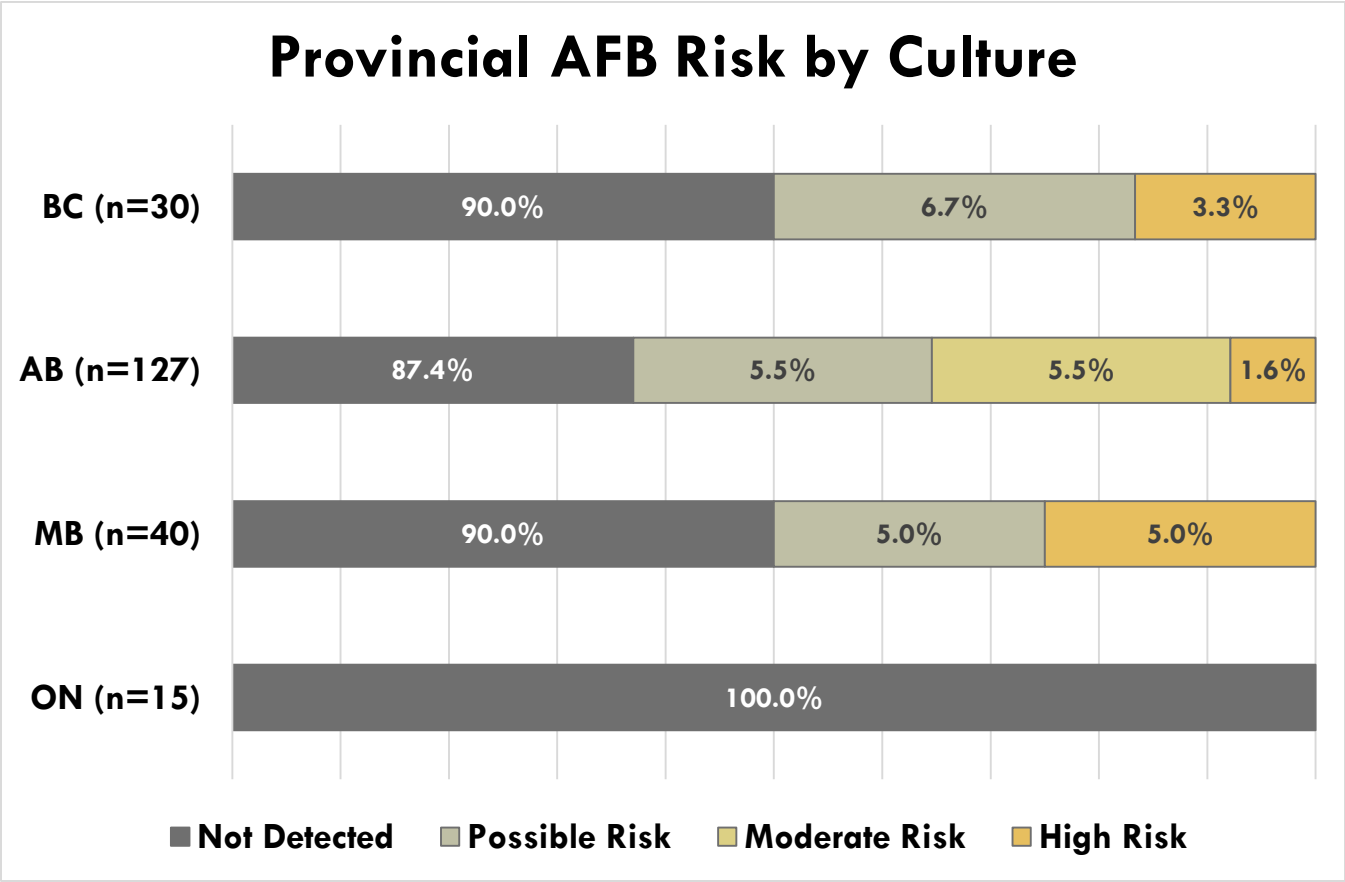

Figure 12. AFB risk designated per province, assessed by the average number of bacterial CFUs cultivated on diagnostic media plates per apiary sample. Apiaries were categorized based on the following results: Possible Risk (1-99 CFUs), Moderate Risk (100-999 CFUs), High Risk (>1,000 CFUs) or Not Detected. The total number of samples taken from each province (n) is listed.

