

## Introduction:

Bee local: A comparison of productivity and pathogen load  
in local vs. Claifornia re-queened colonies

Andre Burnham, Fiona McLaughlin, **P. Alexander Burnham** &  
Herman Lehman



*The*  
**UNIVERSITY**  
*of* **VERMONT**

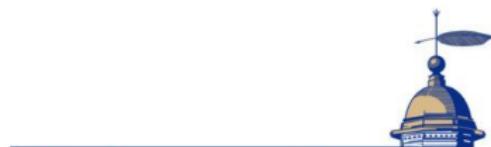
# Acknowledgments

## Co-Authors:

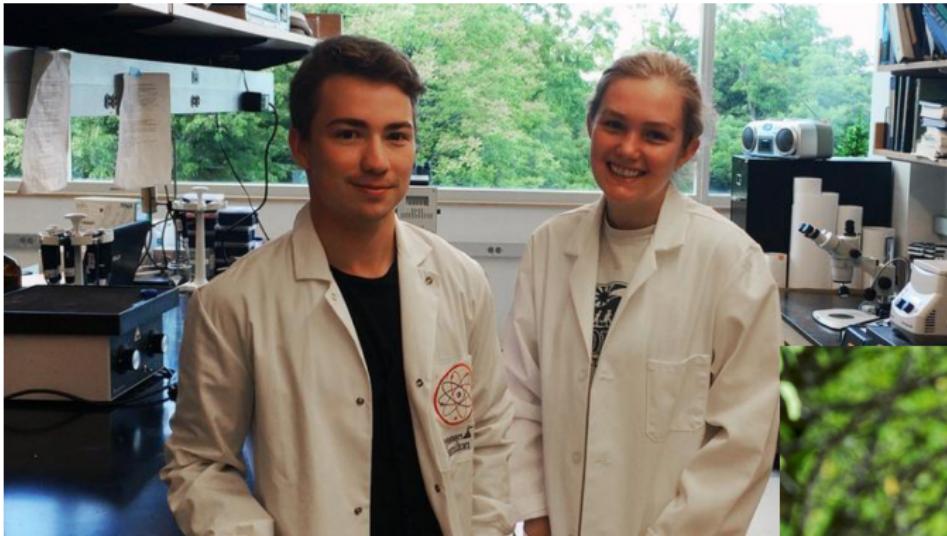
- ▶ Andre Burnham
- ▶ Fiona McLaughlin
- ▶ Dr. Herman Lehman

