

Honey Bee Stock Assessment Project

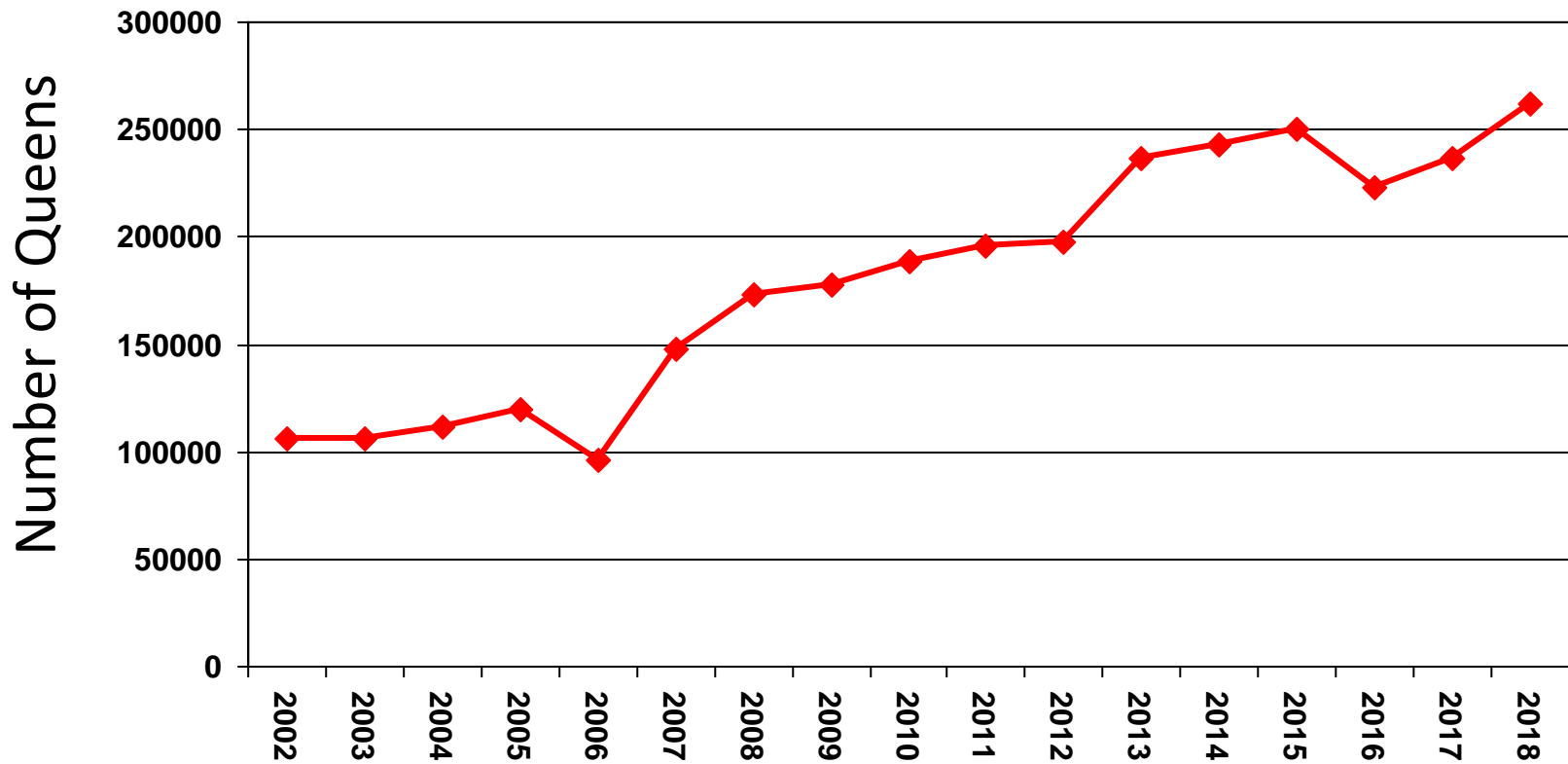
Shelley Hoover,

Marta Guarna, Patricia Wolf-Viega, Stephen Pernal



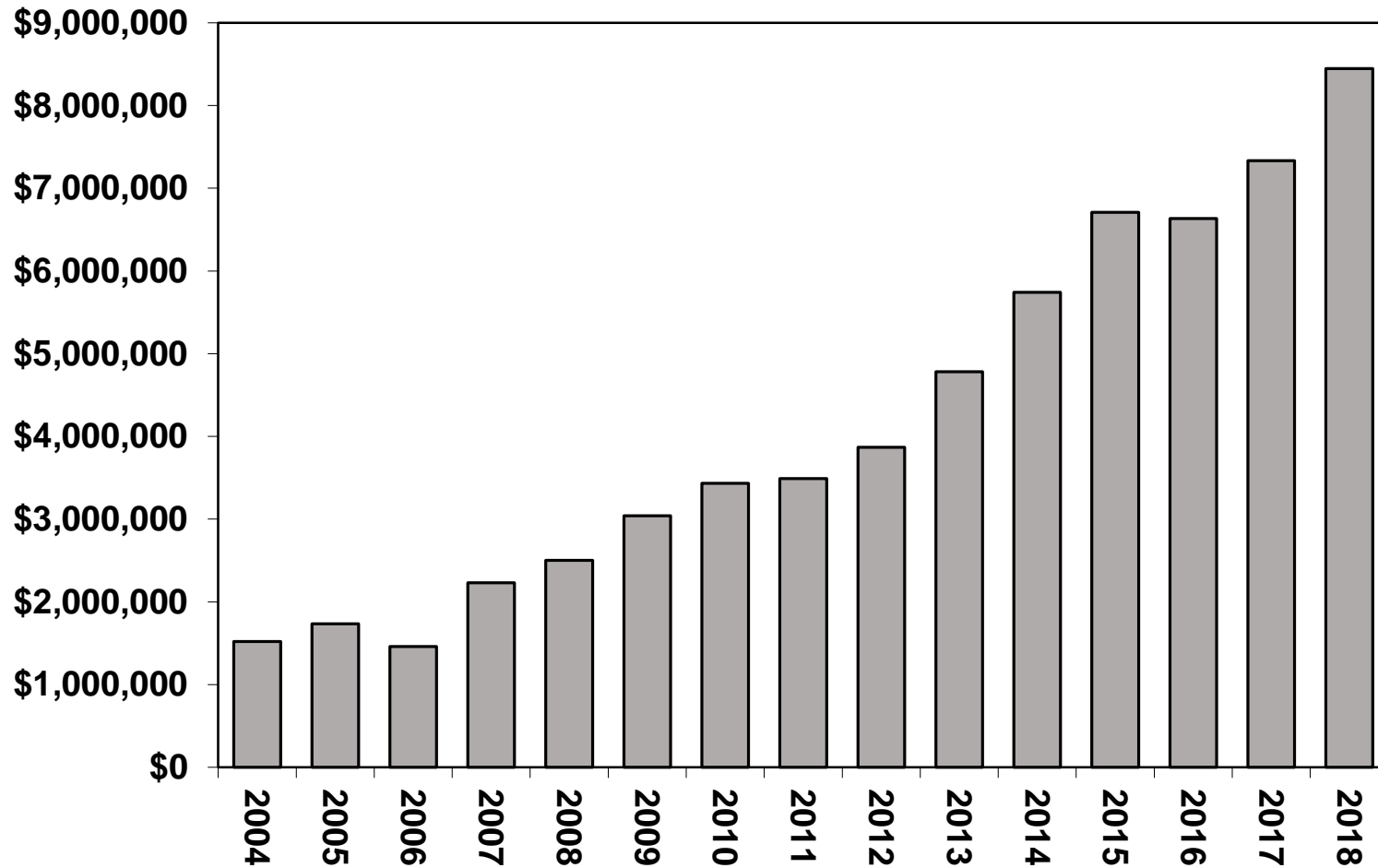
Number of Queens Imported to Canada

