



SELECT HARVESTS

Almond Board R&D Forum Pollination Thermal Camera

Presented 22 August 2023 Michael Ward



SUPPLYING PLANT BASED PROTEIN TO THE WORLD



What We Are Looking For

- Non invasive ways to assess hives
- Fast/ efficient ways to cover larger hive numbers
- Inspection data provided for
 - Each apiarist
 - Individual location
 - Down to individual drop sites
- Independent auditing



What's The Tech

- Digital grading service powered by infrared image analysis
- Verifi technology supplied by The Bee Corp US
- Flir E8 handheld thermal infrared camera
- GPS tracking with mobile linking and Wi-Fi image uploading



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How It Works

- Single infrared image of the hive surface
- Capture thermal signature of the bee cluster
- Adjustments are made with weather information
- Beehive brood temperature ideal 32 to 35 degrees
- Hive size & type is entered by operator
- Algorithm calculates the frames with information gathered

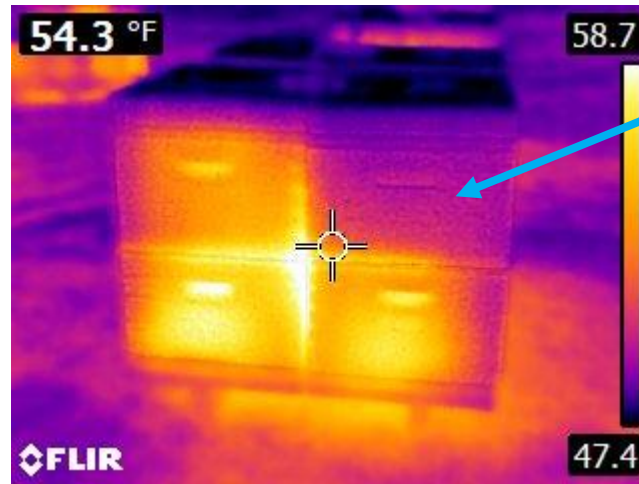
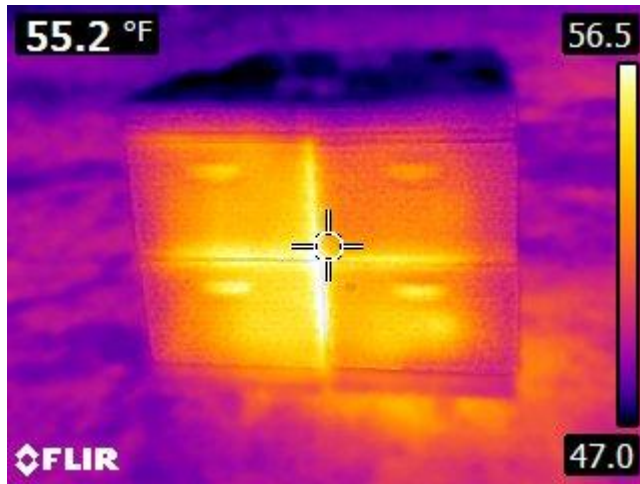


Method

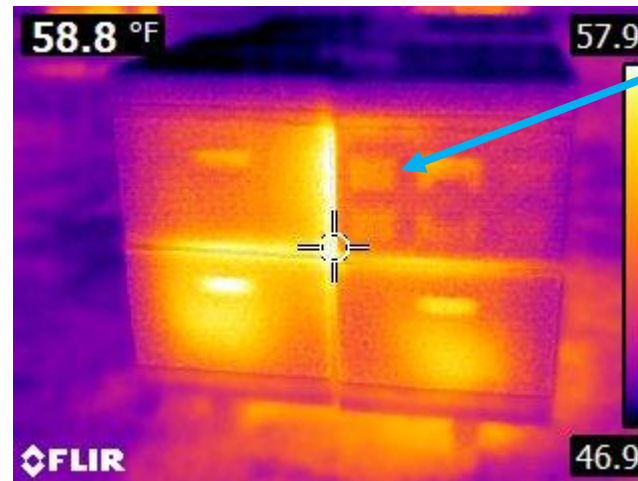
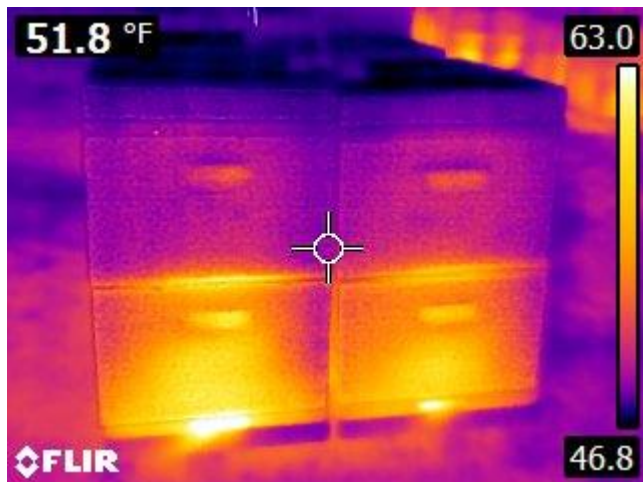
- Ensure images are taken 3 hours after sunset
- Wi-Fi connection between phone & Flir E8
- No background lights (car, interior lights etc)
- Stand 1-2 meter from front or back of hive
- Sync all images to your phone
- Wi-Fi connection allowed uploads



