



# In Search of a Good Meal: Varroa destructor regularly switches between adult bee hosts to feed

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# Do the words we use matter?

Phoresis: When one organism attaches itself to another organism solely for the purpose of travel.

In Vector Capacity Models

- Number of bites
- Proportion to host
- Intrinsic and extrinsic incubation periods
- Daily survivorship





Are varroa feeding  
when it is in between  
the tergites of a bee?

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Are varroa actively  
switching from one  
adult bee to another?

# Do mites switch from one adult host to another adult host?

- Establish cages of individually painted newly emerged bees.
- Incubate 4 days
- Place one mite in each cage
- Locate the mite each day and record the bee it is on and position.







We record on which bee, and location of the bee:  
direct feeding position- between tergites  
not feeding position- thorax, visibly on abdomen, between head and thorax

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# Using fluorescent micro-spheres to track varroa feeding



Inject pupae with fluorescent beads



Place pupae with mites in 00 gel cap for 48 hours

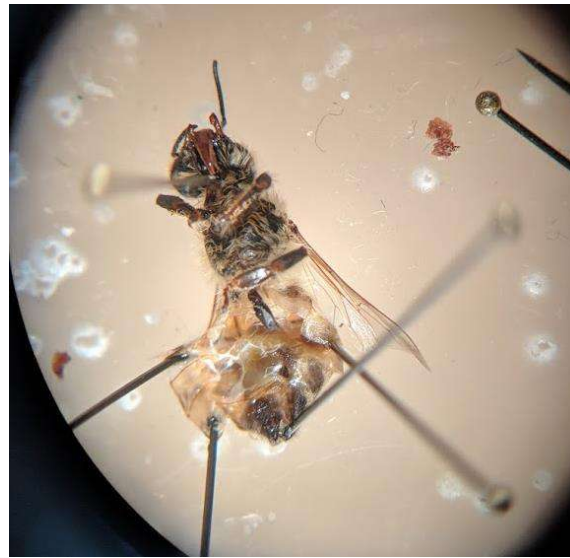


Record location of varroa each day

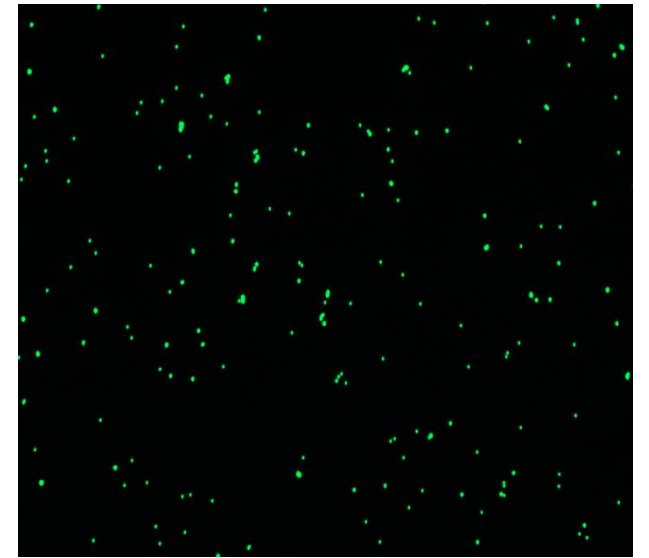
# Finding the fluorescent spheres



Record where the mite is feeding

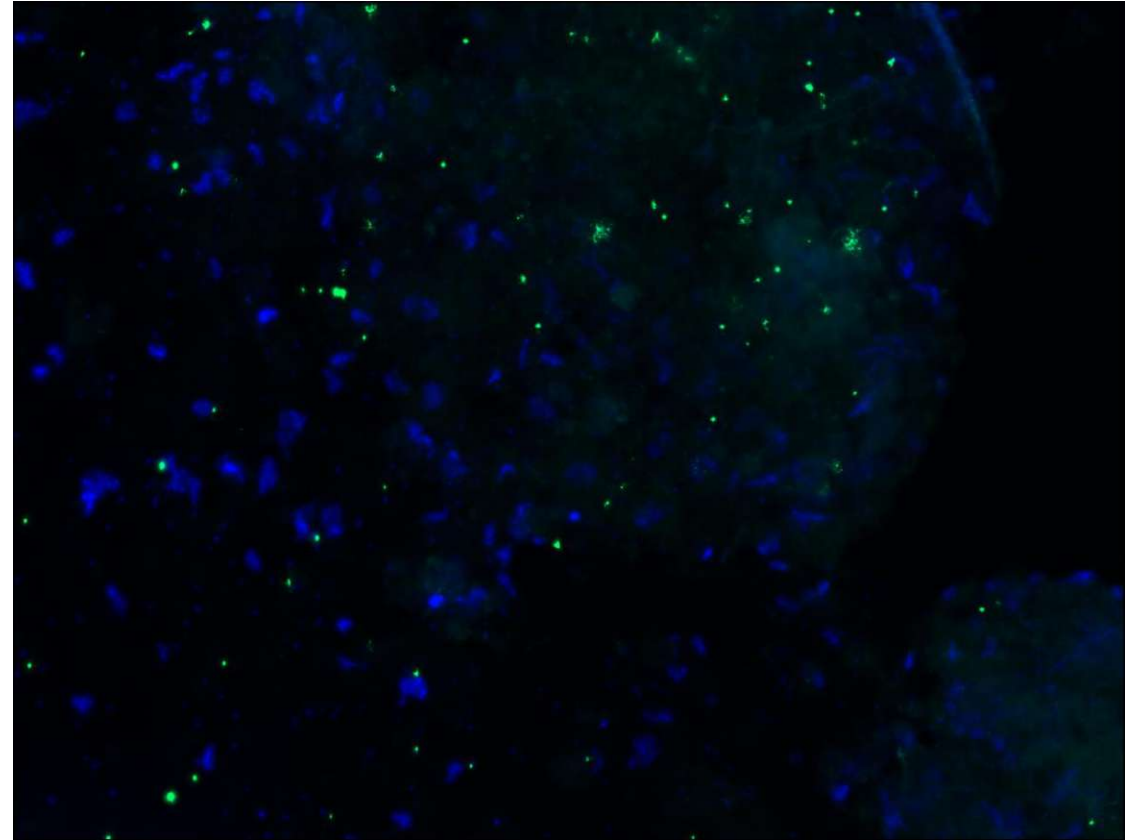
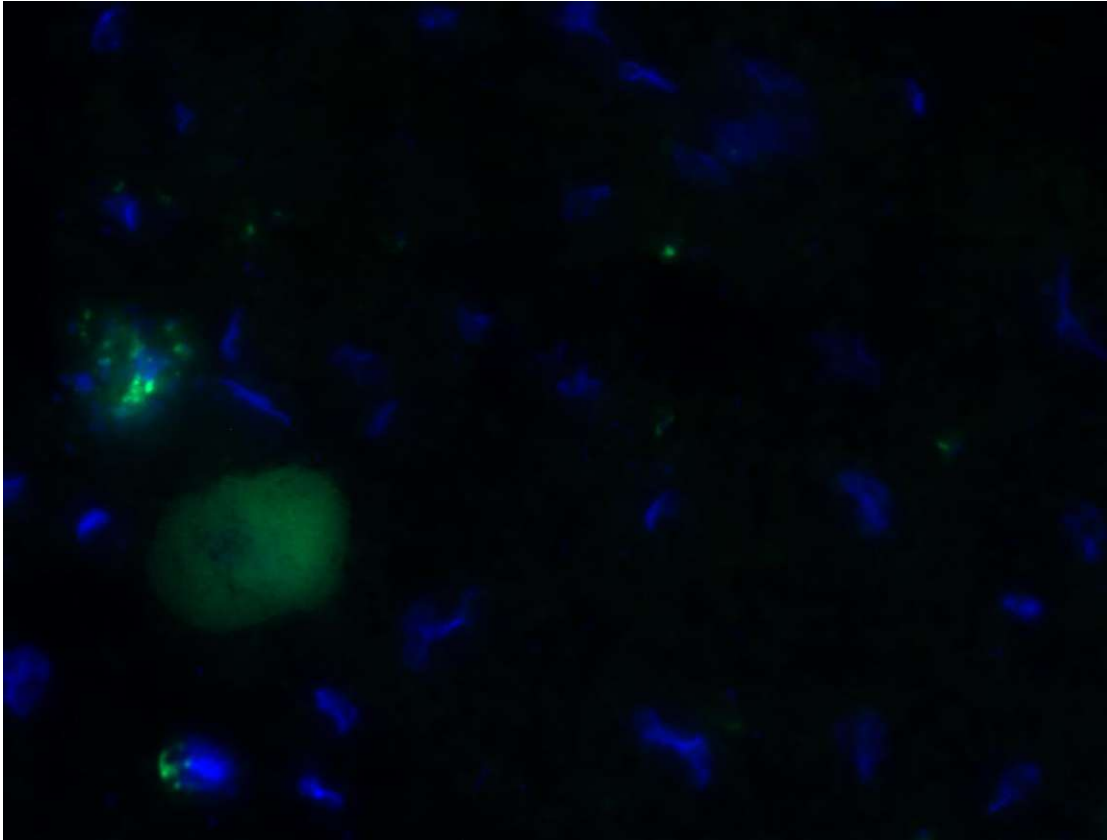