## Thank you to:

- ▶ The Casstevens Family
- ▶ Nancy Thompson
- ▶ Samantha Alger



# The Bee Team

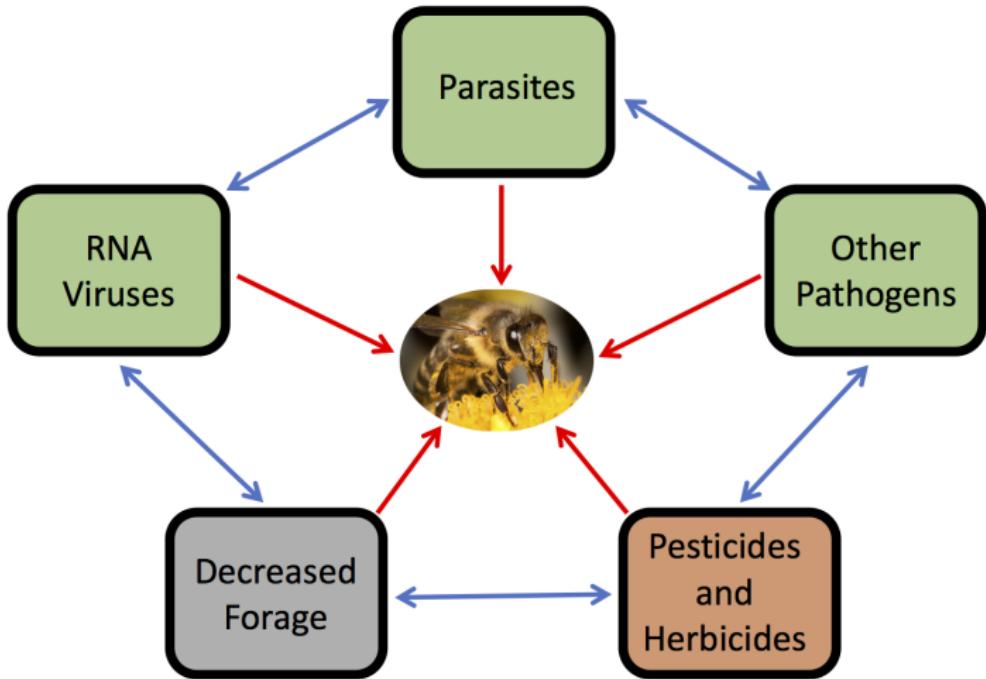


# Honey Bees are Important

- ▶ 30% of the world's food is derived from pollination (Aizen et al., 2009)
- ▶ Pollinators are responsible for between \$235-577 billion (Gallai et al., 2009)
- ▶ Honeybees are responsible for \$14 Billion in the USA (Morse & Calderone, 2000)



# Threats to Bees:



# Honey Bee Pathogens

## VIRUSES:

- ▶ Deformed Wing
- ▶ Black Queen Cell
- ▶ Israeli Acute Paralysis



Deformed wing Virus  
University of Florida,  
Entomology Dept.

## PARASITES:

- ▶ Nosema (ceranae/apis)
- ▶ Varroa Mite



*Varroa destructor*  
North Carolina State University,  
Cooperative Extension



American Foulbrood  
Bee Informed Partnership

# Troubles for Beekeepers (re-queening)



# The basic premises behind this study

- ▶ Imported VS Local
- ▶ Local Adapation



# The basic premises behind this study

- ▶ Mass-Produced VS Handmade
- ▶ Selection by the Breeder



## The question:

*“Are locally-bred queens more successful than imported queens?”*

## Experimental Design

- ▶ 20 colonies re-queened with Californian-bred queens
- ▶ 20 colonies re-queened local-bred (Vermont) queens
- ▶ 2 sites, 10 Local and 10 California for each
- ▶ Sampled for pathogens and productivity measures
- ▶ Sampled at different time points for 3 months

## Pictures of the Yards

# What we sampled

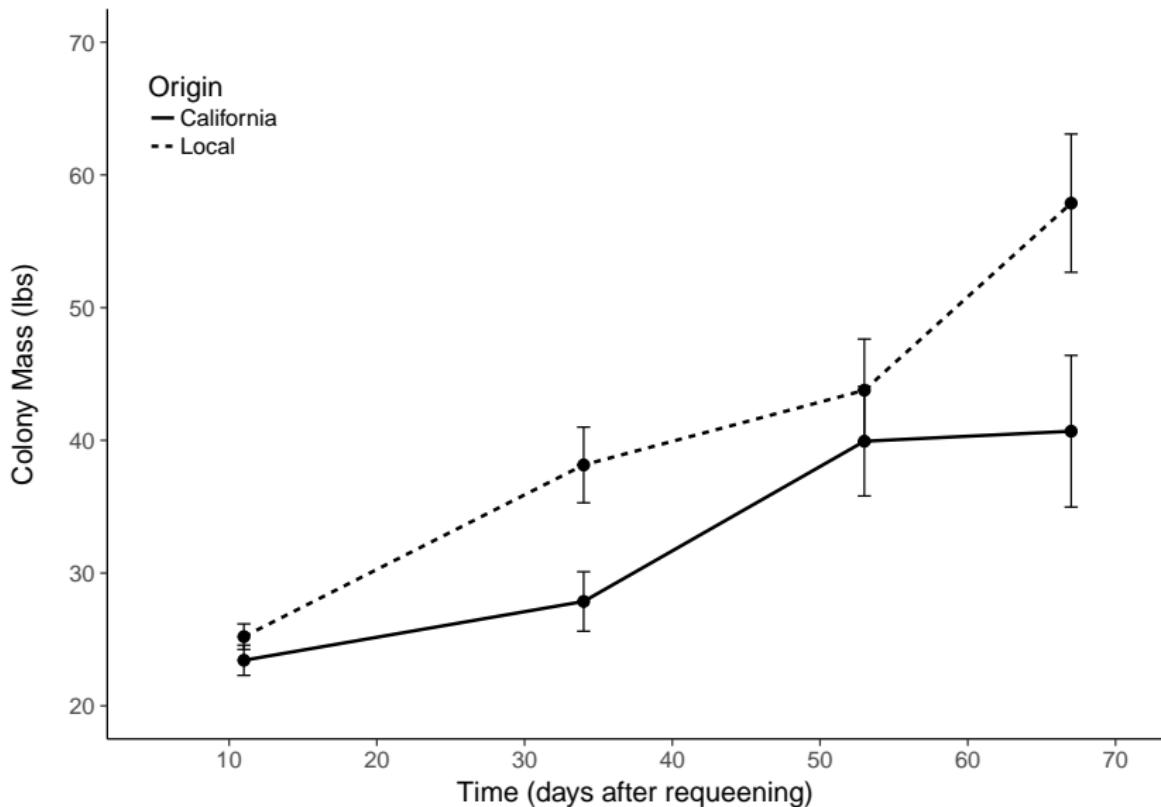
- ▶ Growth:
  - ▶ Colony Mass
  - ▶ Brood Production
- ▶ Foraging:
  - ▶ Pollen Production
- ▶ Pathogens:
  - ▶ Varroa
  - ▶ Nosema spp.
  - ▶ RNA Viruses

