



Queen Health – Evaluation of Imported and Local Queens in Canada

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National Bee Diagnostic Centre
Technology Access Centre

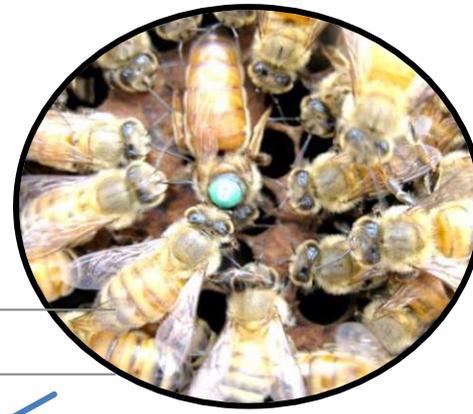


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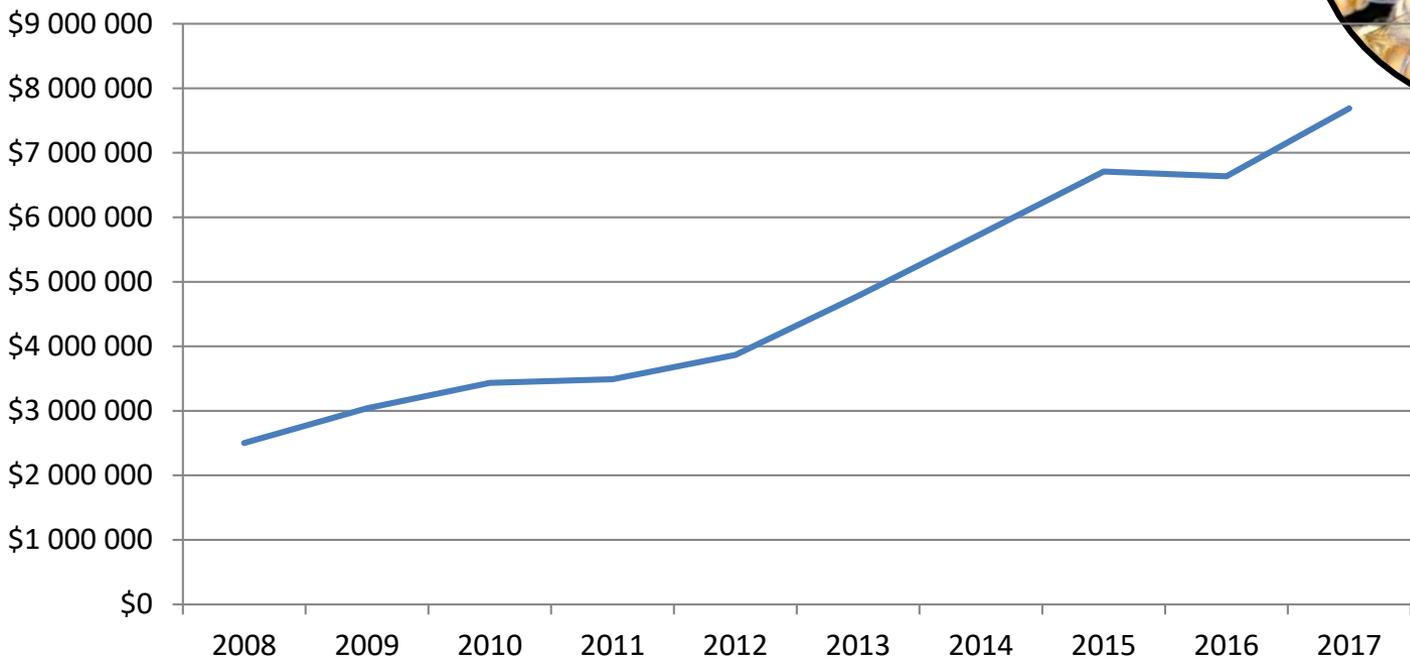
Beaverlodge, AB

NBDC is the first comprehensive laboratory in Canada to provide a full array of diagnostic services exclusively for bee pathogens.

We are one of the NSERC funded Technology Access Centres, committed to applied research, training , outreach and innovation.