Dissect the bee, and collect tissue from that region; avoid the digestive tract

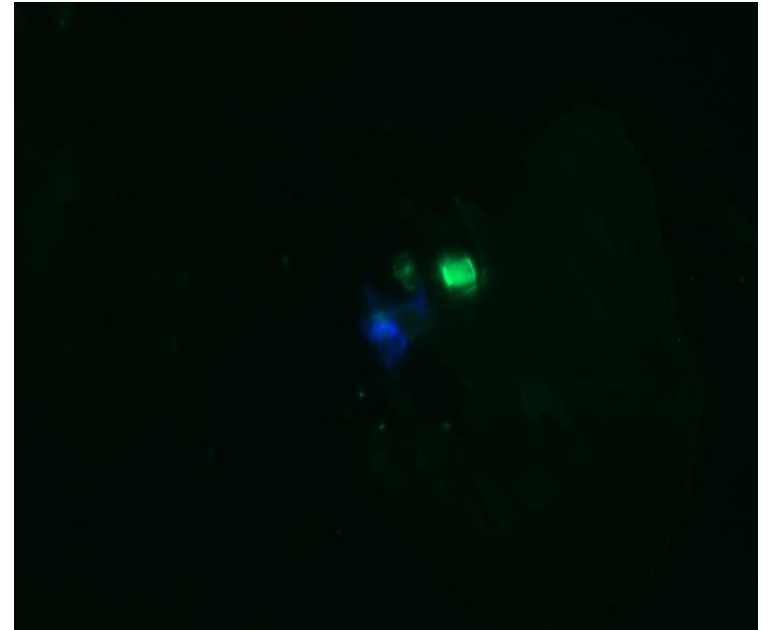
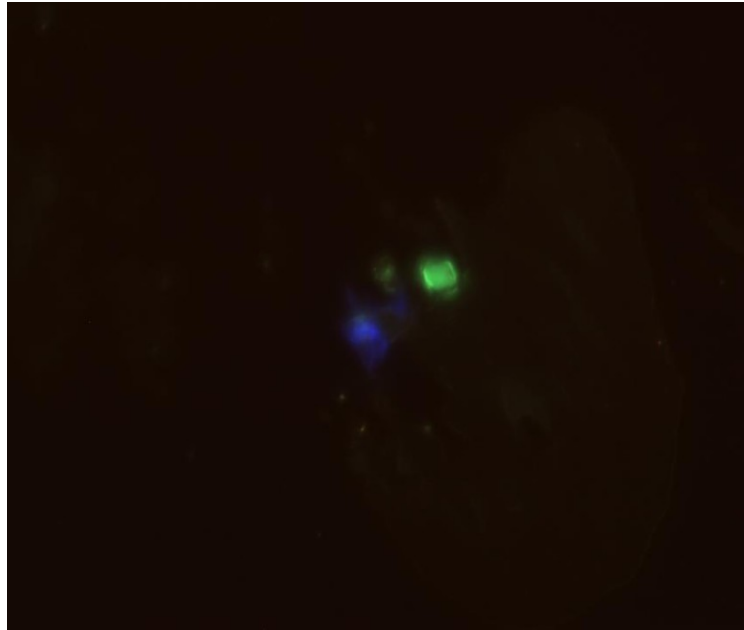
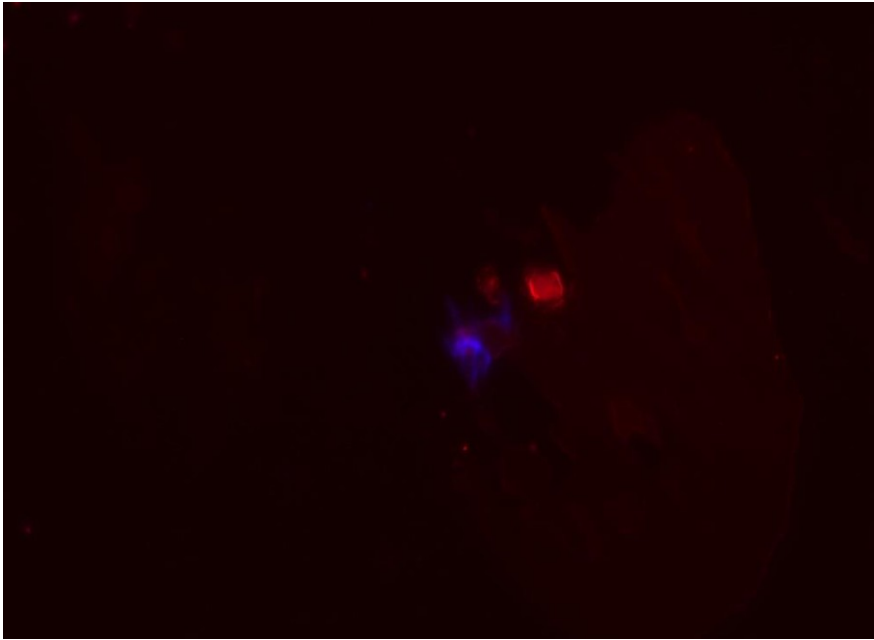


Locate beads via fluorescent microscopy

# FITC (GFP) Microspheres with DAPI (Blue) Counter Stain







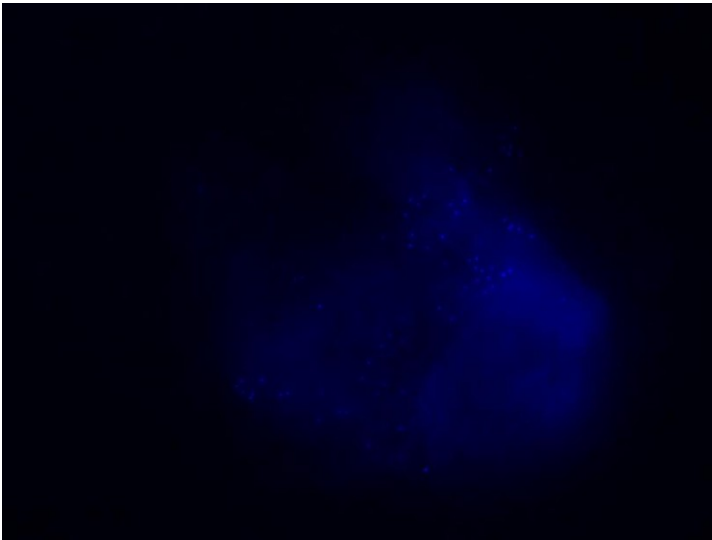
False Positives and auto-  
fluorescence

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Control and DAPI Microspheres in varroa destructor



control



With DAPI spheres



Control and DAPI Microspheres in adult bee (post varroa feeding)