Image Examples



Presumably
an empty box



Box lining
visibly
having an
effect on
the
temperature
reading

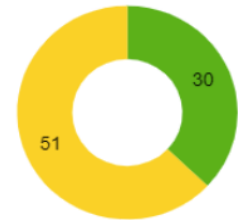
Reporting

Summary Information

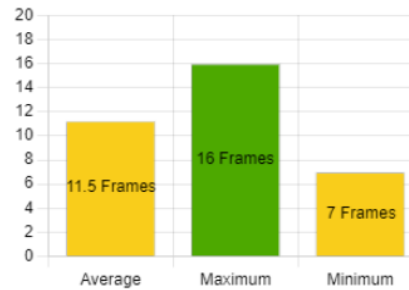
Average Frame Count: 11.5
 Beekeeper:
 Graded Hives: 81

Frame Distribution

- >=12 Frames
- 7-11 Frames
- <=6 Frames

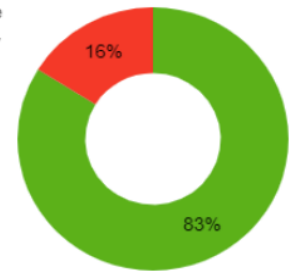


Average Strongest Weakest



Hive Divide

- Above
- Below

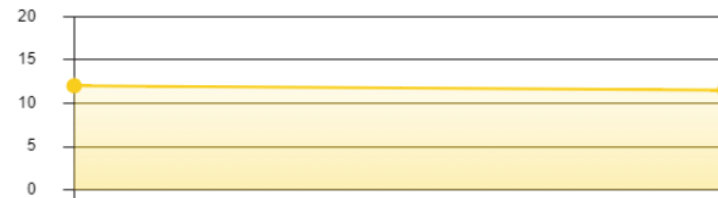


Drop Summary

Number of Hives: 20
 Average Frame Count: 10.5
 Average Bees Per Hive: 17,000

Coordinates:
 -34.11759618015434, 140.86378055615805

Frame Strength Trends



Aug 7, 2022

Aug 6, 2023

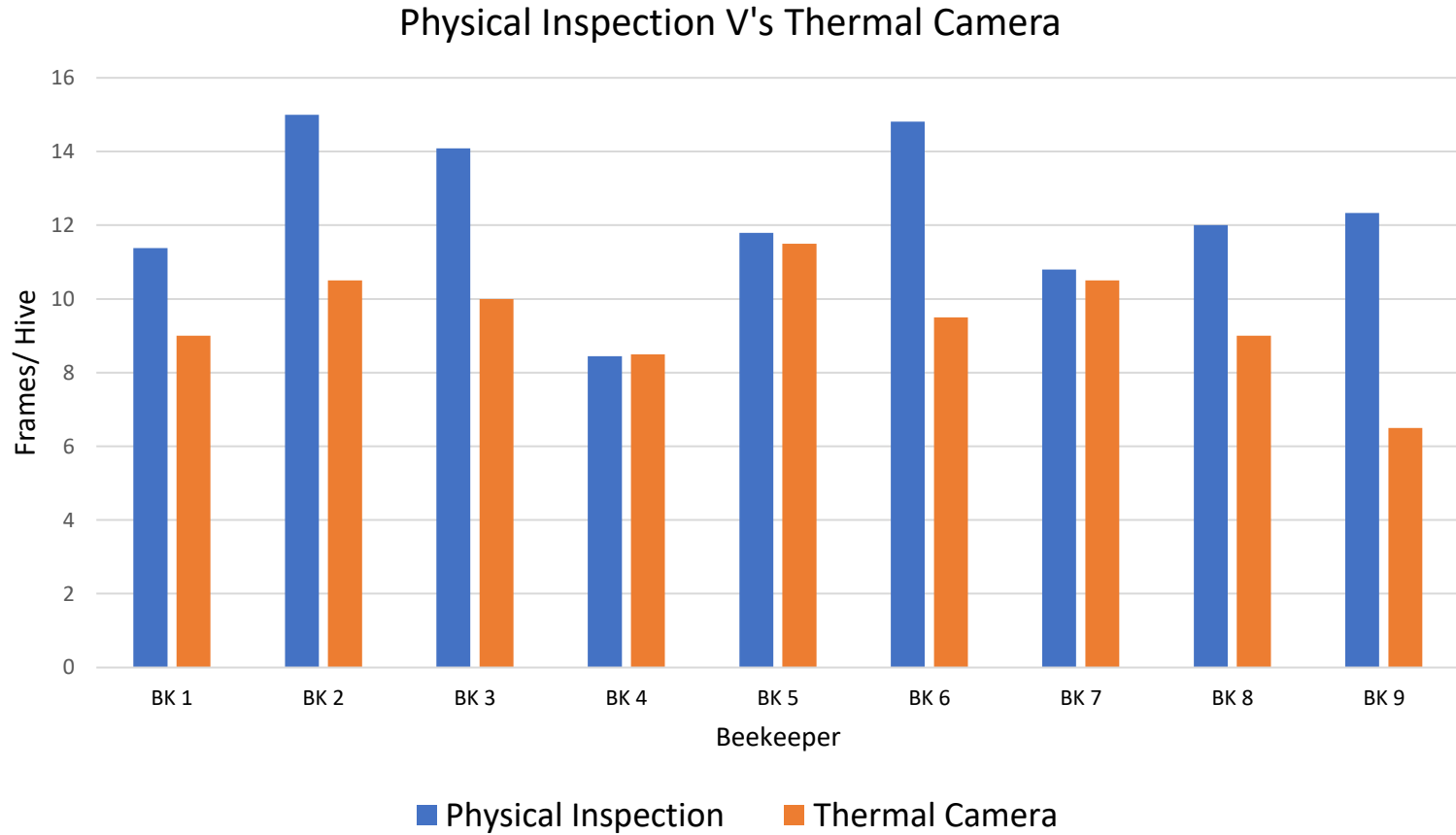


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Results 2023

Physical Inspection 10%
Thermal Camera 25%



Results 2023

Physical Inspection 10%
Thermal Camera 25%

	Total Hives	Physical Inspection	Thermal Camera	% Difference
BK 1	628	11.38	9	26%
BK 2	484	15	10.5	43%
BK 3	895	14.09	10	41%
BK 4	128	8.45	8.5	-1%
BK 5	304	11.79	11.5	3%
BK 6	768	14.81	9.5	56%