Canada imports of queens



In 2017, Canada imports of queens were \$ 7.6 million:

United States - \$7.1 million

Australia - \$0.2 million

Chile- \$0. 2 million

Others: < \$0.1 million (New Zealand; Denmark)

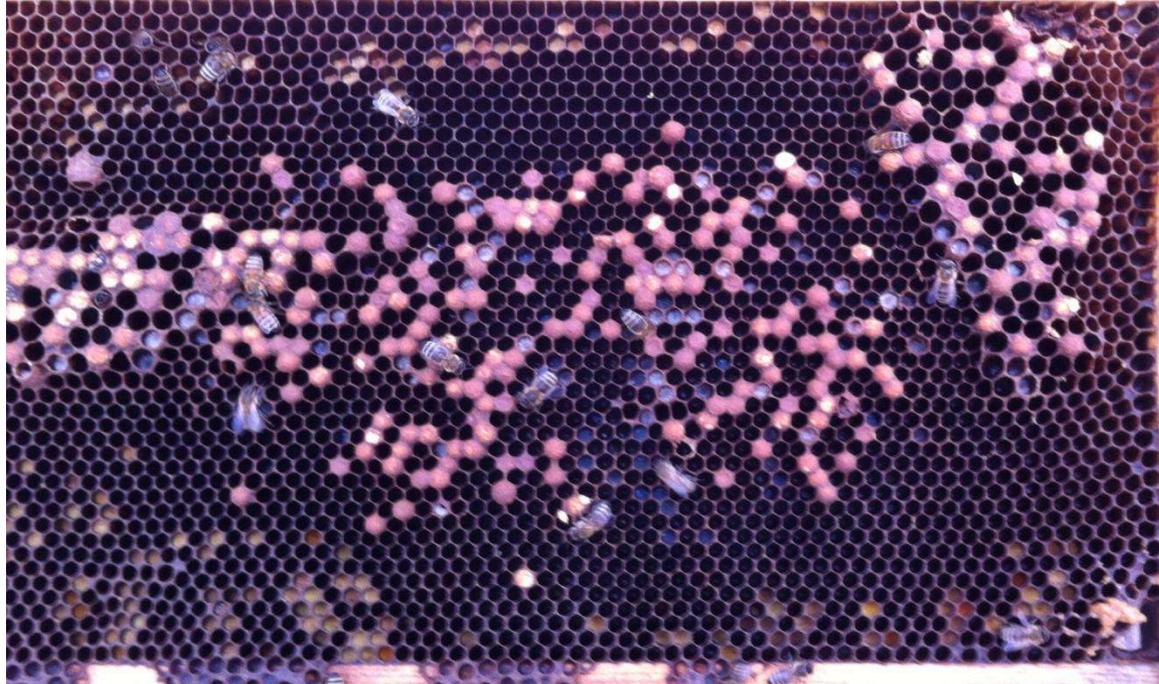
Source: Statistics Canada (CATSNET, May 2018)

Table 2: Top four ranked possible main causes of honey bee colony mortality by province, as cited by beekeepers who responded to the 2016/2017 winter loss survey.

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

'Poor Queens'

- Premature queen replacement;
- Drone layer
- Poor brood pattern
- Susceptibility to diseases



Queen Health – Evaluation of Imported and Local Queens

Queens Sources:

- Queens produced by in Canada
- Queens imported from other countries



New Queens

As they arrive



- Sperm count and sperm viability
- Pathogen :
 - Nosema
 - Tripanosomids
 - Viruses



Local Queen Sources:

- Alberta
- British Columbia
- Saskatchewan
- Ontario
- Quebec

Imported Queen Sources:

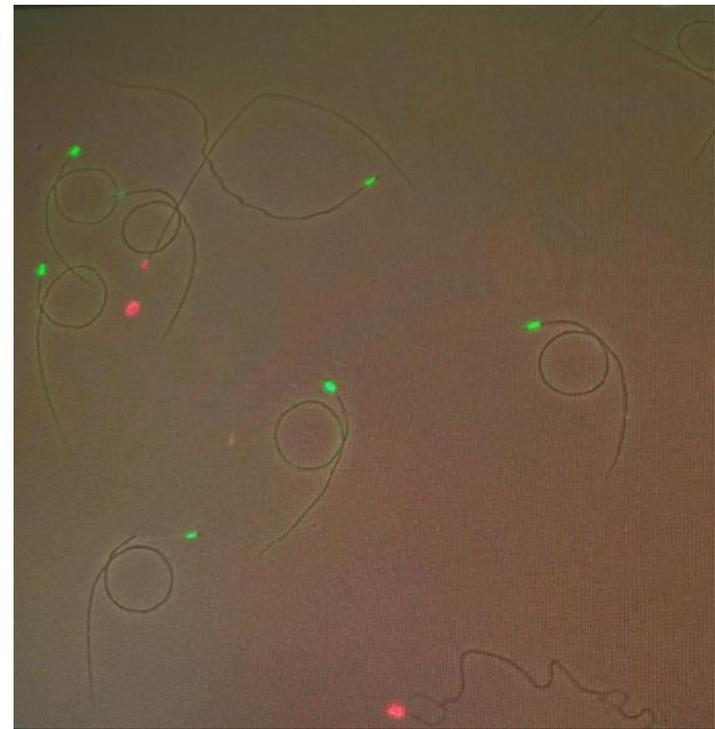
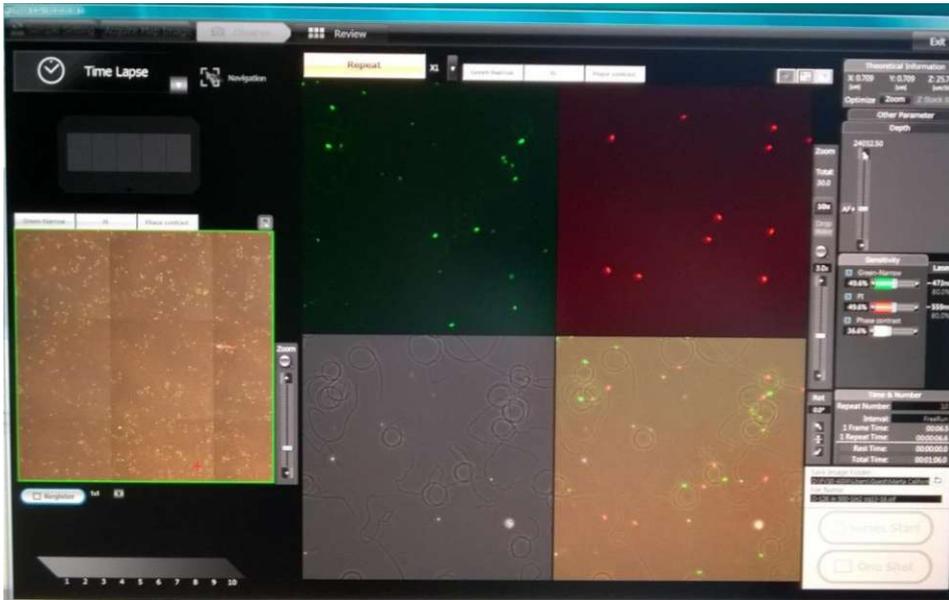
- California
- Hawaii
- Australia
- Chile
- New Zealand

Number of queens analyzed 2014 -2017: 167 Local and 176 Imported

Local Queen Sources (“Canadian Queens”)