## Our Predictions

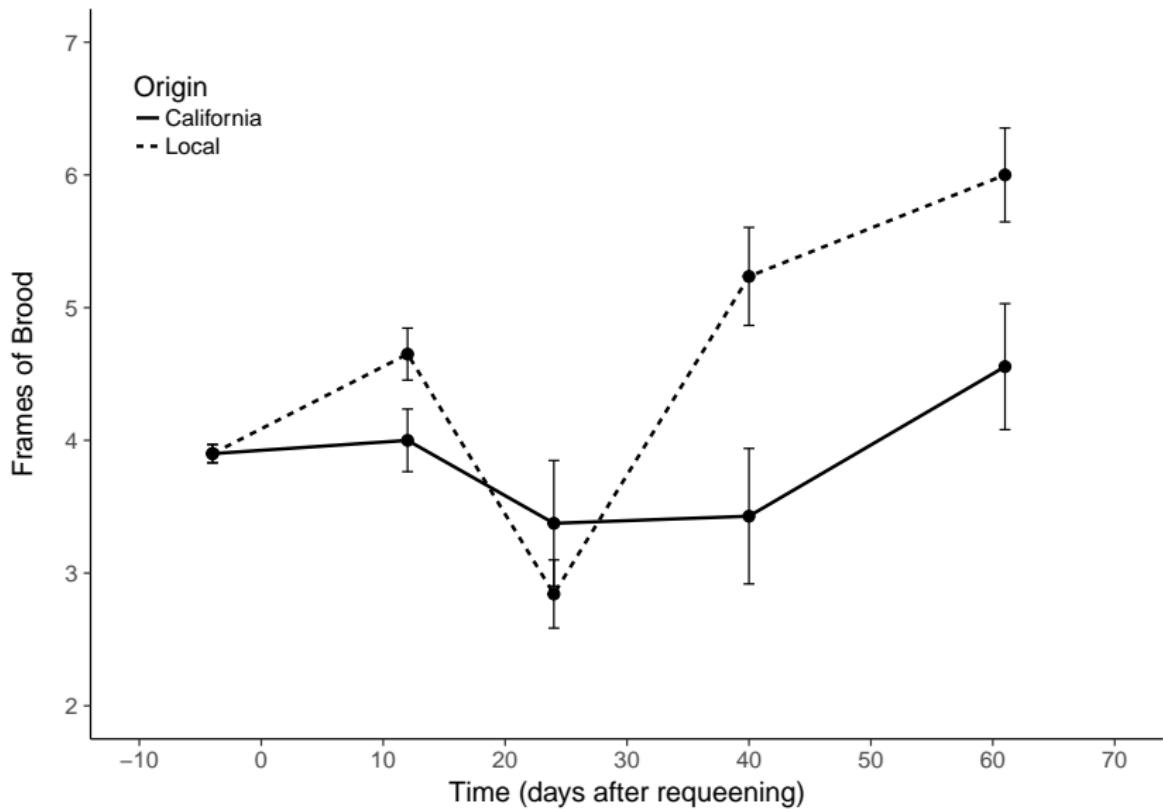
- ▶ Local queens (colonies) will have higher growth through the season
- ▶ Local queens will be better foragers
- ▶ Local queens (colonies) will have lower pathogen loads