Over 250,000 in 2018

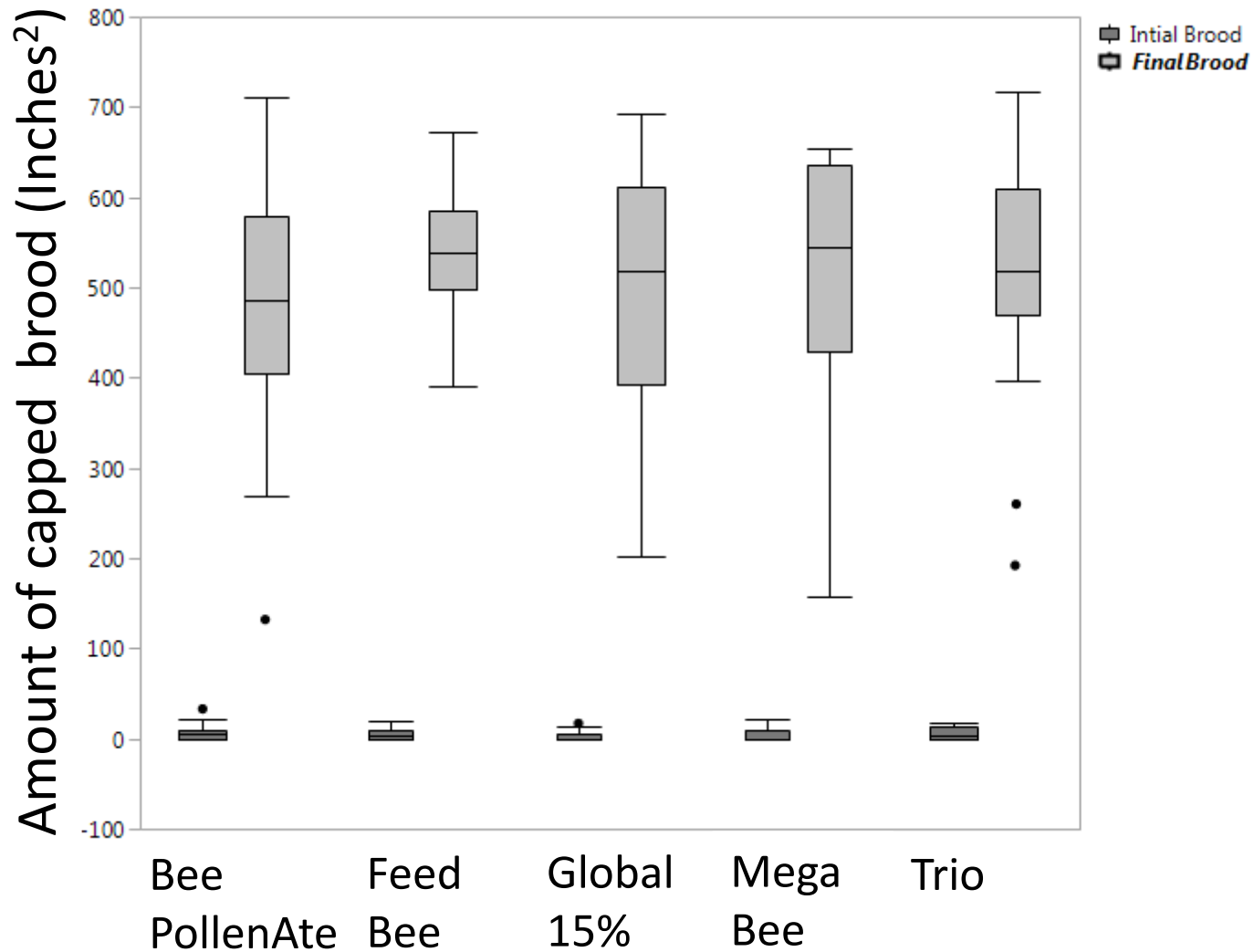


Value of Queen Imports to Canada

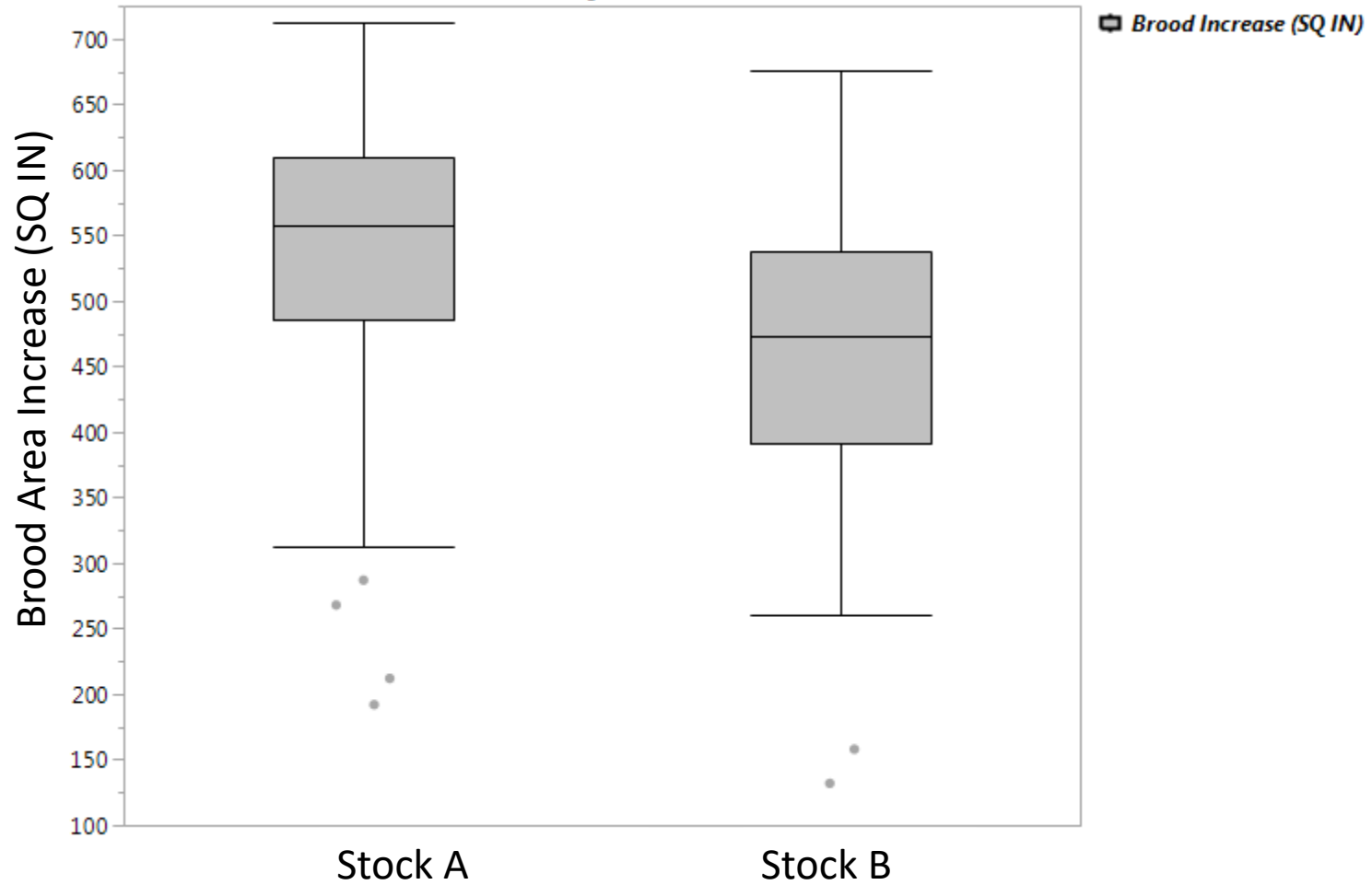
est. \$8.4 million



No difference in capped brood (initial or final)