NBDC lab





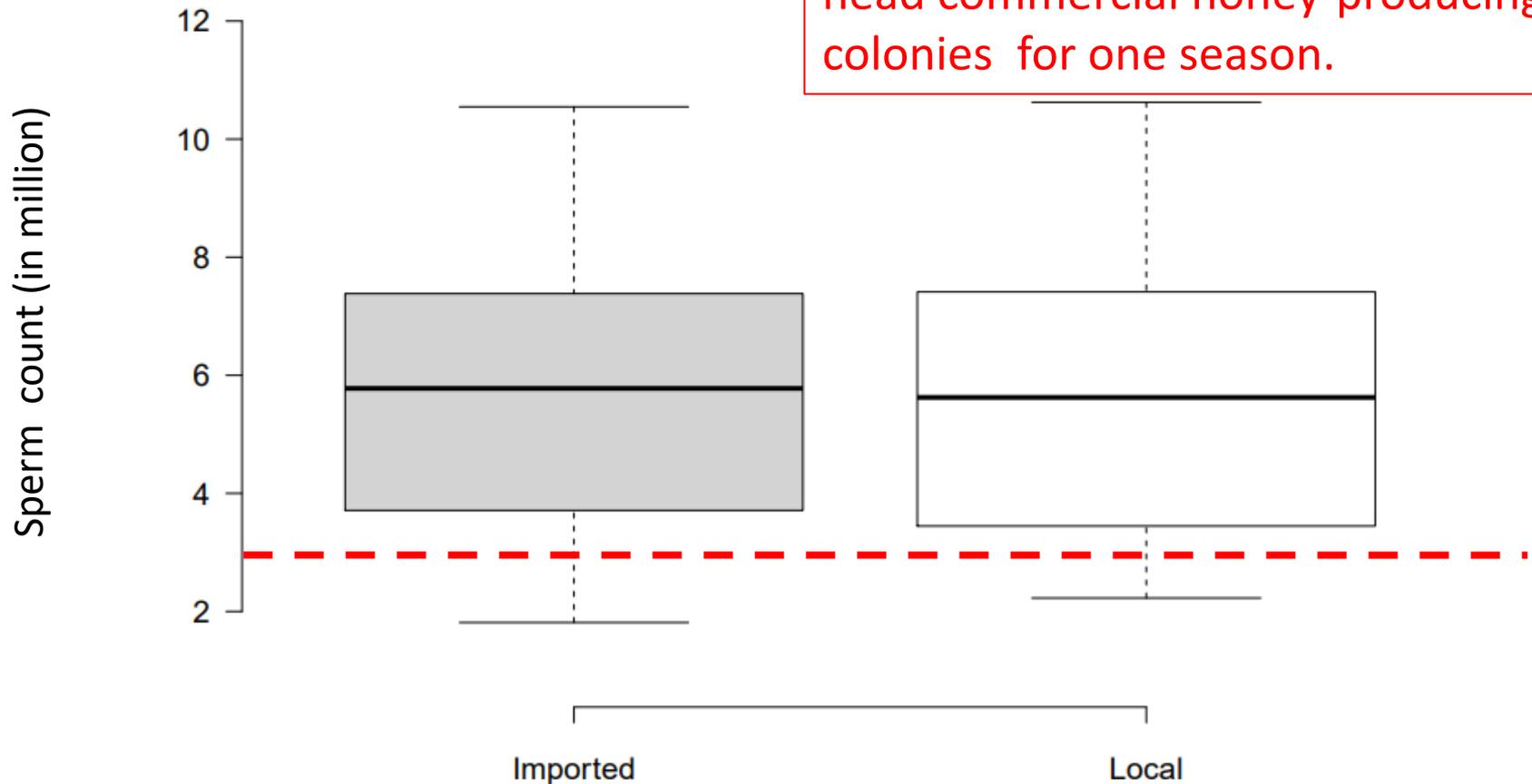
SYBR 14= Live
PI= Dead



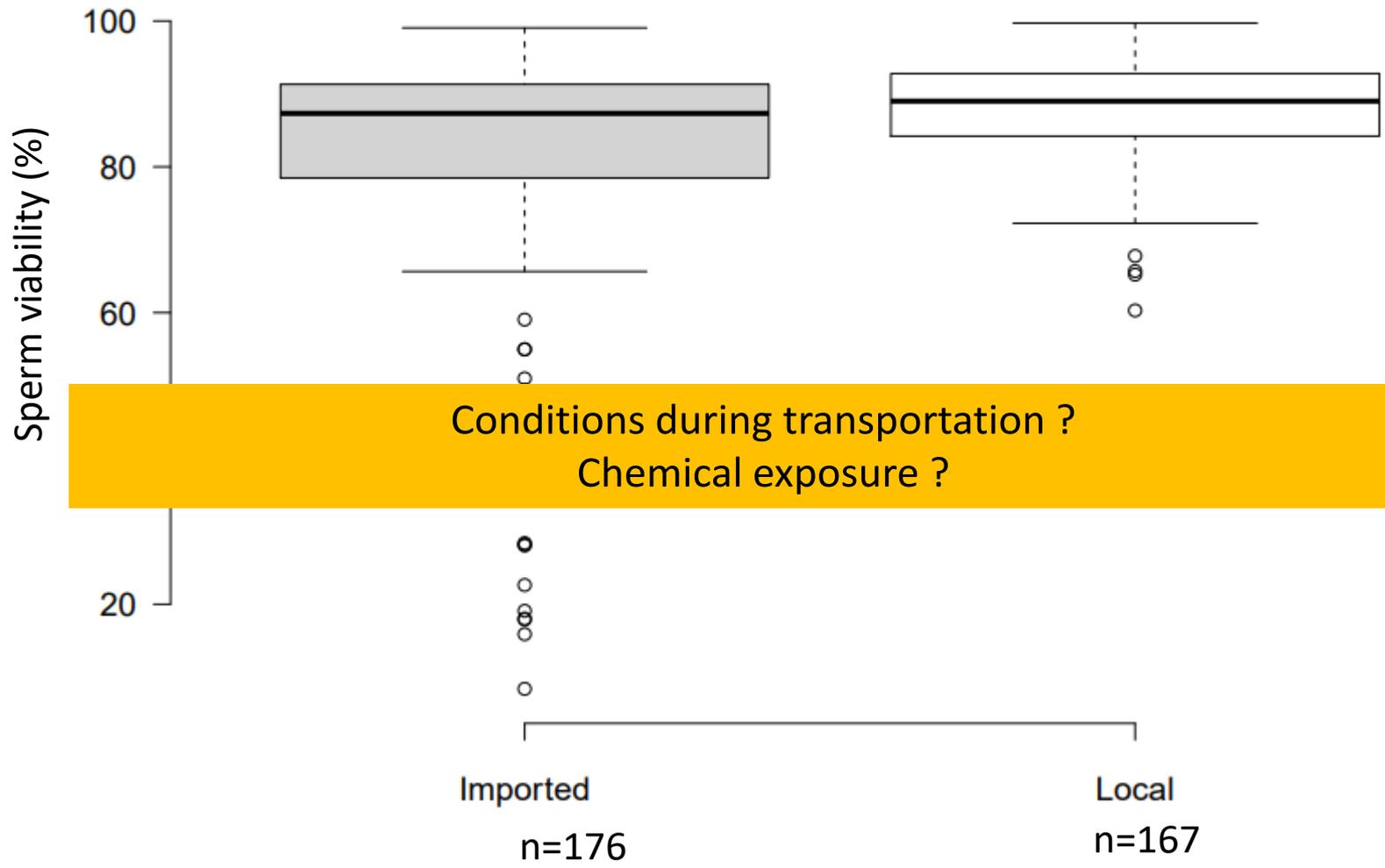


