

Assessing molecular, individual, and colony markers of local and imported stocks to improve honey bee health in Alberta

Tracey Smith¹, Shelley Hoover², Renata Labuschagne³, Stephen Pernal⁴, Olav Rueppell¹

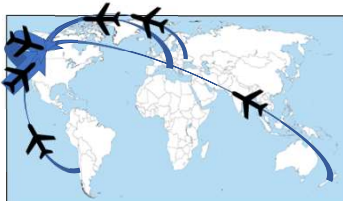
¹University of Alberta, ²University of Lethbridge, ³Alberta Tech Transfer Program, ⁴Agriculture and Agri-Food Canada

- Alberta’s honey bee industry produced \$64 million of honey in 2020, representing about one third of total Canadian production. In addition, honey bees are important pollinators of agricultural crops, particularly hybrid canola in Alberta.
- Ongoing honey bee health problem, epitomized by 50% hive losses during the winter 2021/22, threaten the profitability and sustainability of beekeeping in Alberta. The problems are multi-factorial and thus cannot be solved by one targeted intervention. Instead, an integrated strategy is needed that relies on improving current practices of replacement stock acquisition and selection.
- This project contributes new knowledge for improving honey bee health in Alberta in multiple ways: 1) We will evaluate the performance of local and imported honey bee stocks in three regions of Alberta, 2) We will assess the utility of molecular, individual queen, and colony-level tests for predicting colony performance

The Problem:



Long-Lasting Alberta Beekeeping Winter



Queen Importation from Abroad

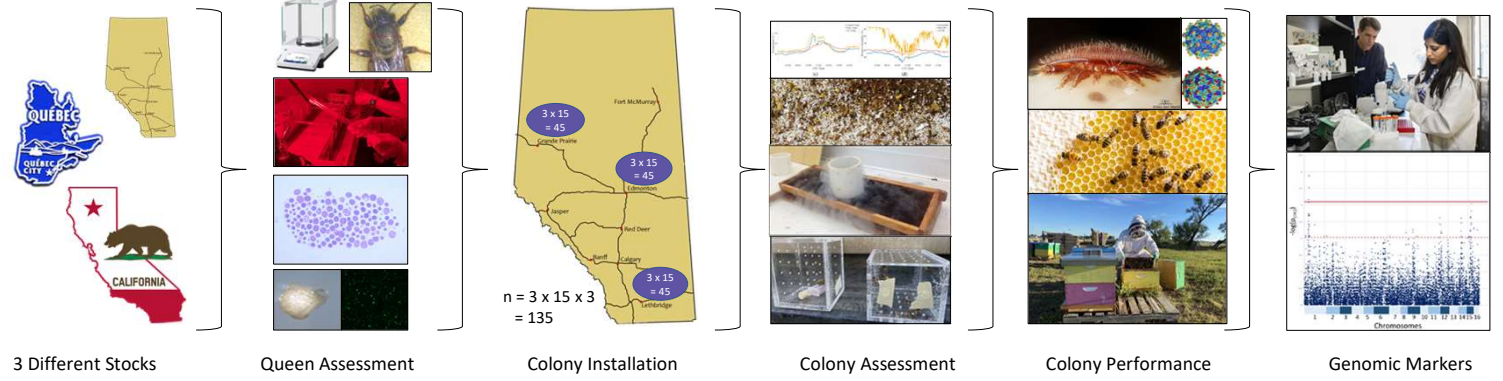


Measurement of Queen and Stock Quality

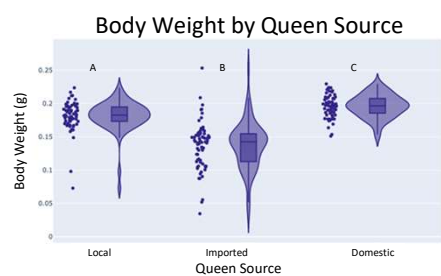


Sustainability of Apiculture and Canola Pollination

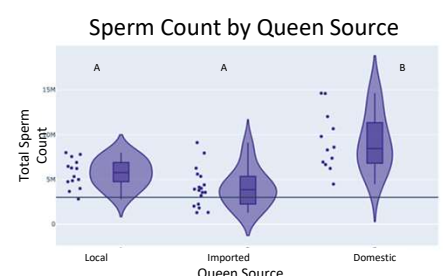
Project Methods:



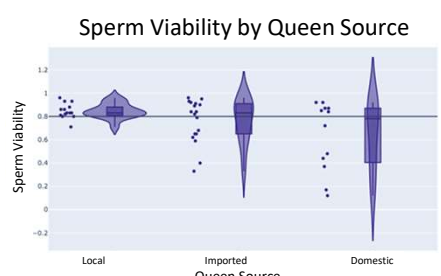
Results: Queens assessments and colony installation



Imported queen weighed significantly less than local and domestic stocks.

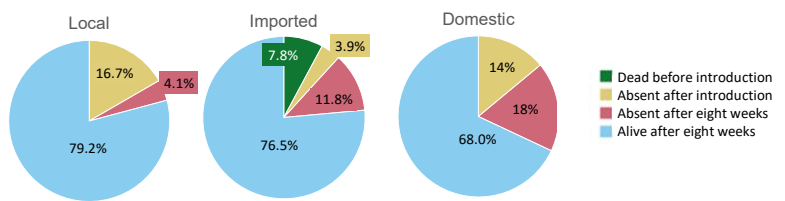


Domestic queens had higher sperm counts than local or imported queens.



Sperm viability was more variable in domestic and imported queens than in local queens.

Queen Survival



Discussion

- Stocks differed in key queen quality metrics
- All queens failed at higher than acceptable rates
- Slight overall advantage of local stock
- Behavioural analyses, colony assessment and performance analyses, and genomic markers remain to be included