*Stocks differed in brood increase



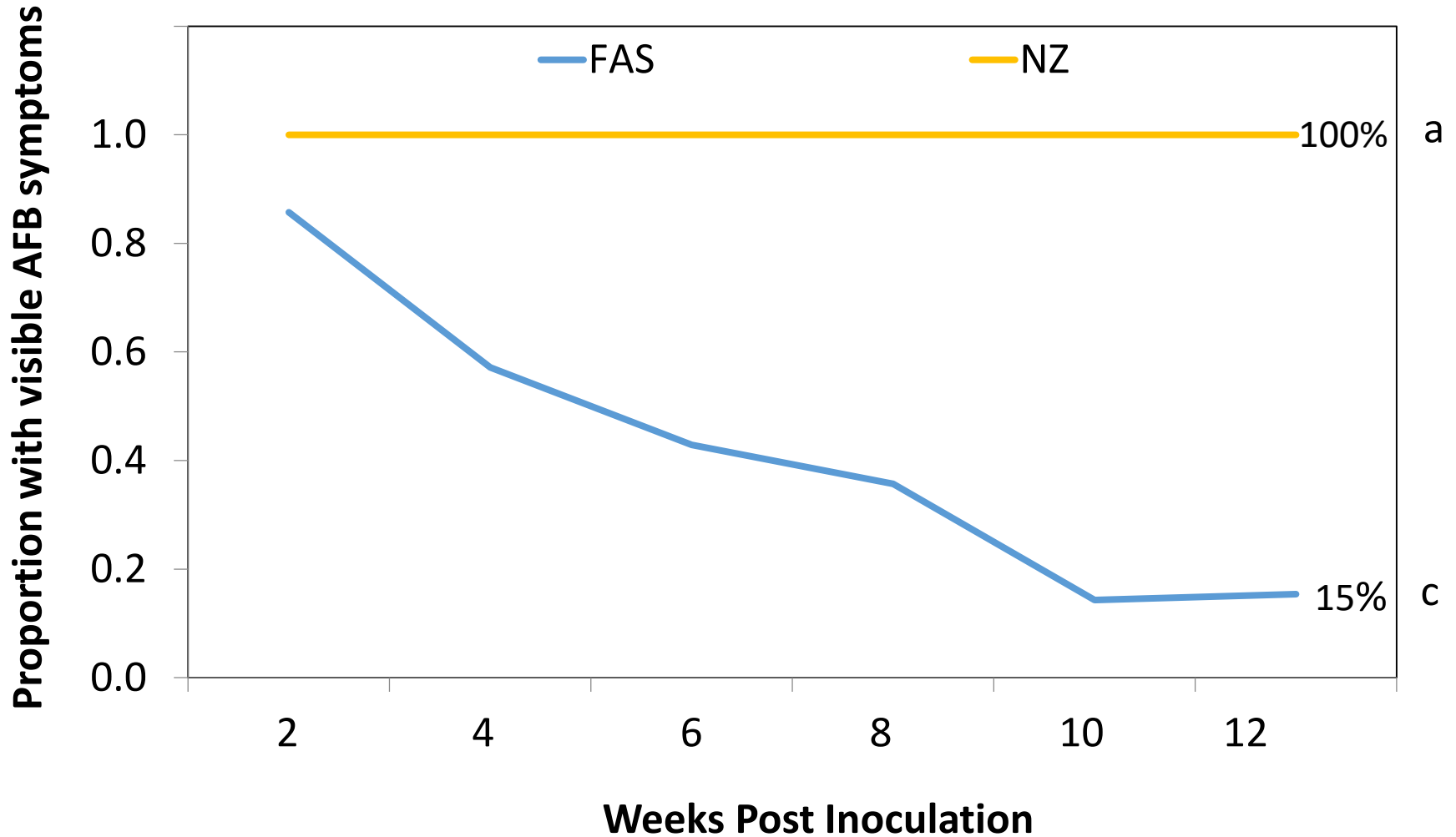
e.g. Hygienic stocks resistant to AFB



Hygienic stocks resistant to AFB



F1



Friedman repeated measures test $M_3=10.85$, $P = 0.013$, Kruskal-Wallis post-hoc tests to determine treatment differences at 12 weeks.

Queen
quality
matters.

It matters a lot.

(Both genetics *and* care)

- Physiological state of nurses rearing Q cells
- How well fed is cell builder / finisher?
- Conditions during grafting
- Cell transport
- Make up of mating nucs, resources in nucs
- Weather conditions during mating
- Drone quality and quantity
- Queens caught and banked or nucs / splits transported?
- Queens shipped? Banked again?
- Shipped by air? Truck?
- How long in cages
- Treatment by attendants

Stock Assessment / Queen Trait Project

Evaluate queen traits and compare to colony level traits in the field:

- Brood patchiness
- Brood area
- Honey production
- Population
- Defensiveness
- Hygienic behaviour

Queen Traits

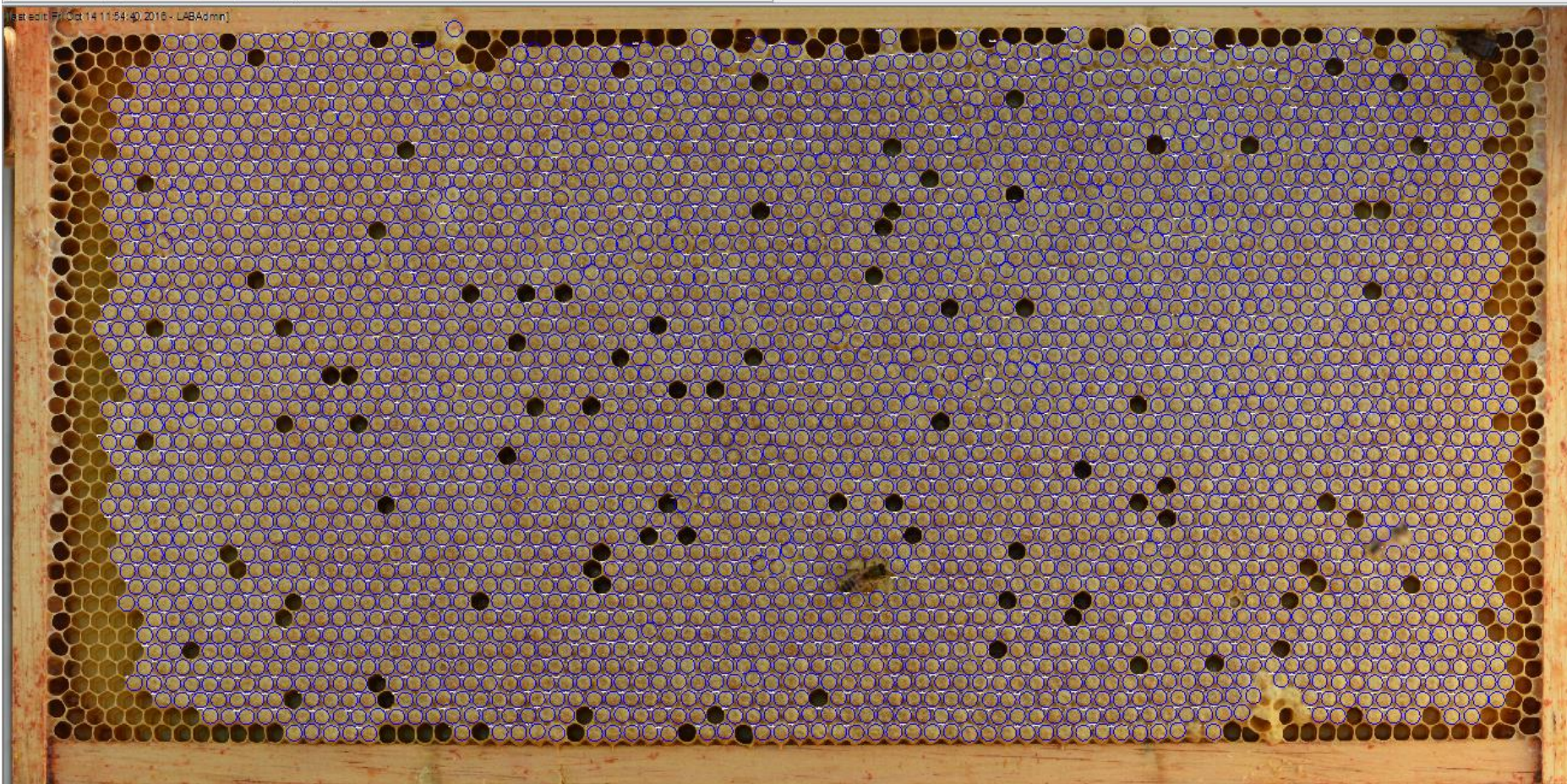
- Queen live weight
- Pathogen loads
- Sperm quantity and viability
- Spermatheca volume
- Thorax width and length
- Head width
- Number of ovarioles, ovary weight