Sperm Count Imported vs Local 2014-2017

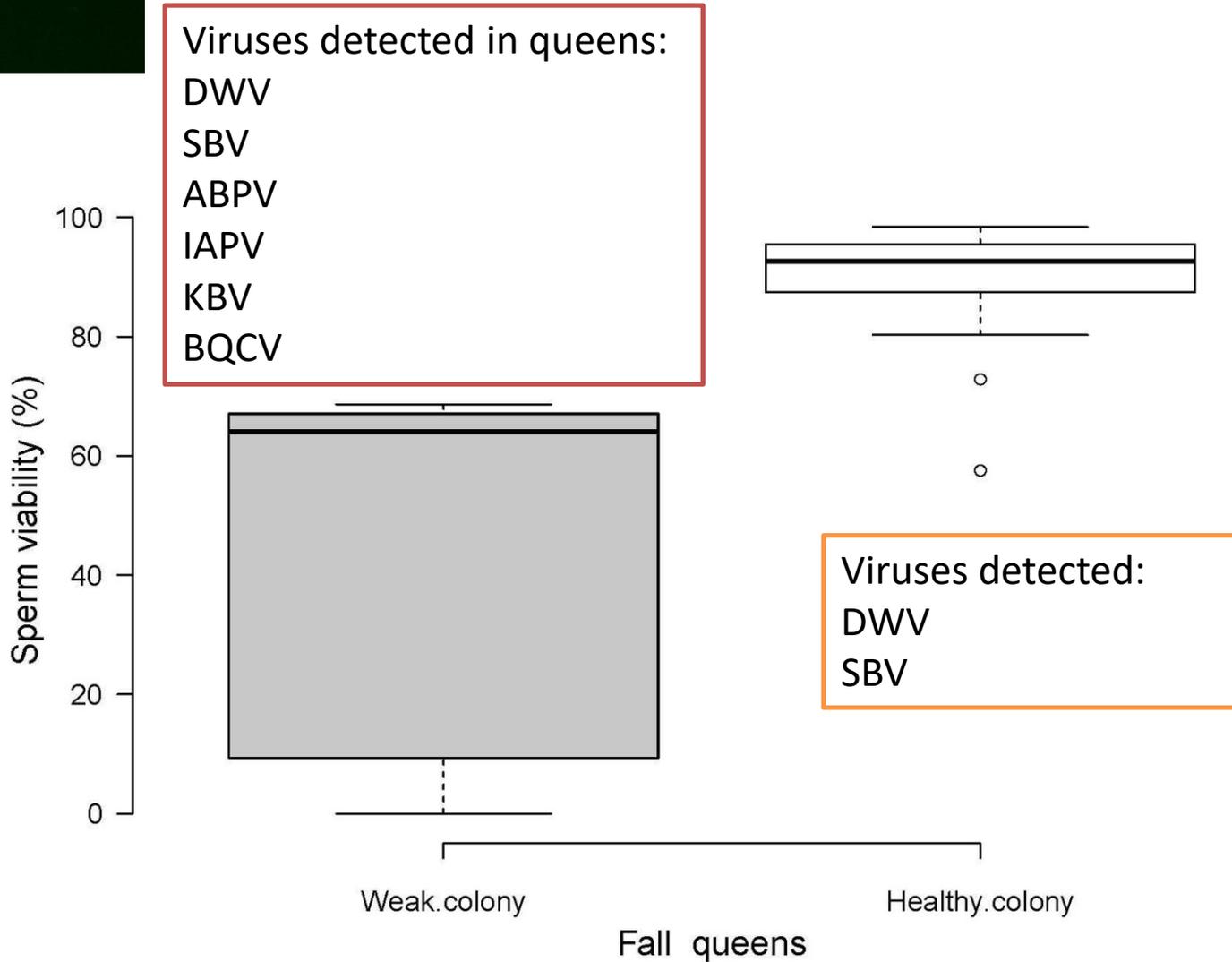
“Poorly mated”: fewer than 3 million stored sperm. Queens are unable to head commercial honey-producing colonies for one season.