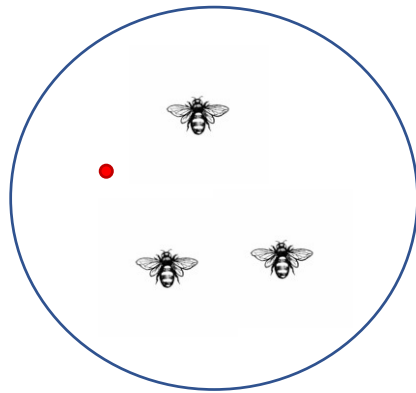
## Groups

No Mite  
Mite + PBS  
Mite + DWV-A/B  
Mite + DWV-A  
Mite + DWV-B

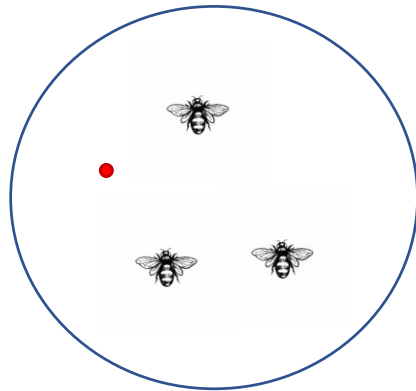
N= 10 per group

50 total cages  
8 bees per cage

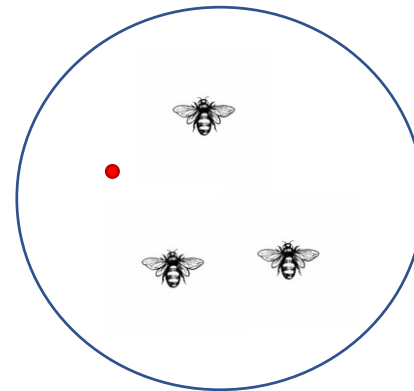
# Examining direct feeding and host switching with virus