# Experimental Design

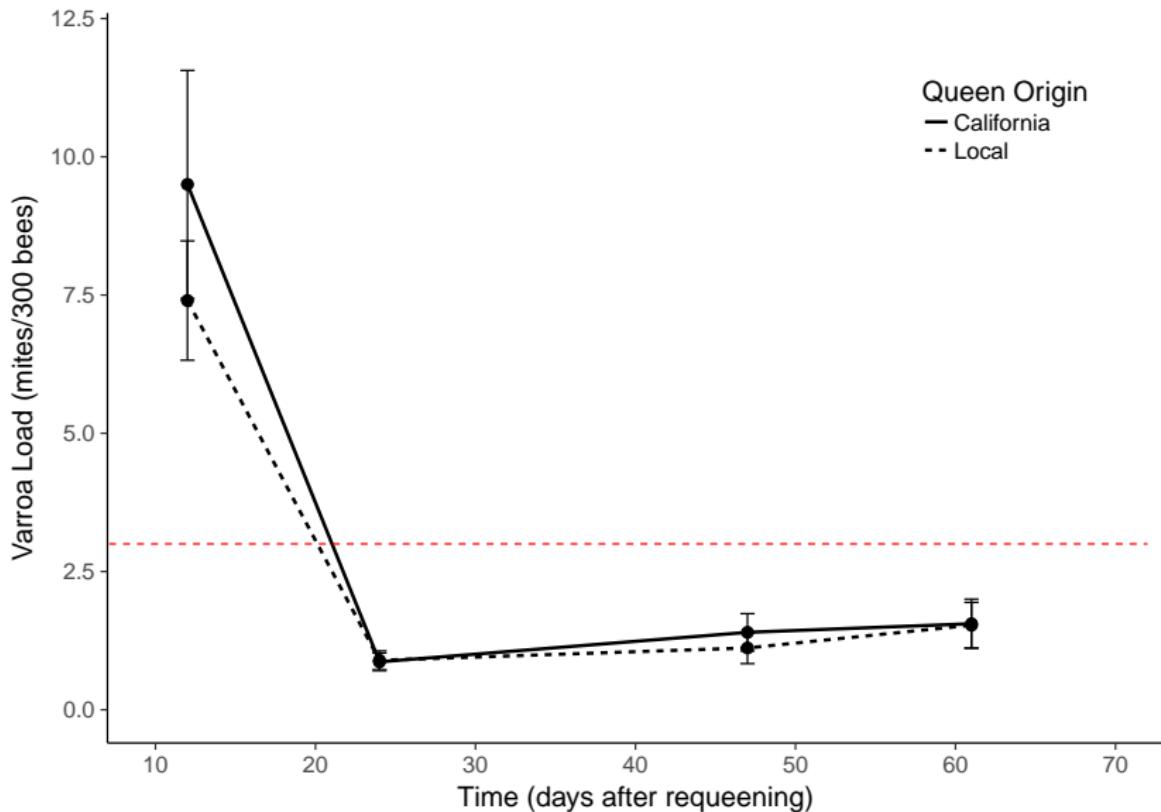
# Colony Mass (growth)



