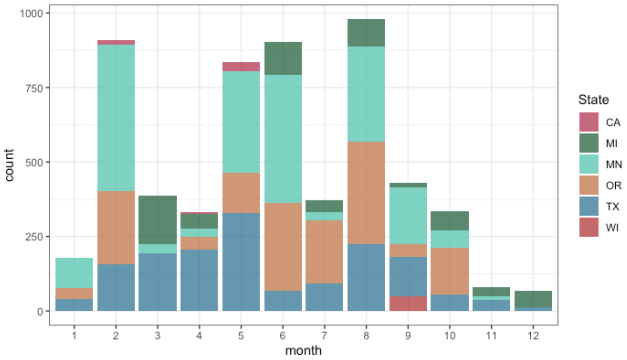
In Field vs Lab Alcohol Shake

In answer to the demands of beekeepers for a more immediate communication of the results of monitoring, our tech teams started performing alcohol washes in the field in early 2018 and throughout that year. To compare this new technique to our tested and true lab alcohol shake, we processed a year worth of samples with the 2 methods.

Comparative study

5810 samples performed during 787 sampling events between January and December 2018



Assumed field Varroa load vs Verified Lab Varroa Load

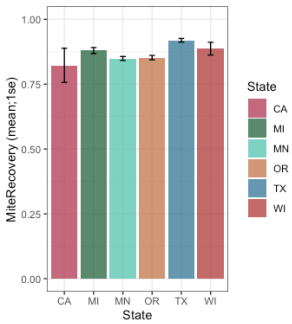
The field load is based on the number of mites shaken off an assumed 300 bee sample size. In comparison, the lab load is based on any remaining mites not detected in the field and an accurate number of bees in the sample collected.

Any inaccuracy of the field read can be the result of:

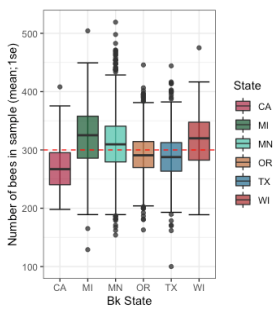
- Missed mites and/or
- Sample containing more or less than 300 bees

Mite recovery

The field shake recovered on average 87% of the mites in the sample.
But there was variability across technicians, with some averaging at 82% recovery while others were up to 92%.

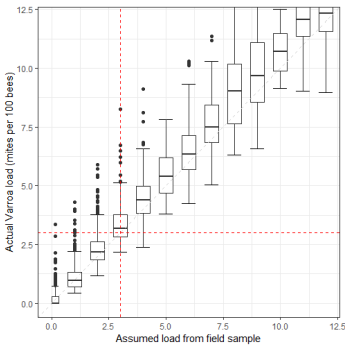


Number of bees in the sample



The average number of bees in the sample was very close to the 300 target (300.8), which shows high **accuracy**. But the **precision** was not optimal, with 95% of the samples comprised between 271 and 328 bees. Samples furthest from the 300 target are likely underestimating or overestimating the mite load.

Assumed field Varroa load vs Verified Lab Varroa Load



The load estimated from the field test is like a "blurry" picture. It is enough to estimate the ballpark of the infestation, but not for a precise measure.
For example, a field test reading at 3 mites/100 has a 95% chance to actually be somewhere between 2.4 and 4.8 mites/100.

Sensitivity and Specificity

Diagnostic at colony level

If we use the action threshold of 3 mites per 100 bees, 857 colonies should be identified as "positive" per the lab. Of those, 760 were correctly assigned by the field reading.

Types	Count	Freq (%)
False negative	97	0.017
False positive	35	0.006
True negative	4918	0.846
True positive	760	0.131
total colonies:	5810	1

Sensitivity: Samples above threshold (positives) were detected in the field 88.7% of the time.
Specificity: Samples below threshold (negatives) were correctly found negative in the field 99.2% of the time.
This means that 11.3% of colonies that should have been diagnosed as "positives" were missed by the field sample.

Diagnostic at yard level

If instead we use the rule of any colony in a yard reaching 3 mites per 100, 300 yards should be identified as "positive" per the lab. Of those, 274 were correctly assigned by the field reading.

Types	Count	Freq (%)
False negative	26	0.033
False positive	5	0.006
True negative	482	0.612
True positive	274	0.348
total "yards":	787	1

That means 91.3% of the yards requiring action were correctly detected in the field, and 98.9% of the negative yards were correctly assessed in the field.
In other words, 8.7% of the yards requiring actions would still be missed in field samples.

If we only look at the presence or absence of mites, the field reading correctly identified 95.3% of the samples with mites, and 99% of the yards in which at least one colony had mites.

In short… the field alcohol shake offers an immediate estimation of *Varroa* load at the cost of some precision.
It has a high success of detecting the presence of mites. The estimated load should be interpreted with caution as a "blurry picture", enough to indicate the ballpark of the infestation, but not as precise as the lab estimate.