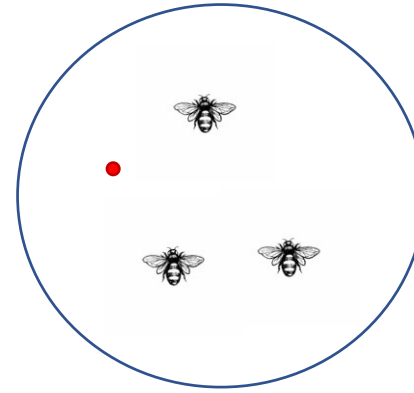
No Mite  
N=10



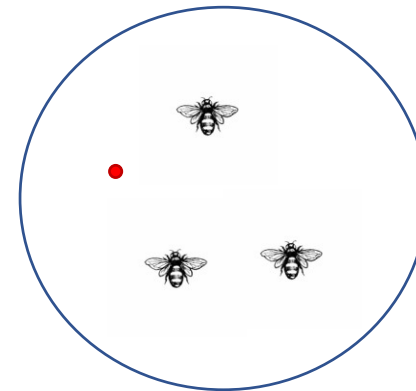
Mite + PBS  
N=10



Mite + DWV-A/B  
N=10



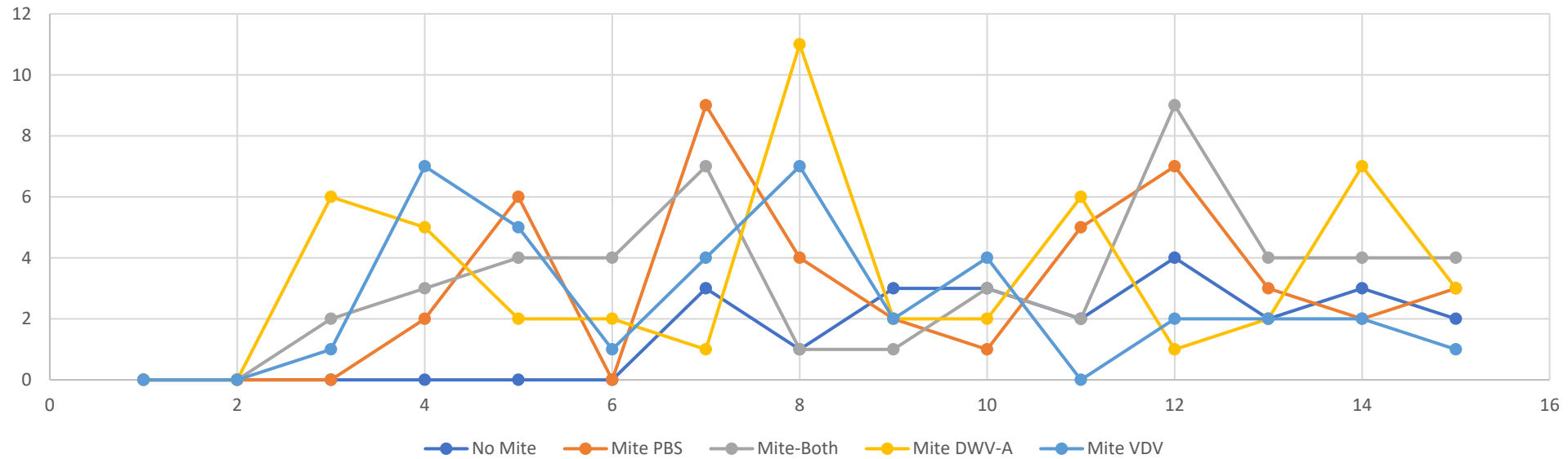
Mite + DWV-A  
N=10



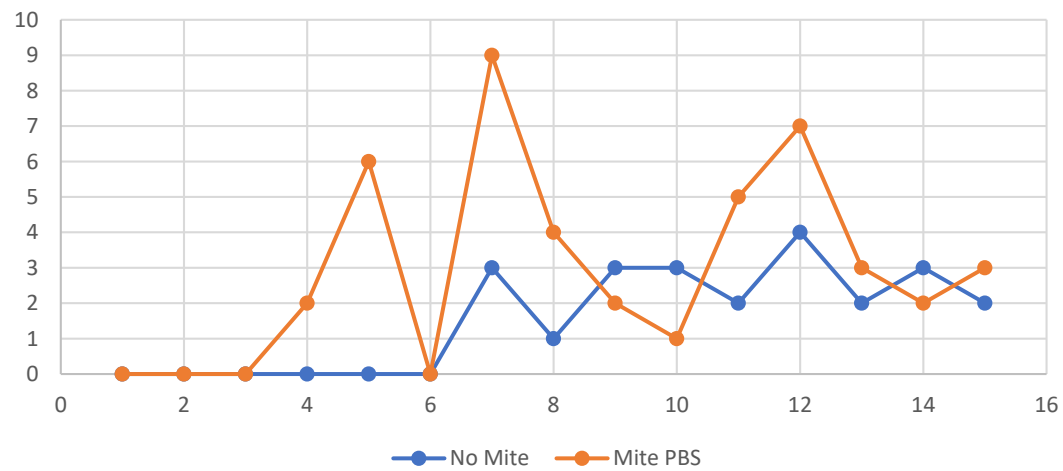