EFB (PCR)

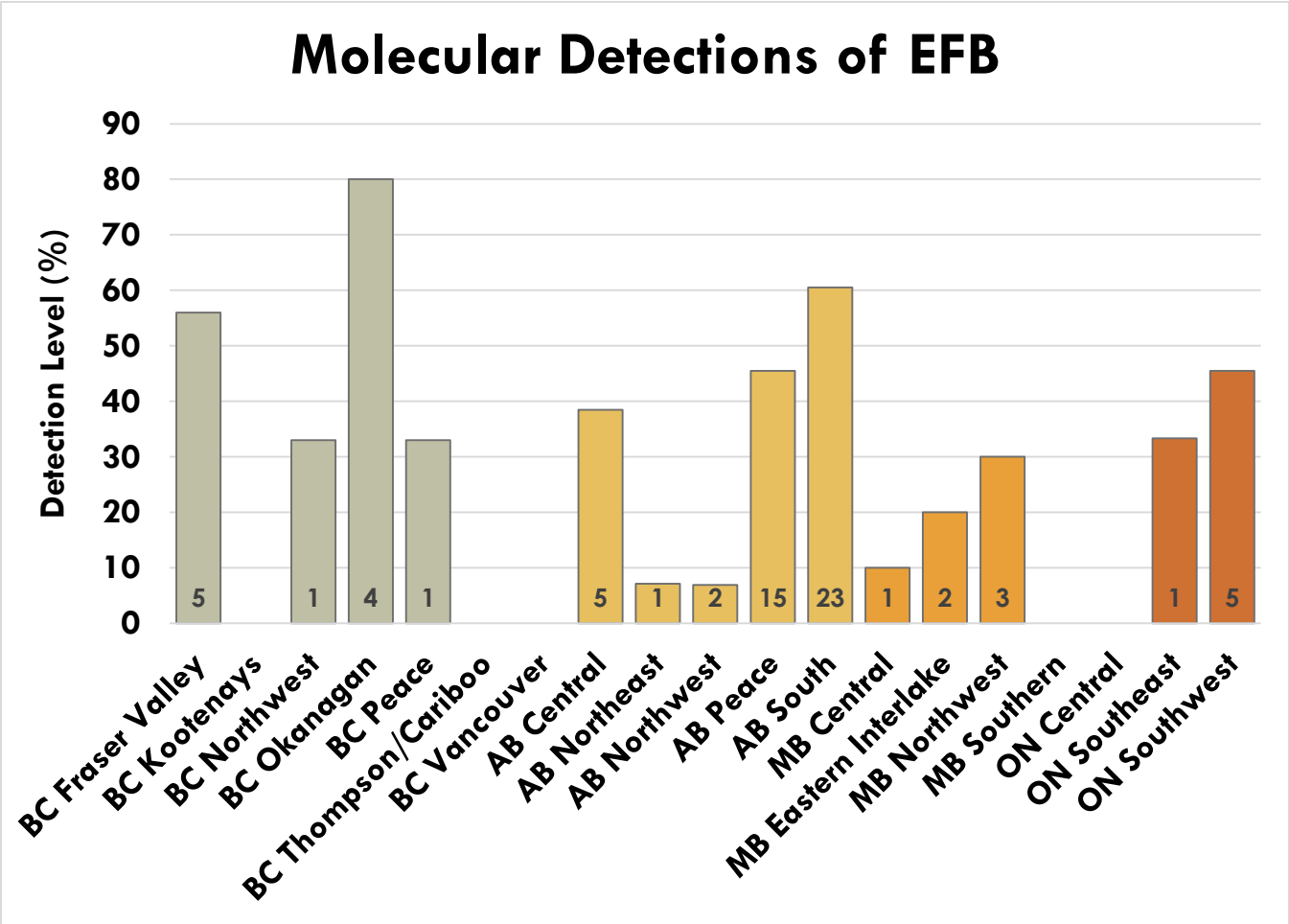

Figure 13. Molecular detection of EFB per provincial region, detected by PCR*. The total number of EFB positive samples are listed within each bar per provincial region.