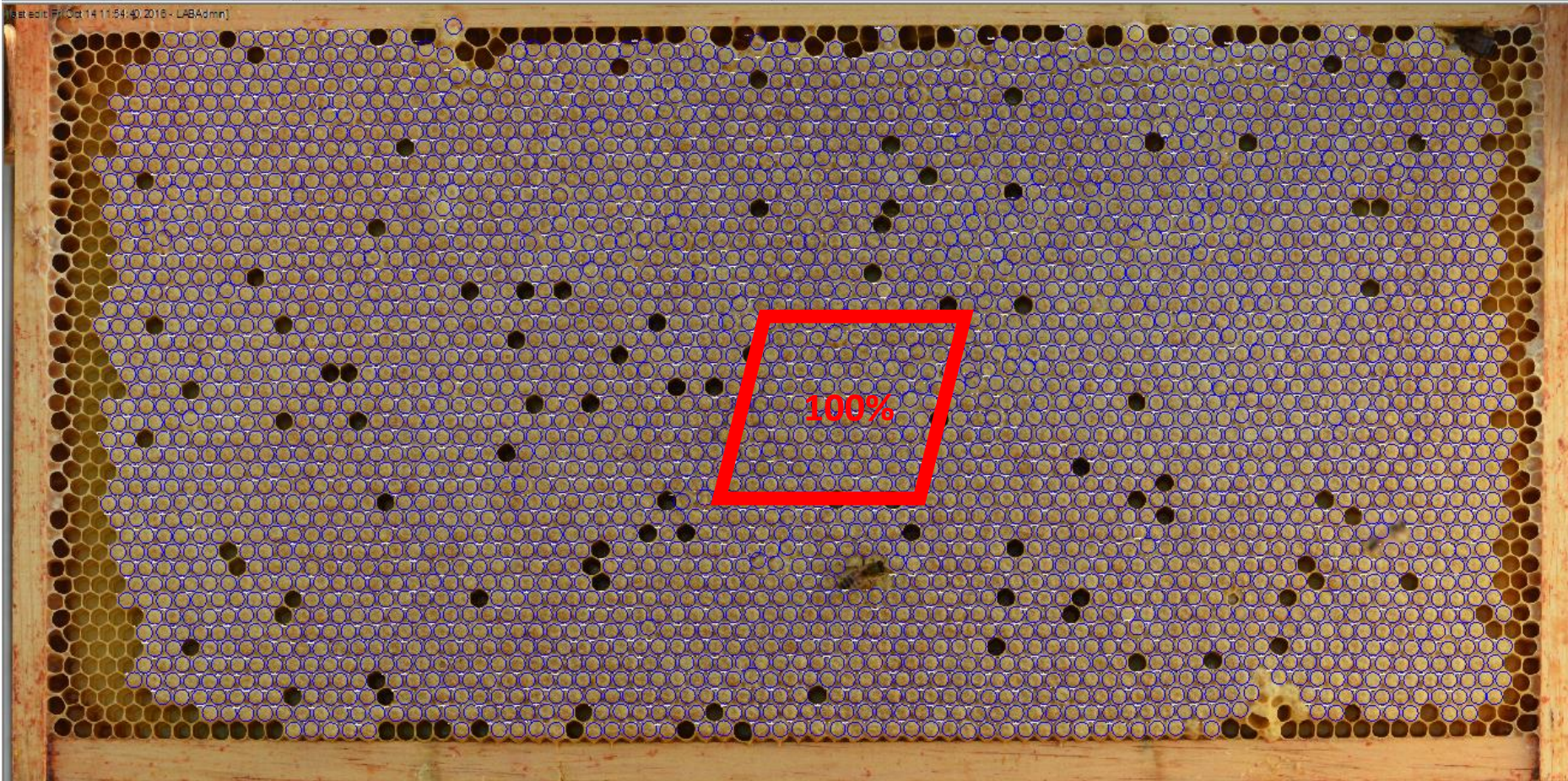
Establish quality control standards for queens?