Mite + DWV-B  
N=10



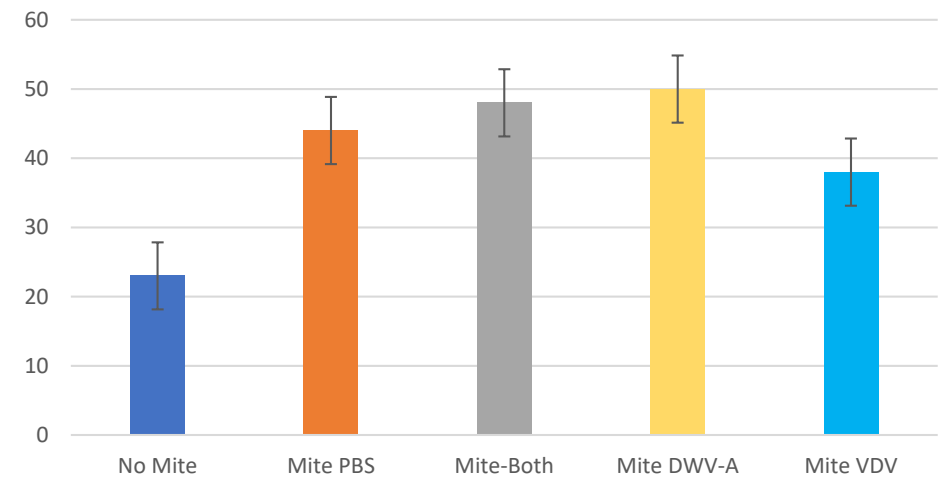
Bee Mortality per day



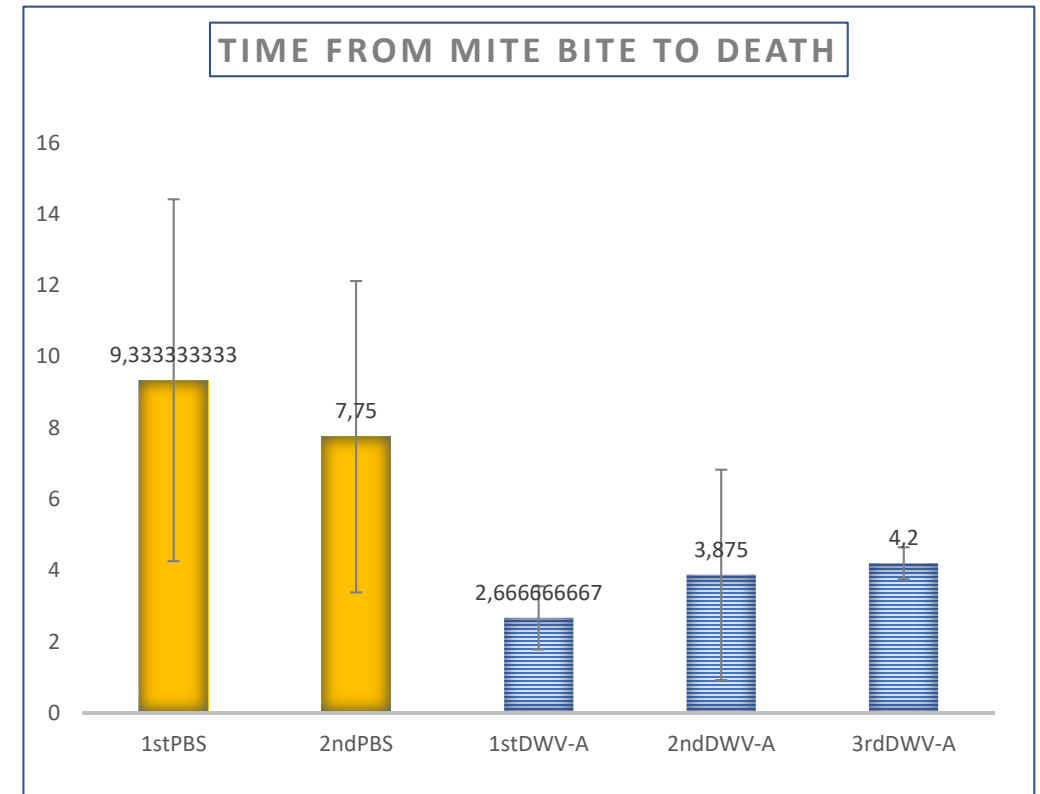
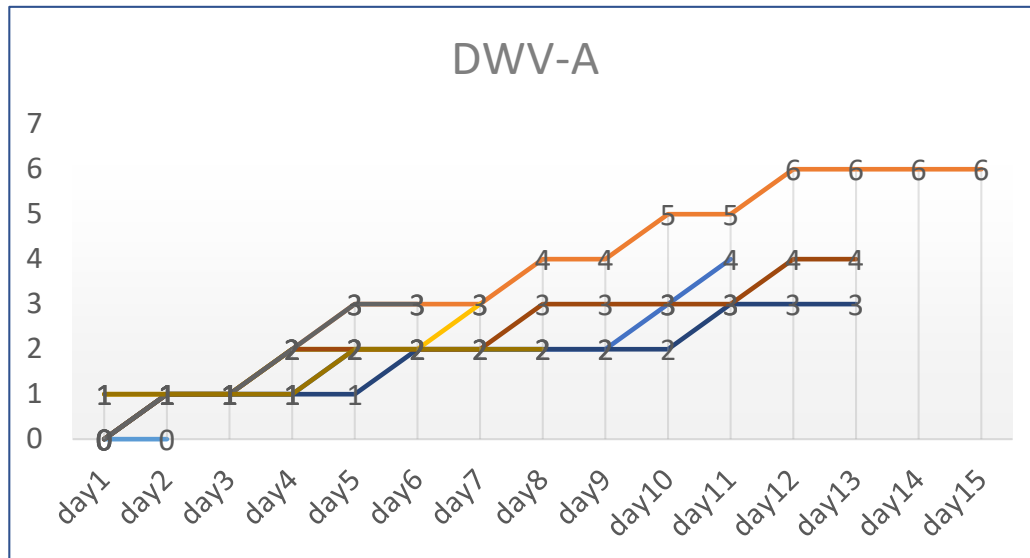
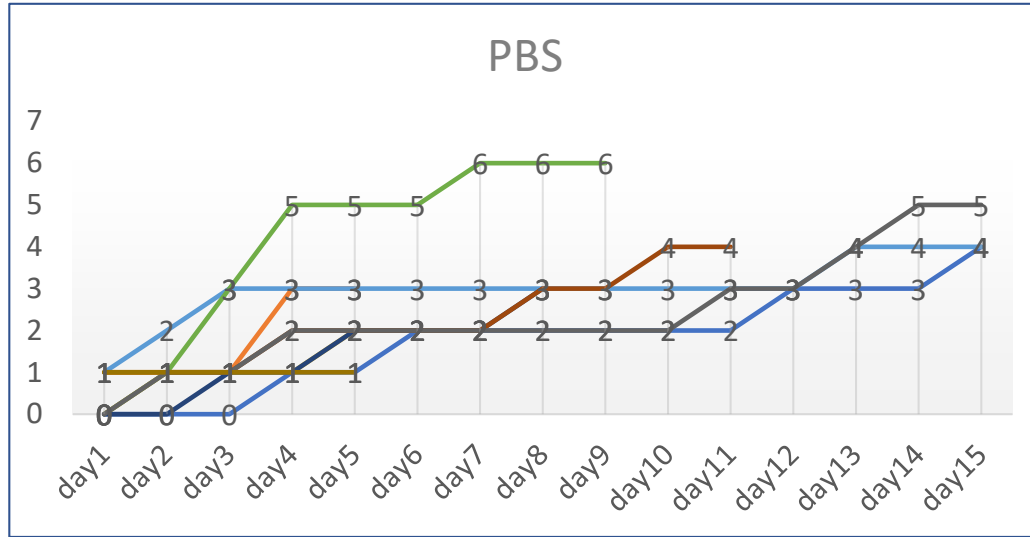
Mite vs No Mite