**Positive detection by PCR does not conclusively diagnose an active condition within the apiary.*

EFB (PCR)

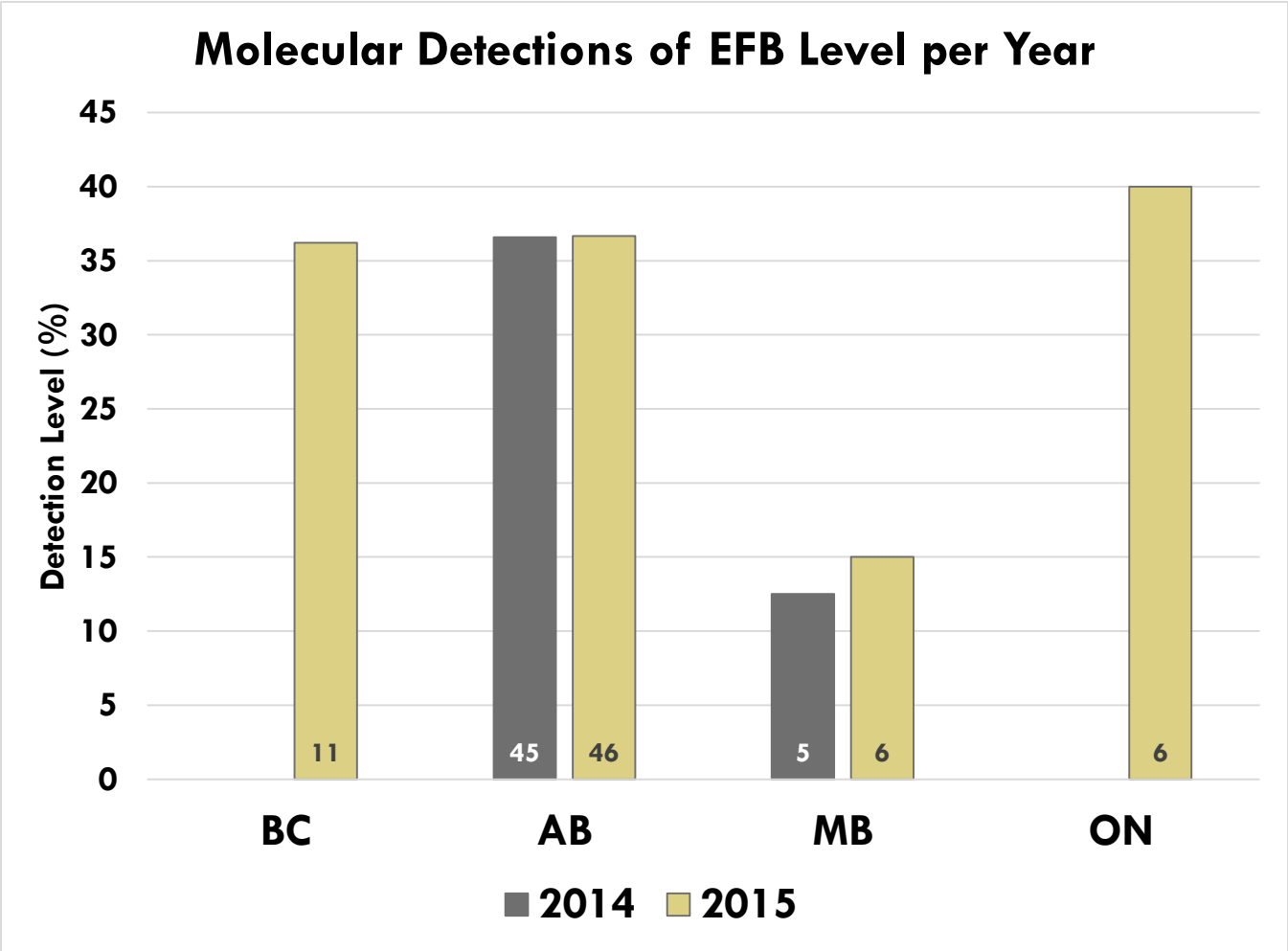

Figure 14. Molecular detection of EFB per province in 2014 and 2015, detected by PCR*. The total number of EFB positive samples (n) are listed within each bar per province.

**Positive detection by PCR does not conclusively diagnose an active condition within the apiary.*

Tracheal Mites (PCR & Dissection)

In the **2014 Survey,** no tracheal mites were found in any samples from **Alberta** and **Manitoba.**

In the **2015 Survey,** no tracheal mites were found in any samples from **British Columbia** or **Ontario.** In **Alberta: 6/127 Samples** and in **Manitoba: 1/40 Samples** tested **positive** for tracheal mites by PCR detection. A detailed listing of the positive regions is provided below.

ALBERTA	TM (+)
AB Central	0
AB Northeast	1
AB Northwest	1
AB Peace	1
AB South	3
Provincial Total	**6**
Provincial TM (+) Percentage	**4.72%**

MANITOBA	TM (+)
MB Central	1
MB Eastern Interlake	0
MB Northwest	0
MB Southern	0
Provincial Total	**1**
Provincial TM (+) Percentage	**2.50%**

Tropilaelaps (Visual Analysis of "Knock" Sample)