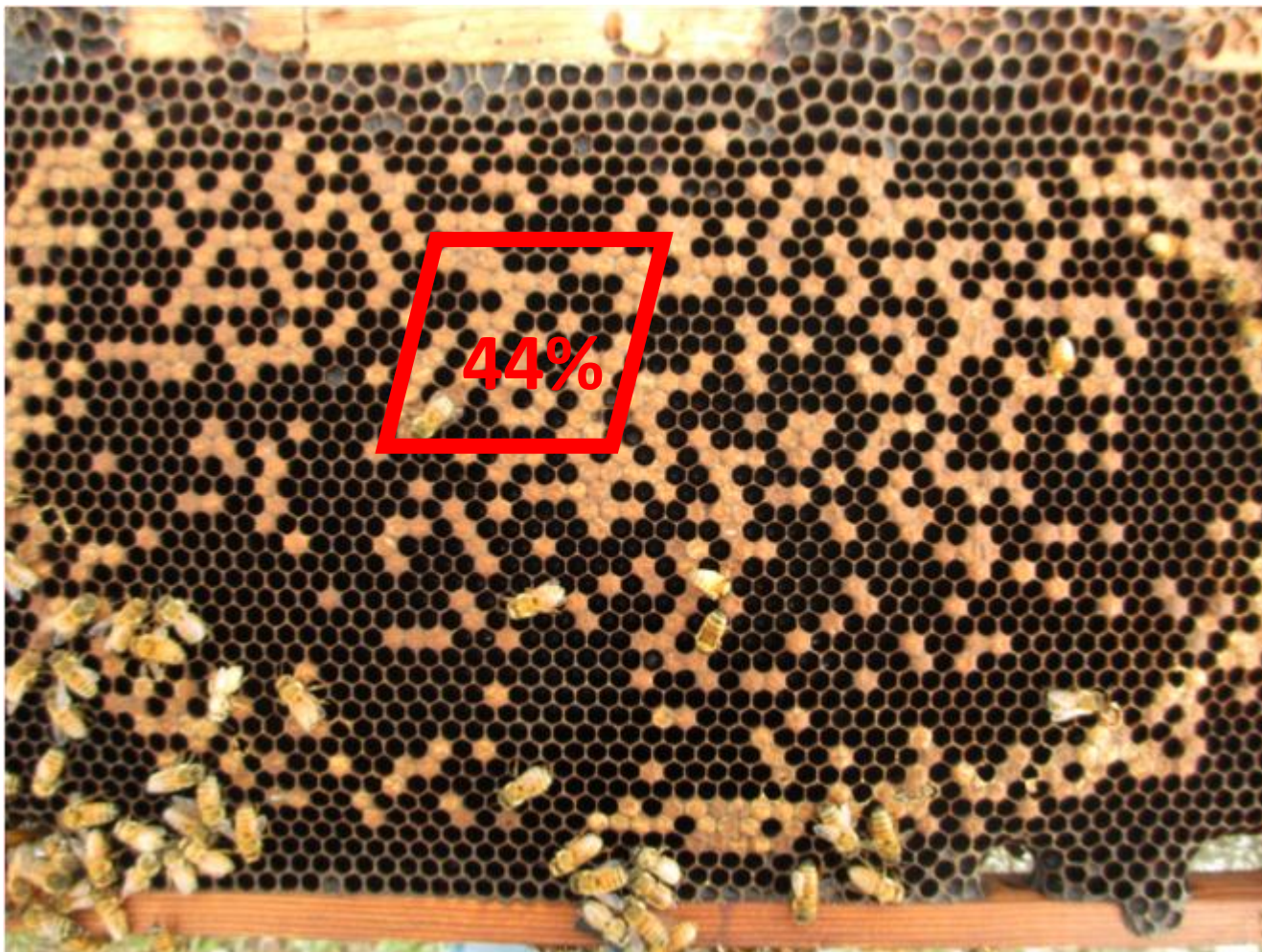
Experimental Methods







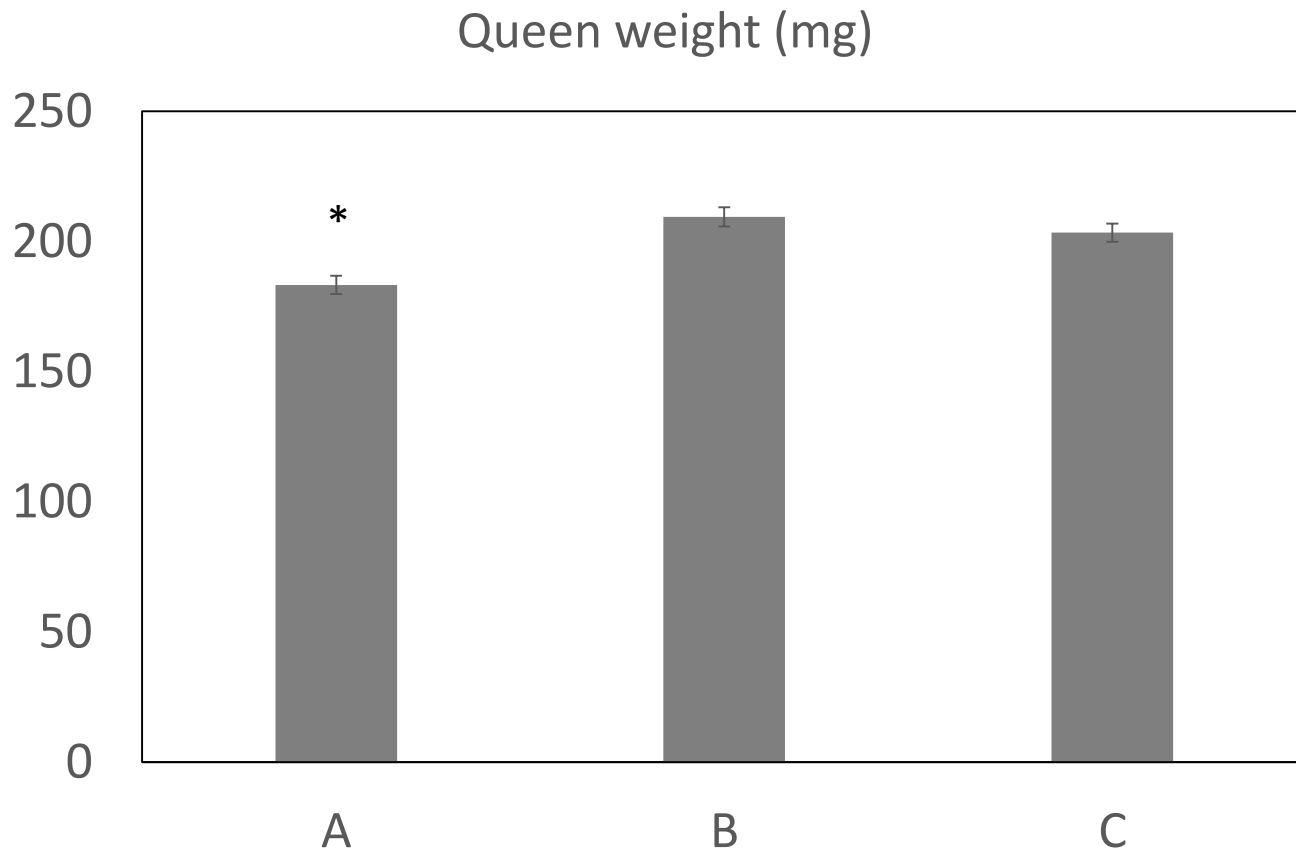
Brood Solidness / Patchiness



Stocks

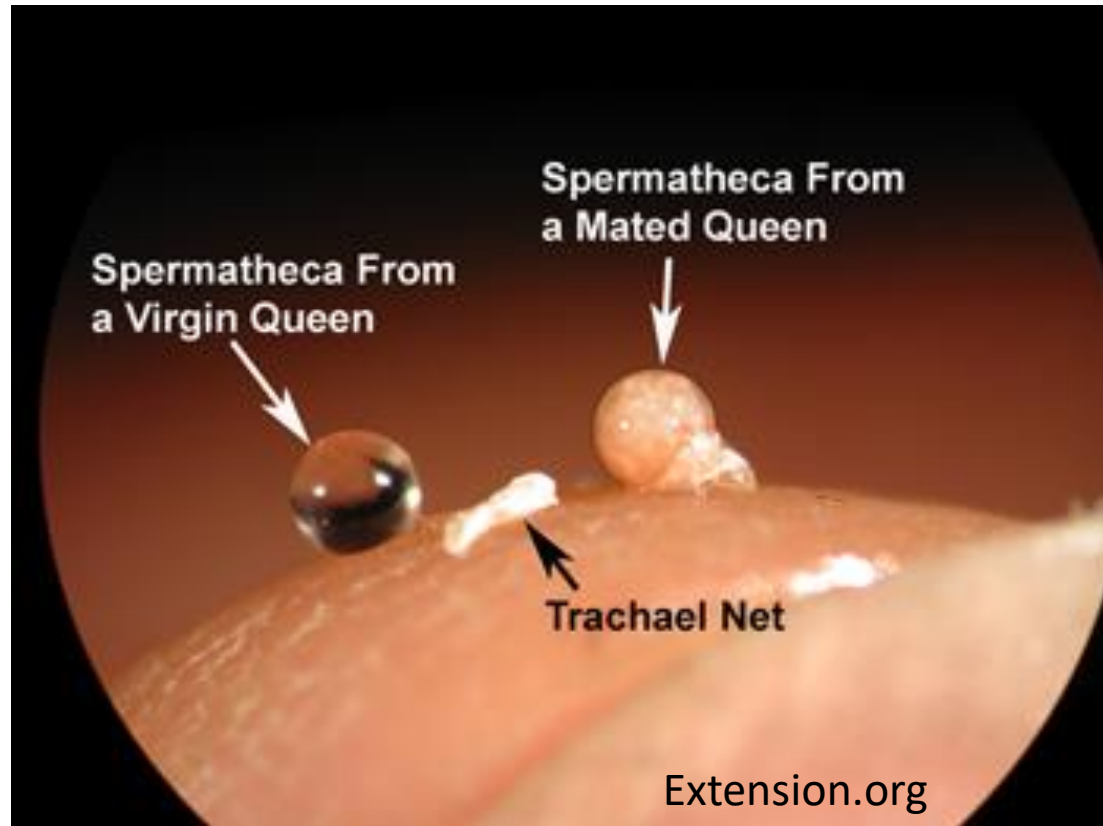
- Two import stocks, one Canadian
- All shipped by air
- Introduced to splits early June 2017