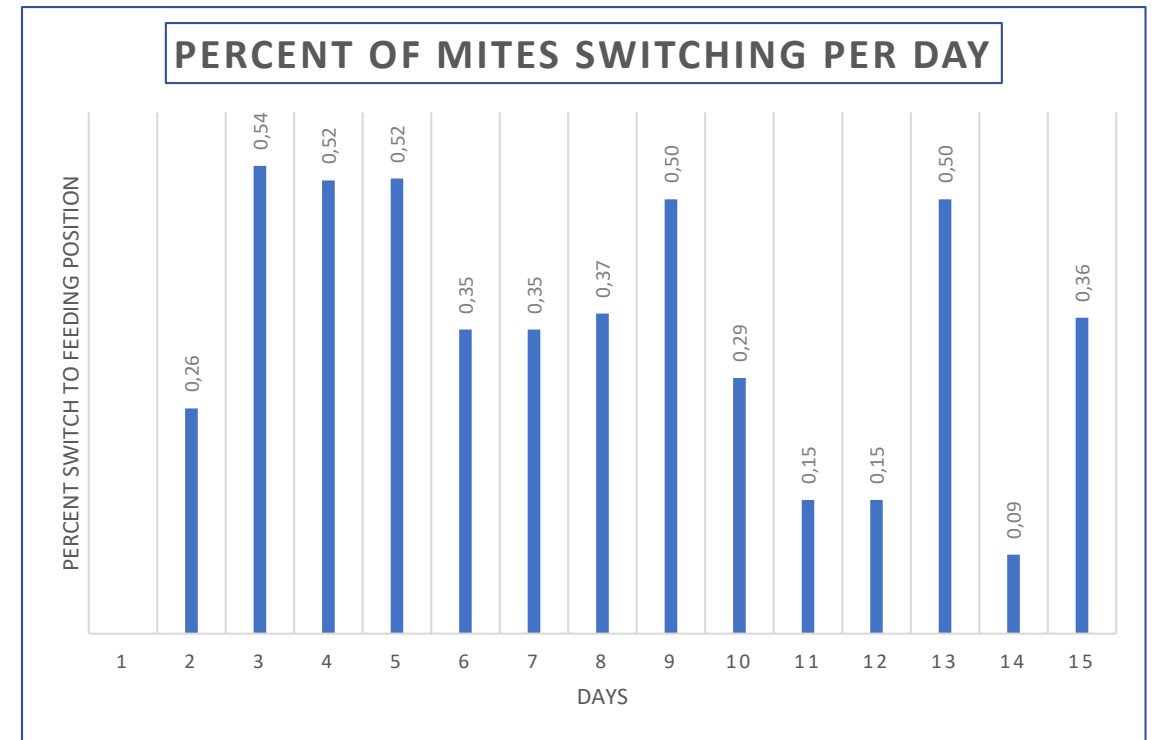
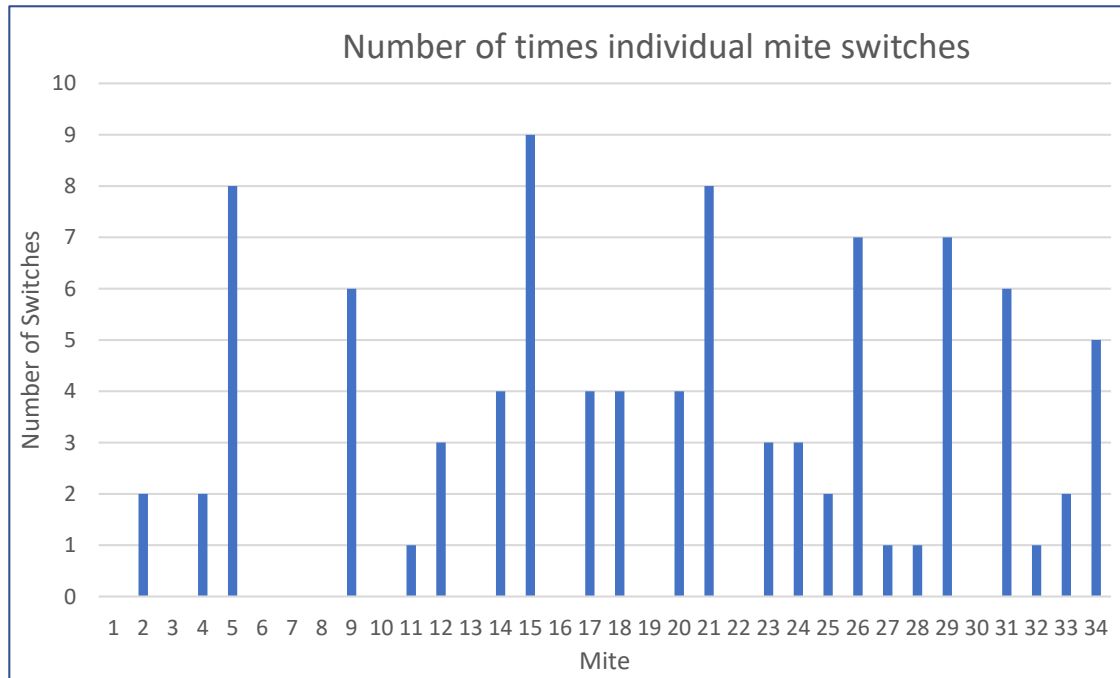
Total Bee Loss per Treatment Group