In the **2014 Survey,** no *Tropilaelaps* specimens were found in any samples from **Alberta** and **Manitoba.**

In the **2015 Survey,** no *Tropilaelaps* specimens were found in any samples from **British Columbia, Alberta, Manitoba** nor **Ontario.**

Viral Incidence (PCR Detection)

	ABPV	BQCV	CBPV	DWV	IAPV	KBV	SBV
BC Fraser Valley	0%	100%	0%	78%	11%	11%	89%
BC Kootenays	0%	33%	0%	33%	0%	33%	67%
BC Northwest	0%	67%	0%	33%	0%	0%	33%
BC Okanagan	0%	100%	20%	40%	20%	20%	40%
BC Peace	0%	100%	0%	33%	33%	33%	100%
BC Thompson/Cariboo	0%	100%	0%	0%	0%	0%	100%
BC Vancouver	0%	100%	0%	67%	0%	0%	67%
AB Central	0%	100%	31%	46%	46%	46%	100%
AB Northeast	0%	100%	43%	64%	29%	21%	100%
AB Northwest	0%	100%	28%	55%	38%	21%	100%
AB Peace	0%	100%	39%	48%	18%	15%	100%
AB South	0%	100%	18%	34%	45%	37%	100%
MB Central	0%	100%	20%	70%	40%	10%	90%
MB Eastern Interlake	0%	100%	30%	60%	50%	0%	100%
MB Northwest	0%	100%	0%	80%	80%	20%	100%
MB Southern	0%	100%	10%	40%	30%	10%	100%
ON Central	0%	100%	0%	100%	0%	100%	100%
ON Southeast	0%	100%	33%	100%	33%	33%	100%
ON Southwest	36%	100%	27%	100%	27%	36%	100%

Table 8. Viral incidence per provincial region detected from extracted RNA and PCR; apiaries were scored as 'Positive' for any detection level of the virus or 'Negative' for the absence of the virus.