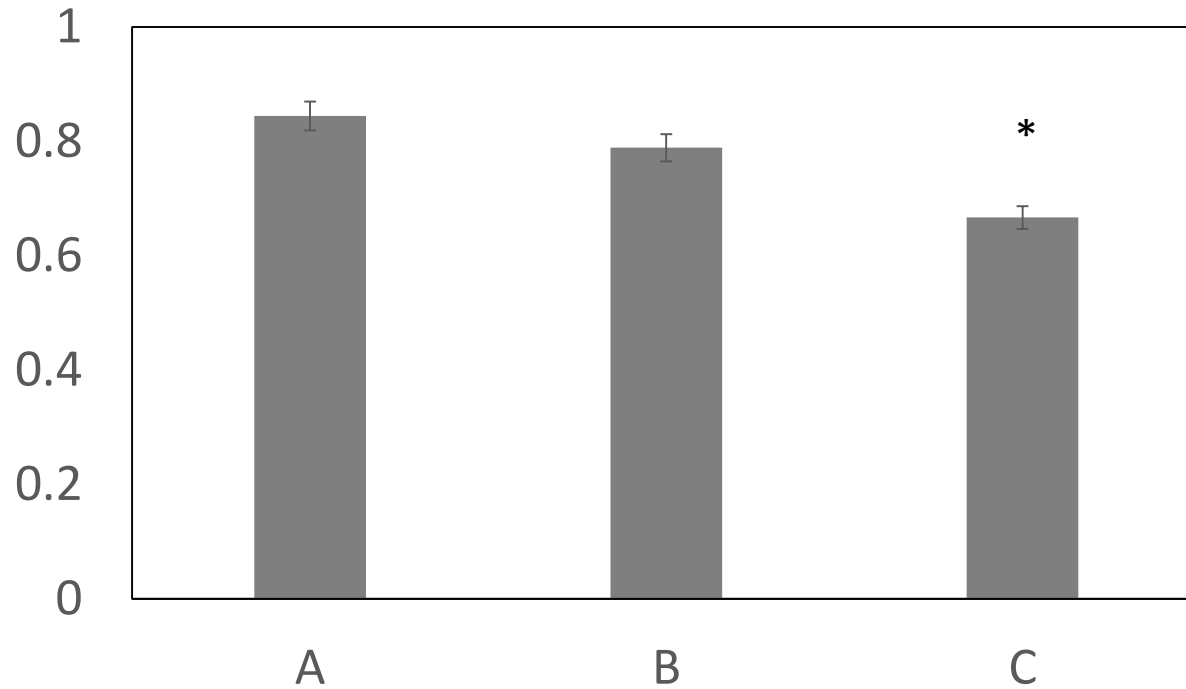


Stock A queens were lighter

$F(2,41) = 14.7, P < 0.001$



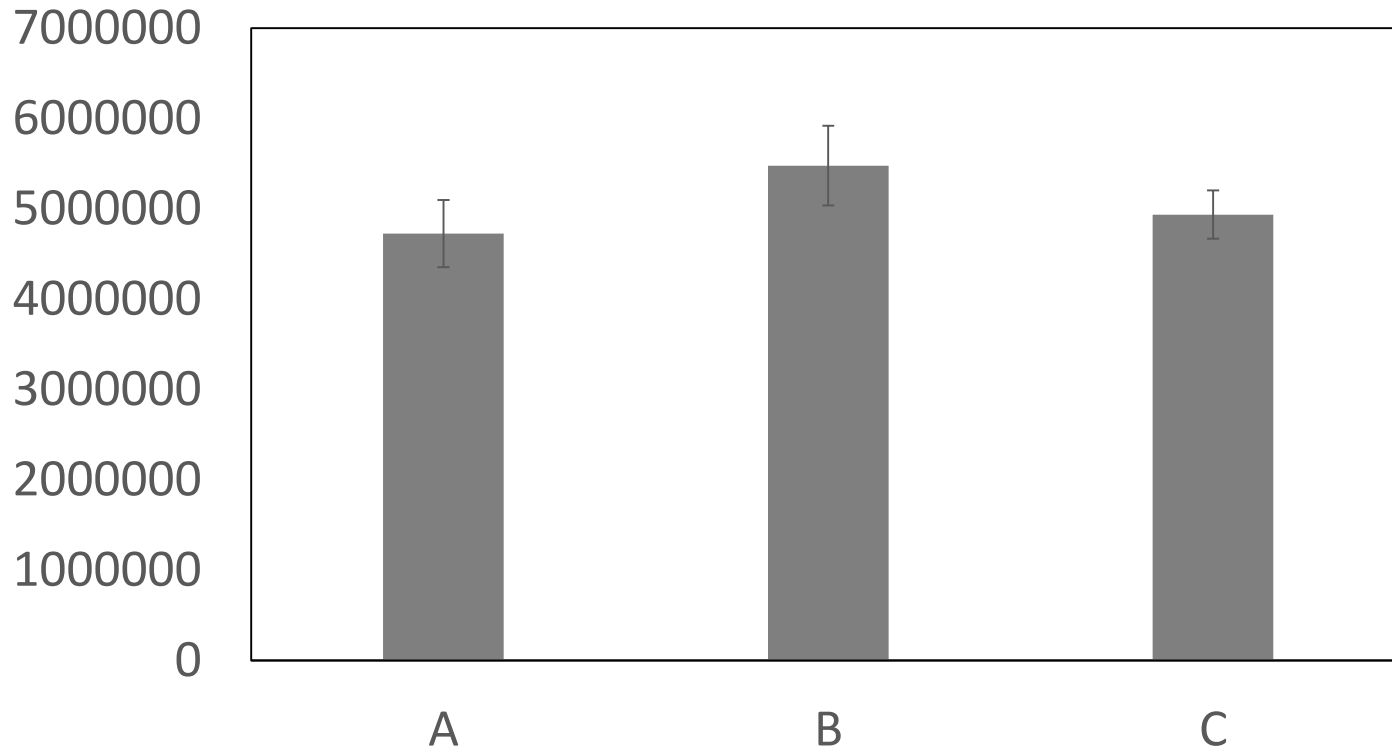
Spermathecal Volume (mm³)



Stock C queens had smaller spermathecae

$F(2,41) = 15.4, P < 0.001$

Total Sperm



No Significant Difference

Sperm Viability

STOCK	A	B	C
	84	74	
	87	91	81
	87	82	79
	87	83	87
	98	79	77
	94	91	80
	96	74	94
	89	86	88
	88	90	93
	91	87	83
	85	82	72
	96	88	86
	69	83	88
	93	86	91
	93	73	85
Mean	89	83	85