BK 7	715	10.8	10.5	3%
BK 8	960	12	9	33%
BK 9	70	12.33	6.5	90%



Results 2022

Physical Inspection 10%
Thermal Camera 25%

	Total Hives	Physical Inspection	Thermal Camera	% Difference
BK 1	560	7.9	9.24	17%
BK 2	288	6.14	8.64	41%
BK 3	950	11.13	11.5	3%
BK 4	128	9.78	10.3	5%
BK 5	360	10.75	11.4	6%
BK 6	140	10.44	9.76	-7%
BK 7	256	8.25	13.11	59%
BK 8	708	14.09	13.92	-1%
BK 9	576	7.53	7.65	2%
BK 10	288	11.21	8.53	-24%
BK 11	76	10.89	8.89	-18%



Conclusion/ Summary

- Another tool for the tool kit
- Can cover large hive numbers per night 400-500 hives
- Physical assessment and thermal have variations from our experience
- Good idea but needs further development/ refinement
- Fast/ easy assessment of low/ dead hives on arrival
- Hive placement needs to be considered for imagery



Further Research

- Paint type, ie dull v's reflective
- How much is inspection timing having an influence
- Box thickness and type
- Angle of photos
- Honey stores
- Sample 1:1 physical v's thermal on larger scale



Thankyou



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ALLINGA FARMS



RENSHAW