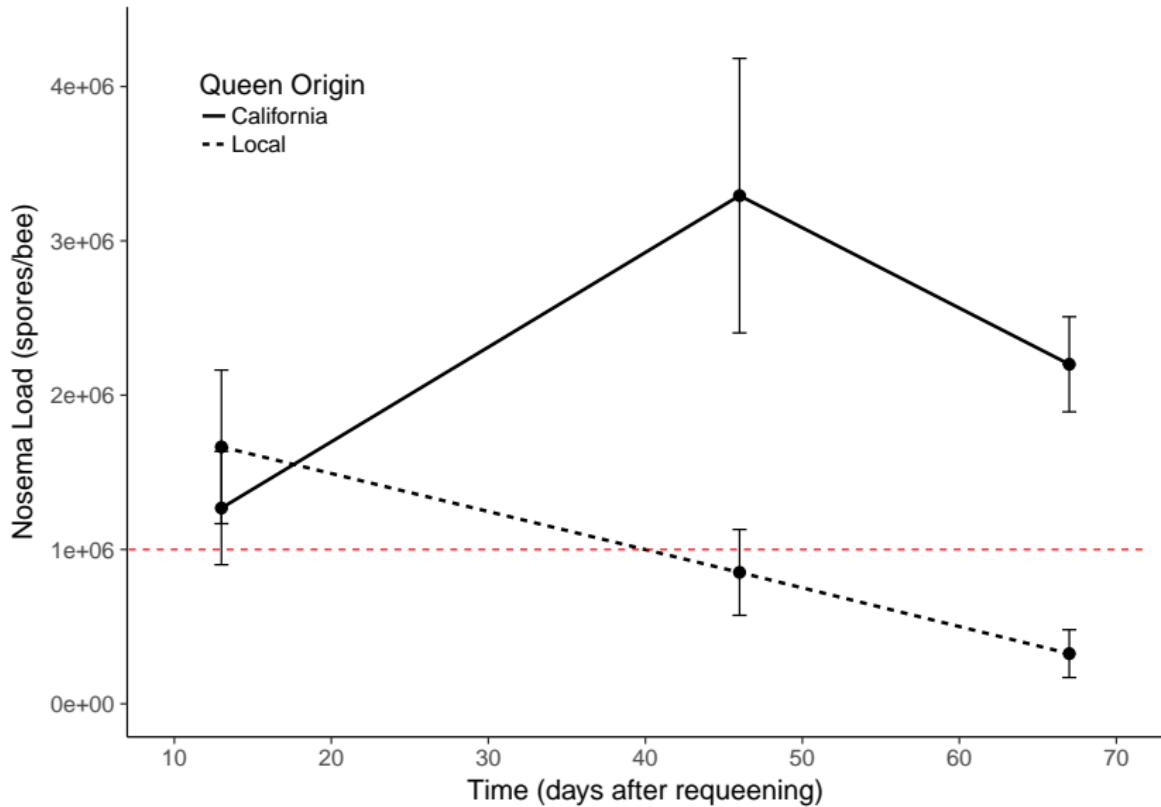
# Frames of Brood (growth)



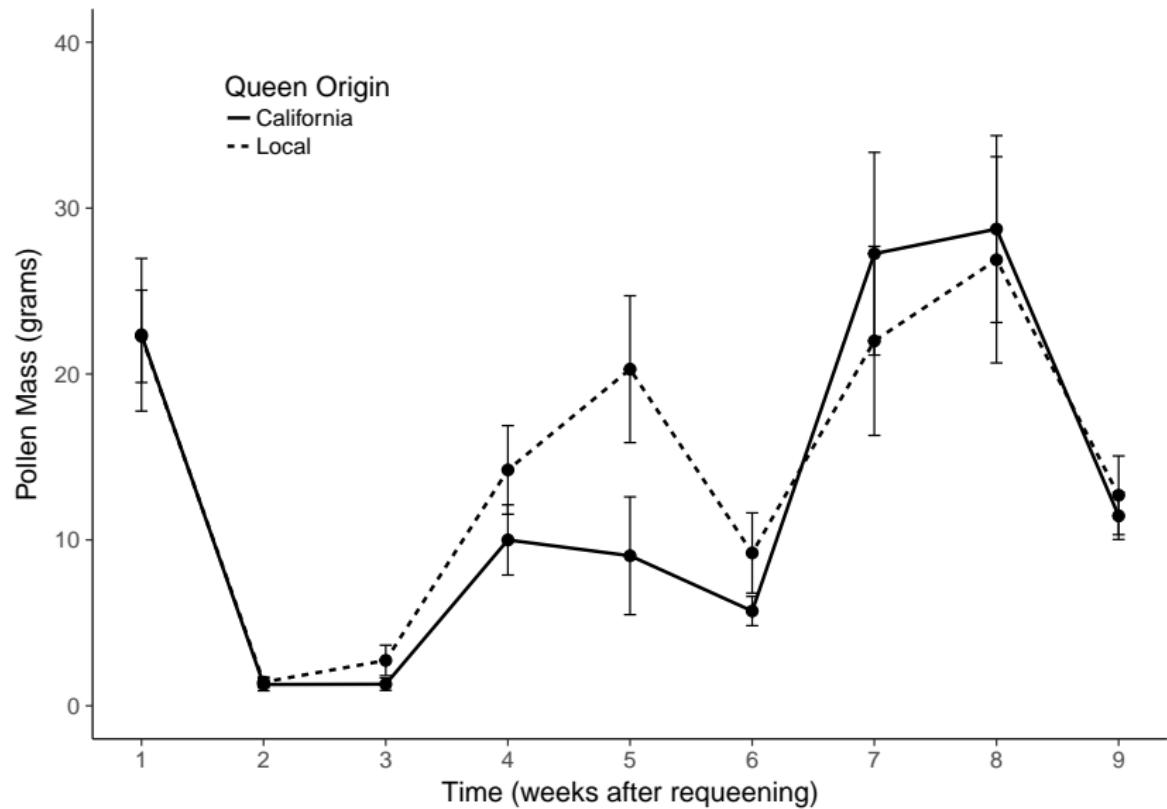
# Pollen Collection (foraging)