**Positive detection by PCR does not conclusively diagnose an active condition within the apiary.*

Viral Incidence (PCR Detection)

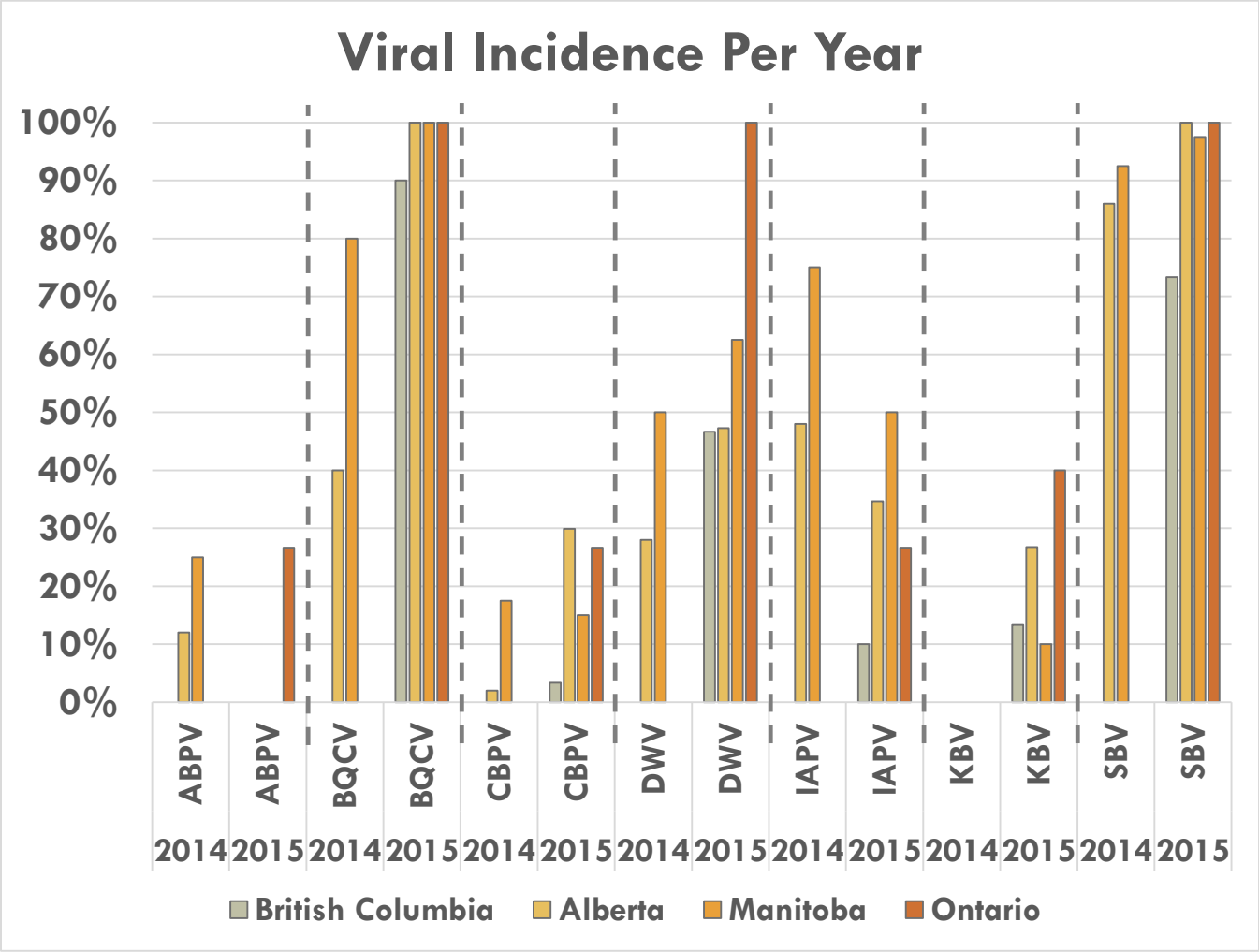

Figure 15. Viral incidence per province for 2014 and 2015 detected from extracted RNA and PCR; apiaries were scored as 'Positive' for any detection level of the virus or 'Negative' for the absence of the virus.