# Observing host switches and direct feeding

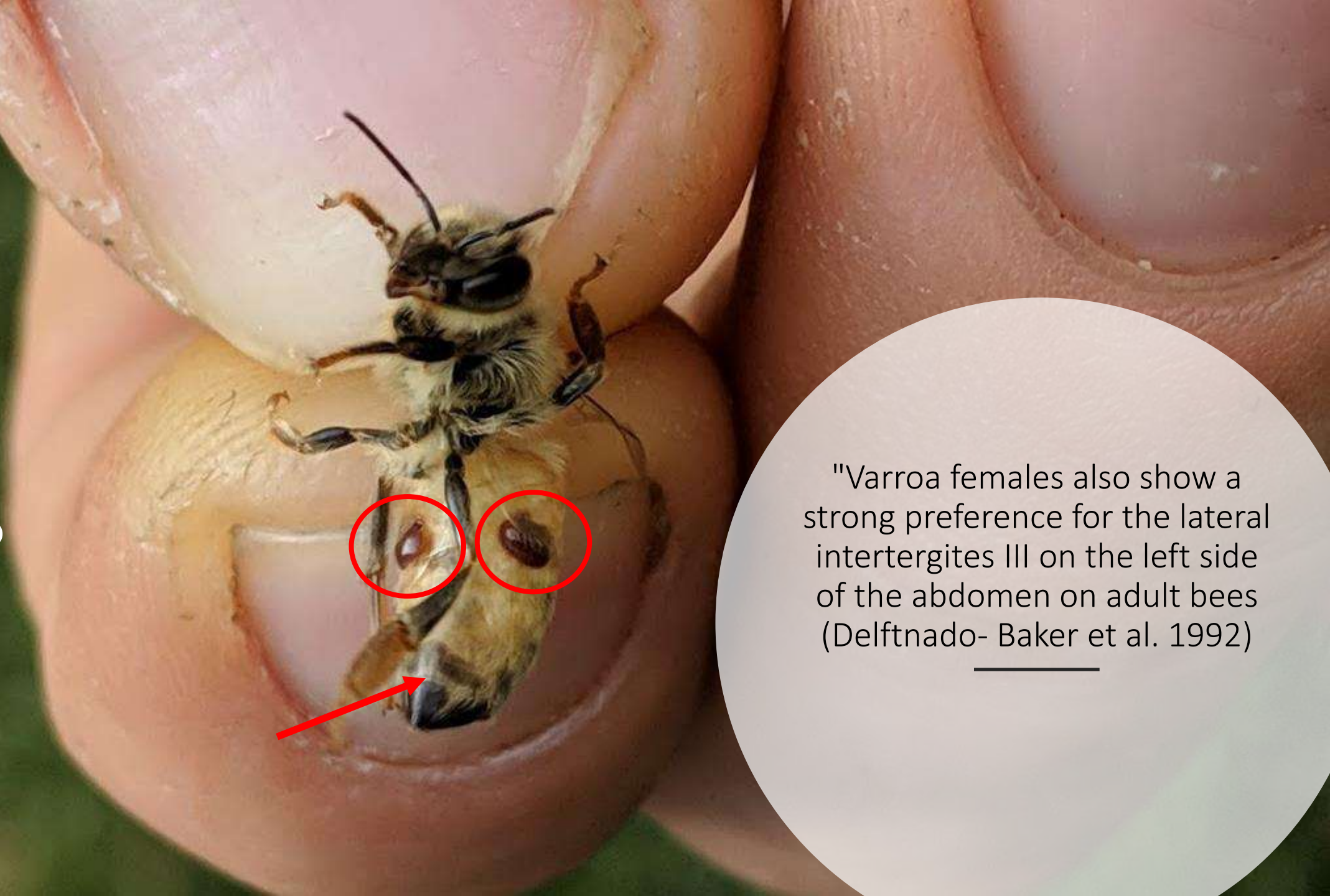


# Ongoing analysis: varroa switching rate is not uniform or constant





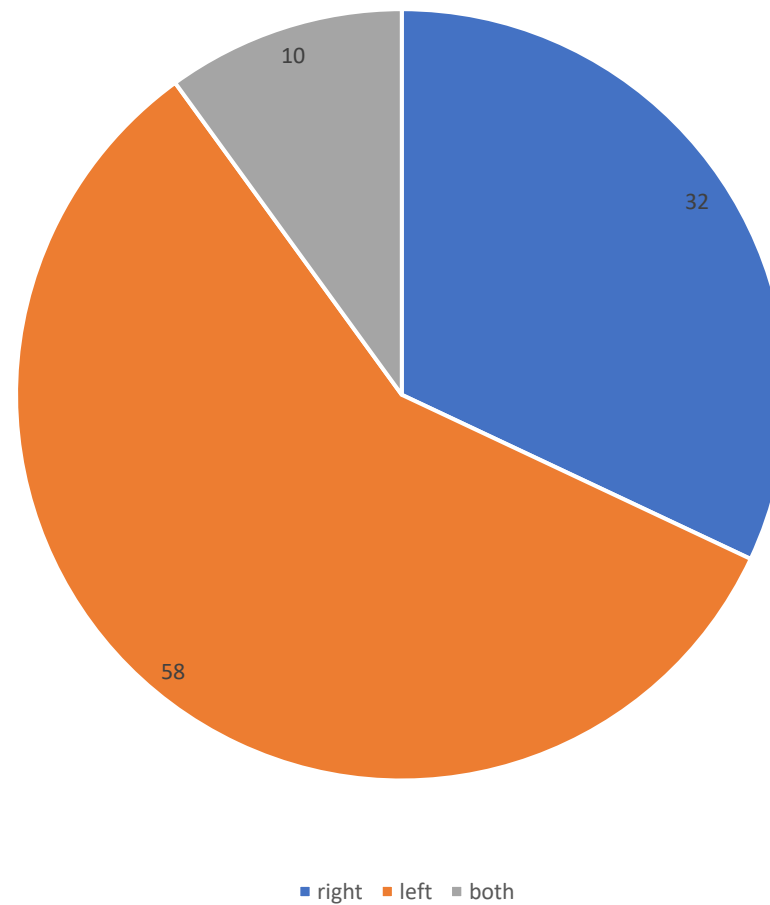
**Right or  
Left  
Handed?**



"Varroa females also show a strong preference for the lateral intertergites III on the left side of the abdomen on adult bees (Delftnado- Baker et al. 1992)"

Percent  
varroa  
selecting one  
side of bee

Percent varroa that feed on side of bee



N = 50



Nano colonies-  
less removed  
from colony  
settings







# THANK YOU!!!!

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- Kirsten Traynor
- Eugene Ryabov
- Matt Heerman
- Daniel Sonenshine
- Serhat Solmaz
- Steve Cook
- David Hawthorne
- Dennis vanEngelsdorp (Advisor)

**Project** *Apis m.*