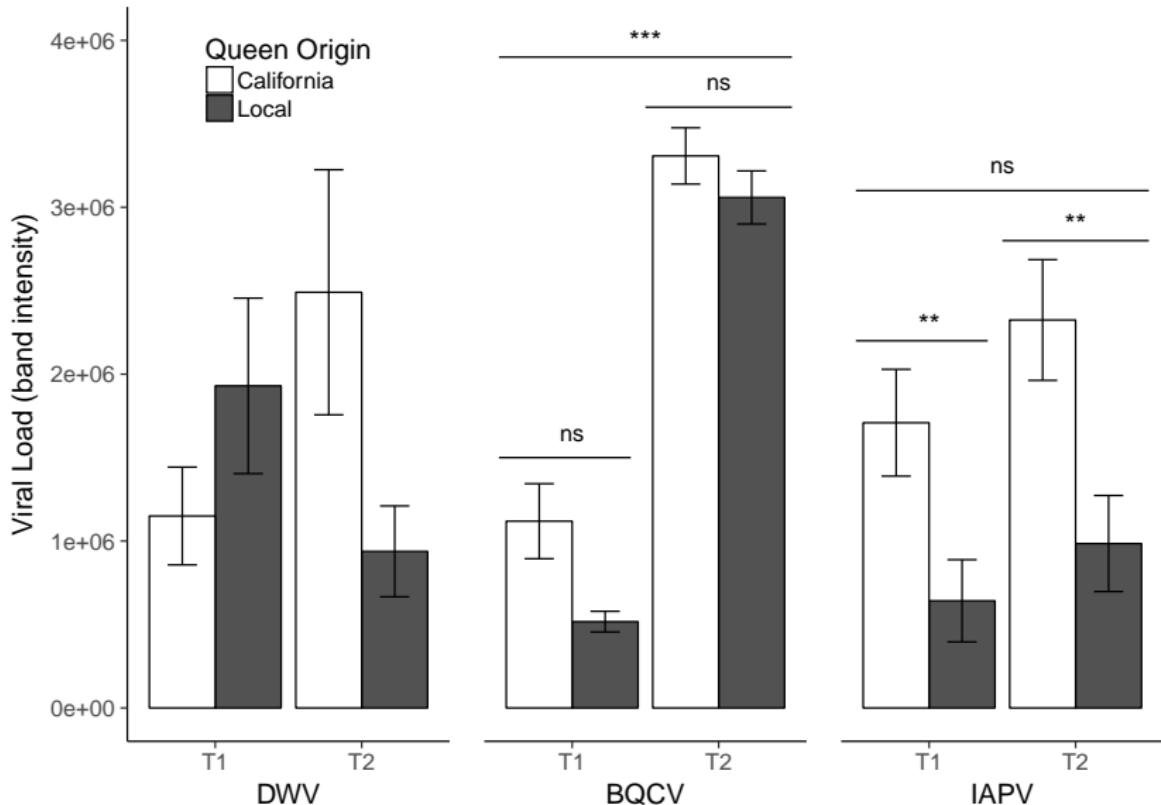
# Varroa Load (pathogens)



# Nosema Load (pathogens)



# Viral Load (pathogens)



## In Summary

- ▶ Colony Mass = **Higher in Local**
- ▶ Amount of Brood = **Higher in Local**
- ▶ Pollen Collection = **No Difference**
- ▶ Varroa Load = **No Difference**
- ▶ Nosema Load = **Lower in Local**
- ▶ RNA Viruses = **Mixed Results**

## In Summary

- ▶ Overall, colonies re-queened with locally raised queens had higher growth
- ▶ Pollen collection did not seem to be involved in this growth
- ▶ Some pathogens seemed to have less of an effect on local honeybees and others had similar effects across both groups

## Implications

- ▶ Locally-raised queens outperform mass-produced, California queens in their northern environment.
- ▶ This could be evidence for the importance of care in breeding stocks (mass produced vs handmade)
- ▶ **And/Or** This could be evidence for local (genetic) adaptation (imported vs. local)

Thank you!



# Questions?