**Positive detection by PCR does not conclusively diagnose an active condition within the apiary.*

Notes

Sample Regions

The protocol for Year Two (2015) included sampling in Alberta, Manitoba, and expansion into British Columbia and Saskatchewan. The Saskatchewan Beekeepers Association declined to participate in the Survey; therefore, we advanced sampling in Ontario to 2015. Fifteen samples were taken from Ontario in 2015 and the goal of 50 samples in 2016 will proceed as scheduled.

In British Columbia, composite samples were collected from 30 apiaries in 2015. Due to inclement weather conditions, 2 colonies were unable to be sampled from at one apiary, resulting in a total of 298 colonies for the Province.

Testing Limitations

The use of PCR is an effective diagnostic technique, but it is also very sensitive. Therefore, a *positive detection does not conclusively diagnose an active condition*. Specifically, PCR detection of EFB and the viral panel require further development, such as quantitative PCR, to conclusively associate positive detections with possible clinical symptoms in an apiary.

Preliminary Results

All 212 apiary samples were collected between July and early September, before any fall treatments were applied to hives. Results were obtained from the individual analyses of samples and reported as averages per provincial region and total per province.

- *Nosema* infection was detected in 16 of the 19 provincial regions in BC, AB, MB and ON. Only three BC regions, Kootenay, Thompson/Cariboo and Vancouver, did not show presence of *Nosema*. The highest level of spores provincially was reported in MB with 1.5 million spores/bee and the lowest level was in BC with 0.3 million spores/bee. *Nosema* infection in AB and MB declined from levels reported in 2014.

- Further, *Nosema ceranae* was the most prevalent species within and between provinces. It was present as a single or mixed infection in all regions where *Nosema* was detected, except in southeast ON where only *N. apis* was identified. *N. apis* was not detected as a single infection in any region of MB.

- *Varroa* was detected in all regions sampled in 2015, with provincial infestation levels ranging from 0.8% in AB to 3.2% in BC. *Varroa* increased in both AB and MB with respect to the 2014 sample year.

Preliminary Results, Con't

- Upon visual inspection, provincial AFB incidence ranged from 0% in ON to 0.7% in BC. When cultivated in the lab, AFB was detected in samples from 9 of the 19 regions and was absent from all ON samples. Incidence of AFB by culture ranged from 10% in both MB and BC to 12.5% in AB. Additionally, the proportion of samples that were high risk (>1,000 CFUs) were 5% in MB, 3.3% in BC and 1.6% in AB. Only three AFB cases indicated resistance to the antibiotic Oxytetracycline, 2 in AB and 1 in MB. All AFB positive samples were susceptible to the antibiotic Tylosin.

- The most prevalent viruses detected in the survey were Black Queen Cell Virus (BQCV) and Sacbrood Virus (SBV). Conversely, Acute Bee Paralysis Virus (ABPV) was entirely absent in BC, AB, and MB- only identified in samples from southwest ON.

- *Tropilalaeps* was not identified in any of the 212 composite samples collected.

Closing Remarks

The Canadian National Honey Bee Health Survey was initiated to create a baseline record of pests, diseases and parasites affecting honey bees in Canada. This report presents results from apiary samples collected in British Columbia, Alberta, Manitoba and Ontario during 2015.

Year One (2014) launched the survey in Alberta and Manitoba, resulting in samples from 163 apiaries.

Year Two (2015) of the project expanded the evaluation of apiary health to 2 additional provinces (British Columbia and Ontario), resulting in samples from 212 apiaries.

Year Three (2016) will introduce the survey to Eastern Canada (additional apiaries in Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador).

Year Four (2017) is designed to capture every province in Canada to become fully national. The survey will also expand the panel of diagnostics to include: molecular detection of Africanized bees and additional viruses (Lake Sinai Virus and Slow Bee Paralysis Virus). As the final year of the proposed survey, results from all years will be analyzed in depth to create a detailed summary of honey bee health for Canada. In addition, chemical residue analyses will be performed from beebread taken from the sampled colonies.

Considering the current health concerns of honey bee populations in North America, the Canadian National Honey Bee Health Survey will provide vital information to allow beekeepers to maintain a sustainable apiculture industry.

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