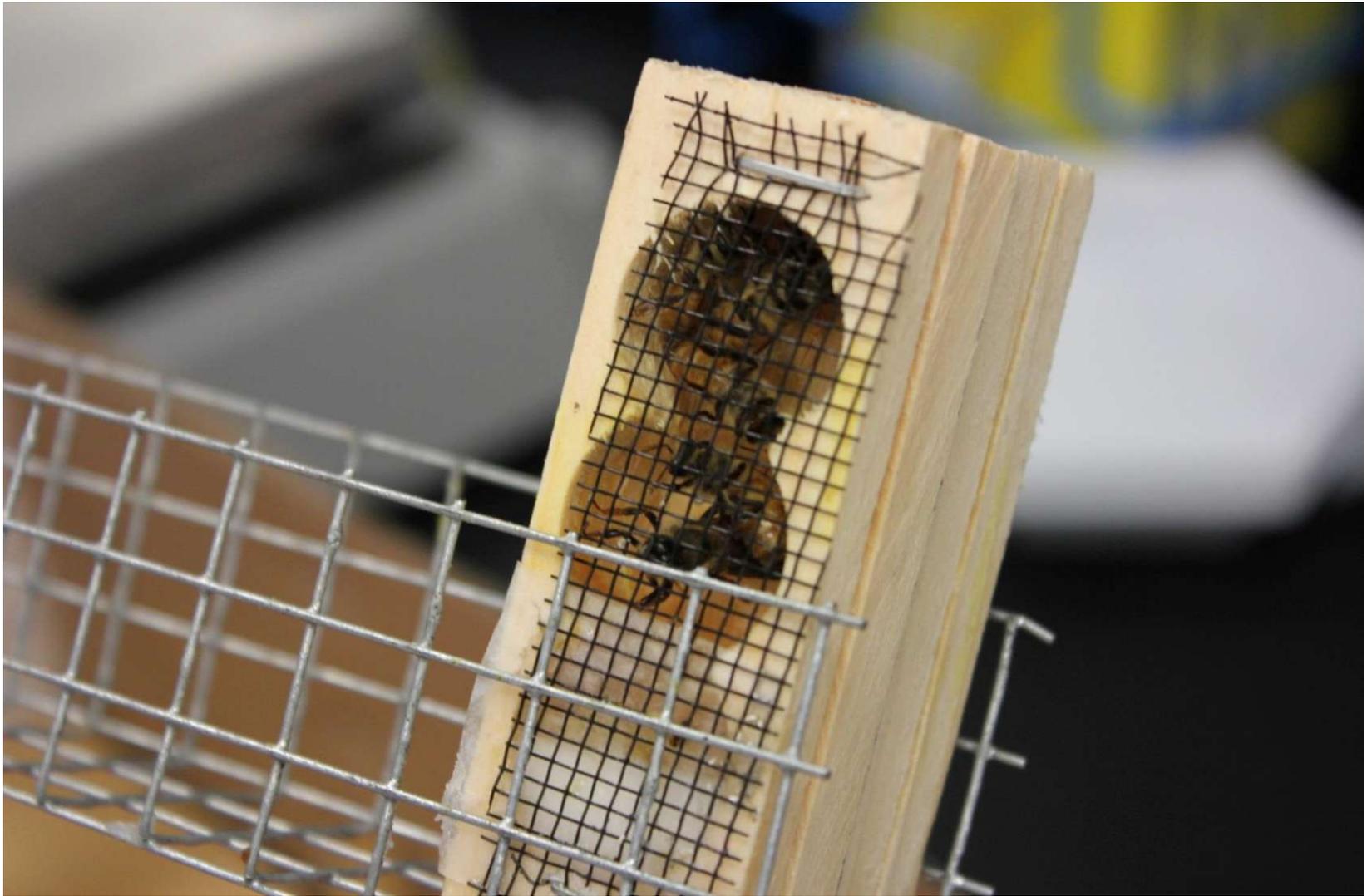


Sperm Viability Imported vs Local Queens 2014-2017

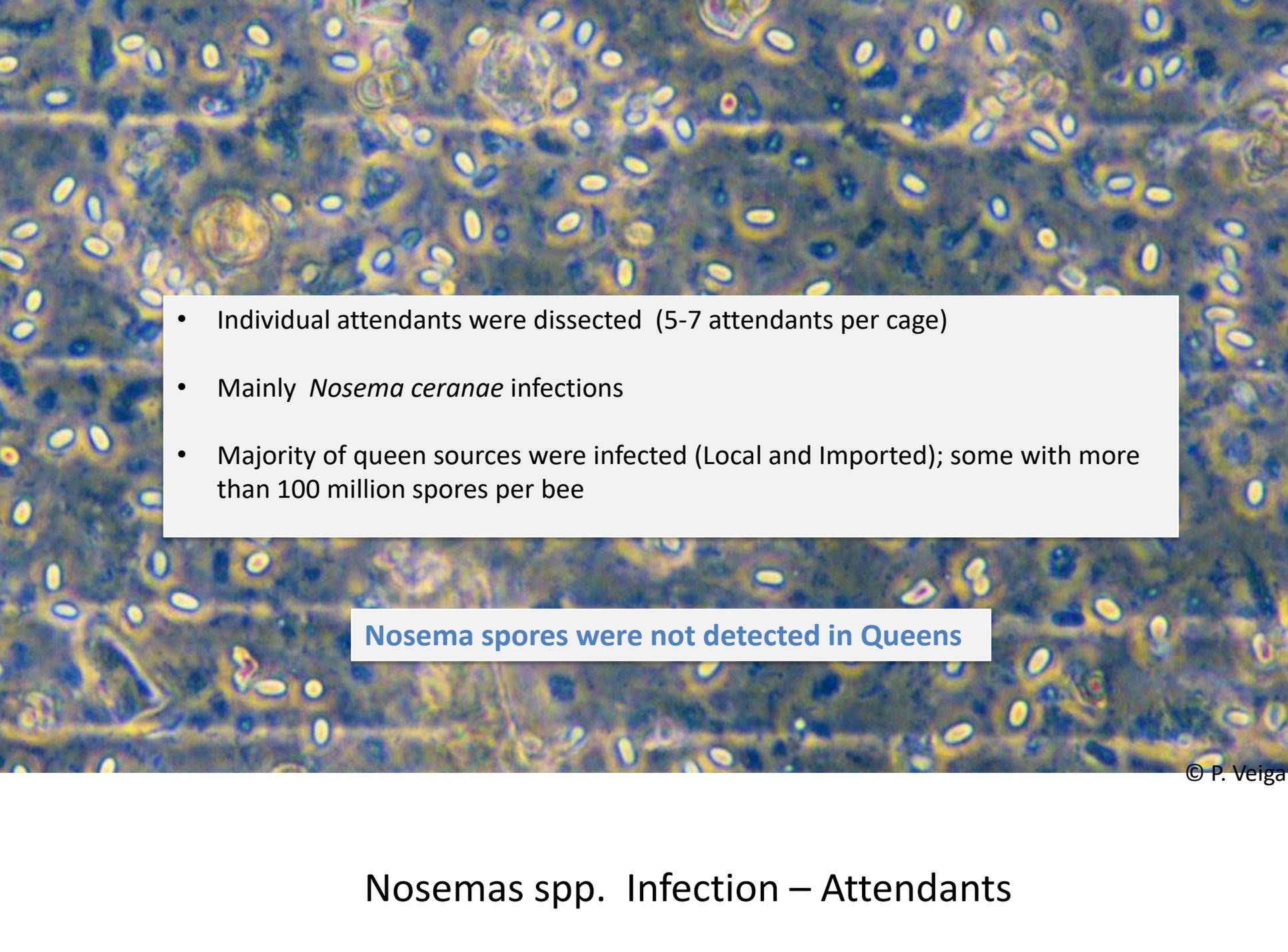


Sperm Viability and Queen failure





*Mystery Box :
Queen, Attendants and what else?*

- 
- Individual attendants were dissected (5-7 attendants per cage)
 - Mainly *Nosema ceranae* infections
 - Majority of queen sources were infected (Local and Imported); some with more than 100 million spores per bee

Nosema spores were not detected in Queens

© P. Veiga

Nosemas spp. Infection – Attendants



Trypanosomatids

© R. Schwarz

- Attendants were tested for *Crithidia mellifica* and *Lotmaria passim*
- Only *Lotmaria passim* was detected



Black Queen Cell virus

Viral Analysis

- Queens were tested for 7 honey bee viruses (BQCV, DWV, SBV, IAPV, KBV, ABPV, CBPV)
- BQCV, DWV and SBV were detected.
- Multi-viral infection in 20% -55 % of queens;
- DWV was detected in the sperm



Recommendations

- Improvement of conditions during transportation – establish standards
- Avoid overwinter weak colonies
- Re-caging queens - helps to mitigate risk of diseases introduction

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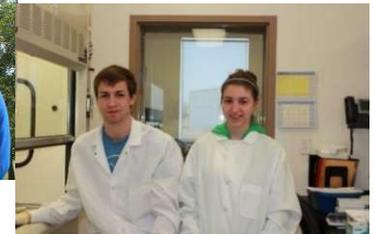


Eric Stromgren

Acknowledgements



NBDC-TAC Summer Students



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