% Poor <80	7	27	21
% OK 80-89	47	53	57
% Great >89	47	20	21

Stock A higher viability than stock B – C intermediate

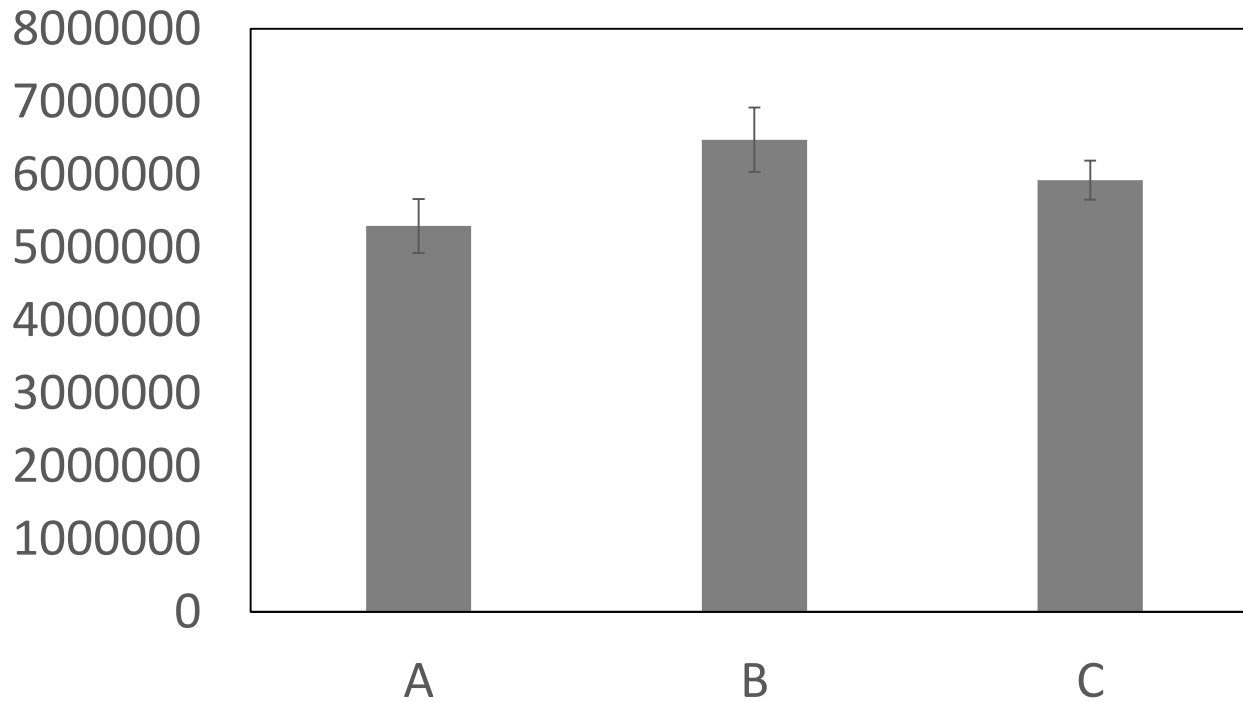


Sperm Viability

STOCK	A	B	C	Canola Qs
	84	74		
	87	91	81	
	87	82	79	
	87	83	87	
	98	79	77	
	94	91	80	
	96	74	94	90
	89	86	88	98
	88	90	93	99
	91	87	83	99
	85	82	72	92
	96	88	86	93
	69	83	88	92
	93	86	91	98
	93	73	85	83
Mean	89	83	85	94

% Poor <80	7	27	21	0
% OK 80-89	47	53	57	11
% Great >89	47	20	21	89

Sperm Count



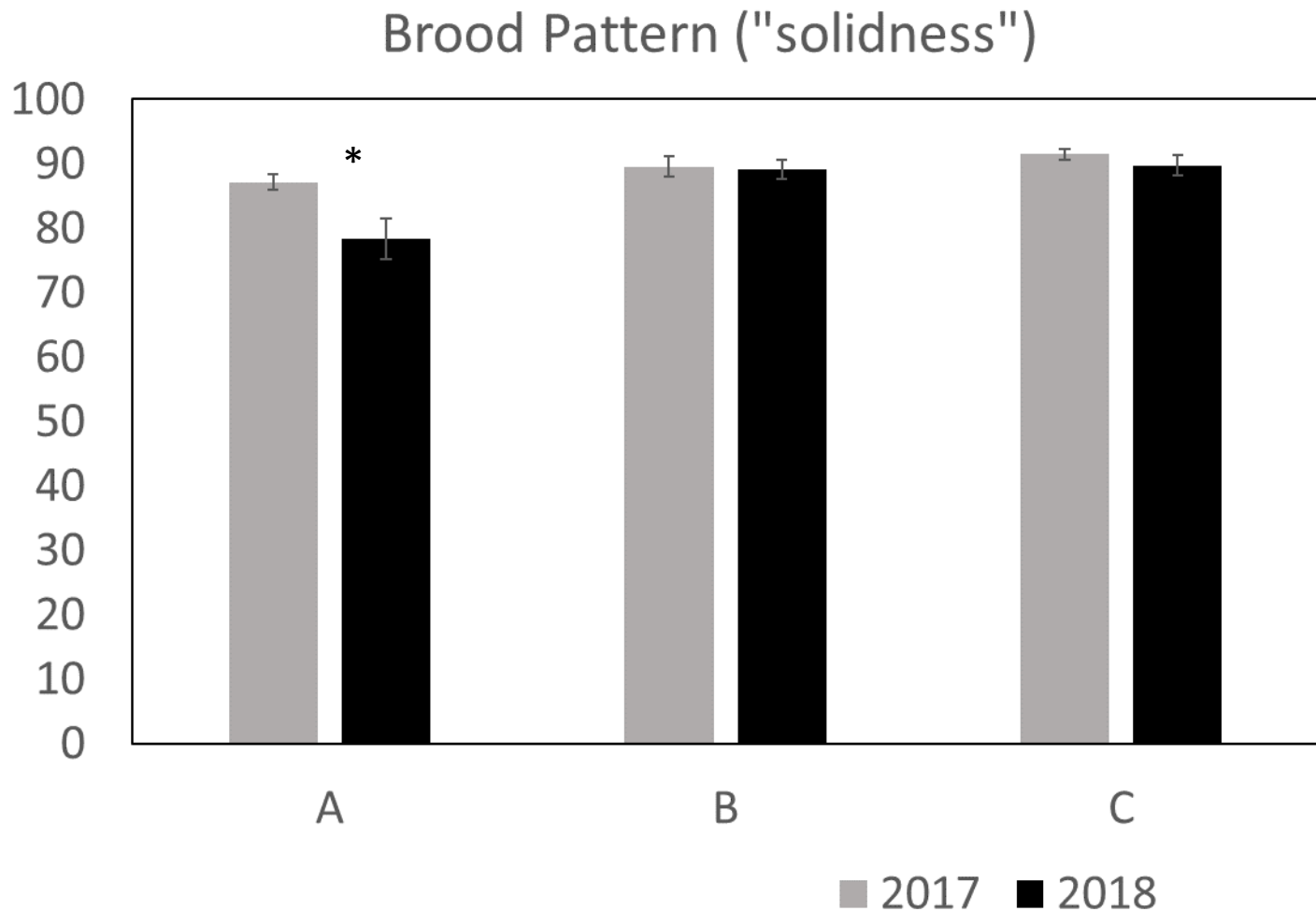
No significant difference

No Difference among stocks in:

- Head width
- Thorax length
- Thorax width



Brood Patchiness

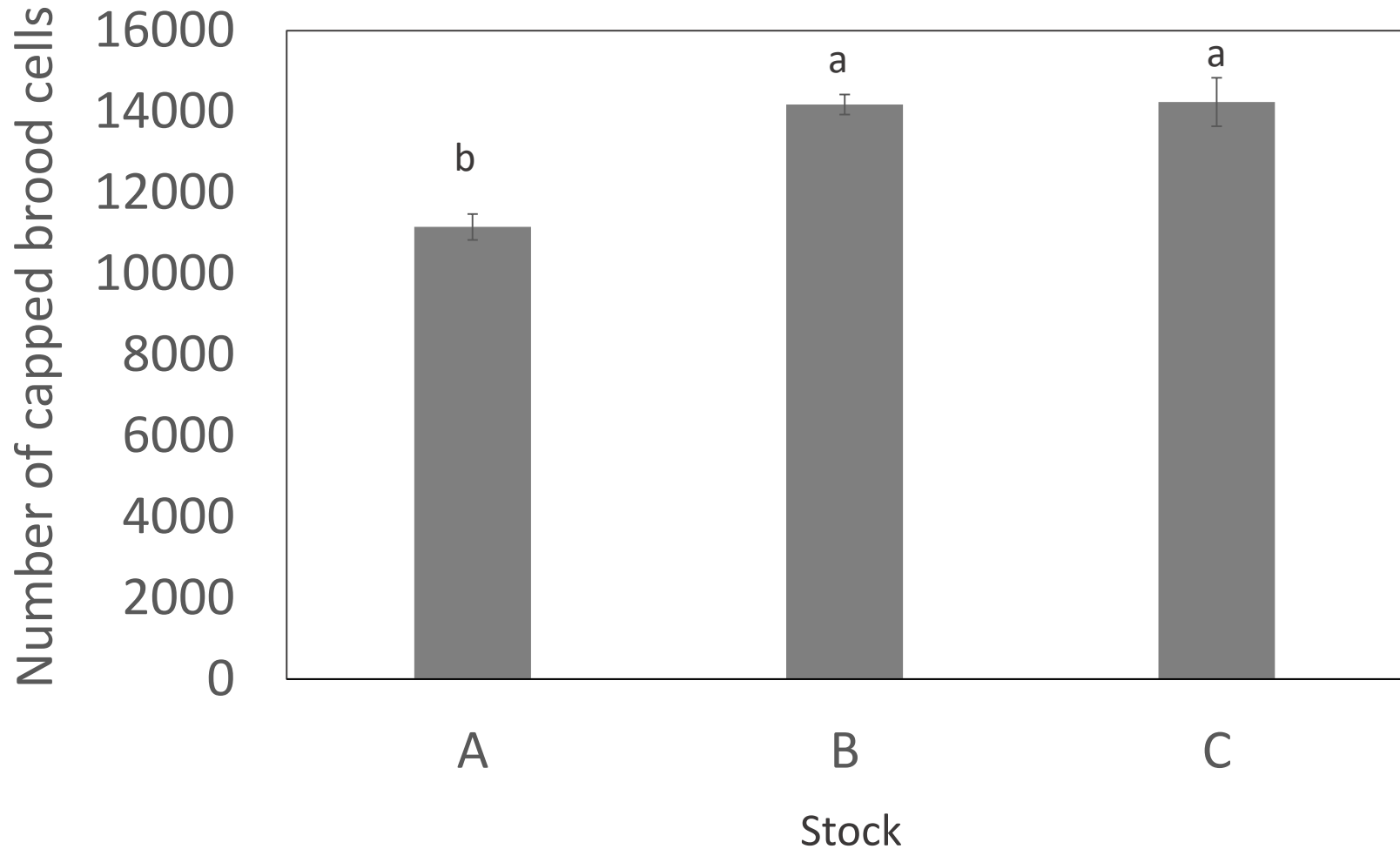


Stock A patchier in both years, especially so in second production season

2017 $F_{2,93} = 3.2$, $P = 0.046$; 2018 $F_{2,57} = 9.5$, $P = 0.0003$

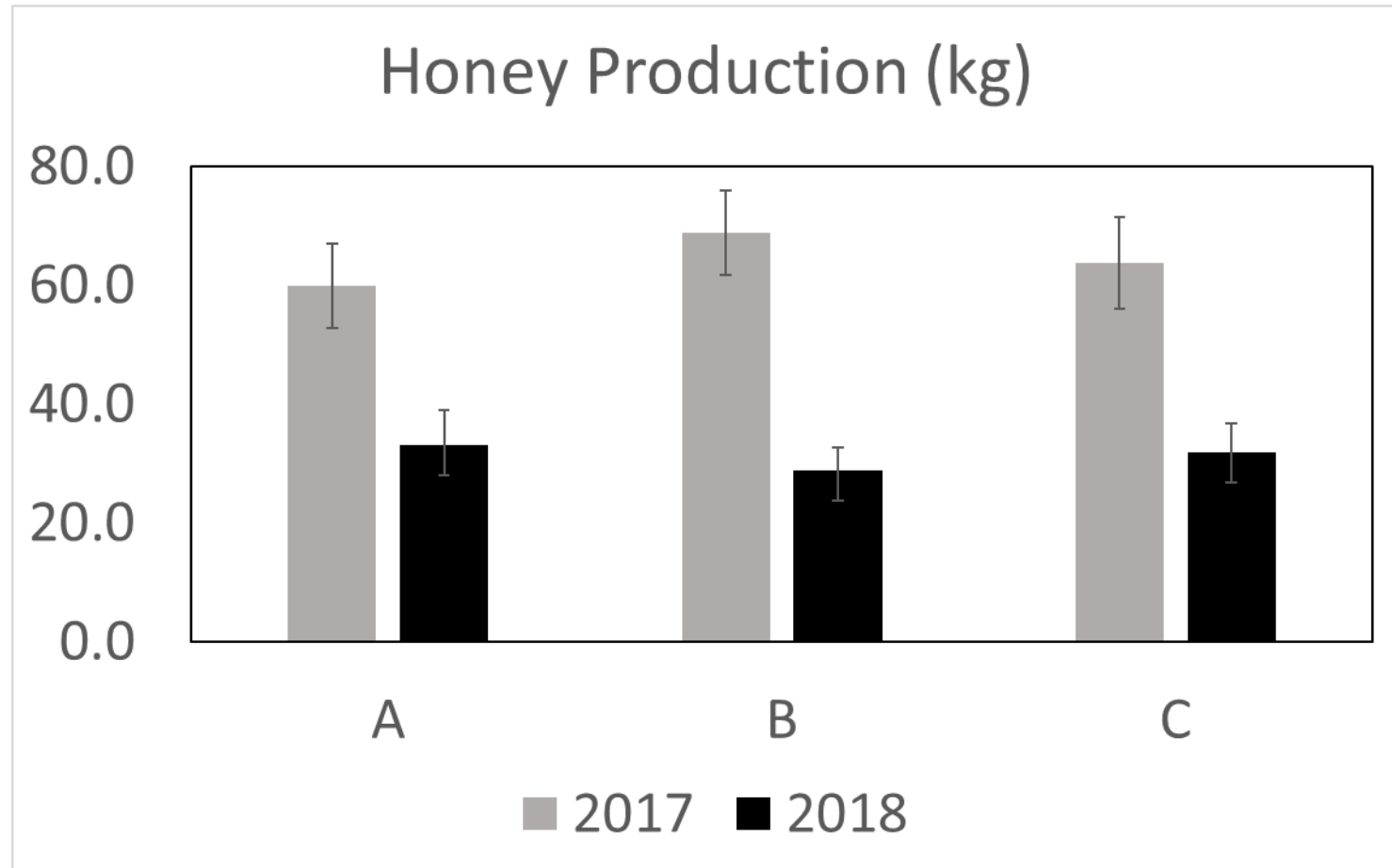
...leads to less brood

Brood Area in August

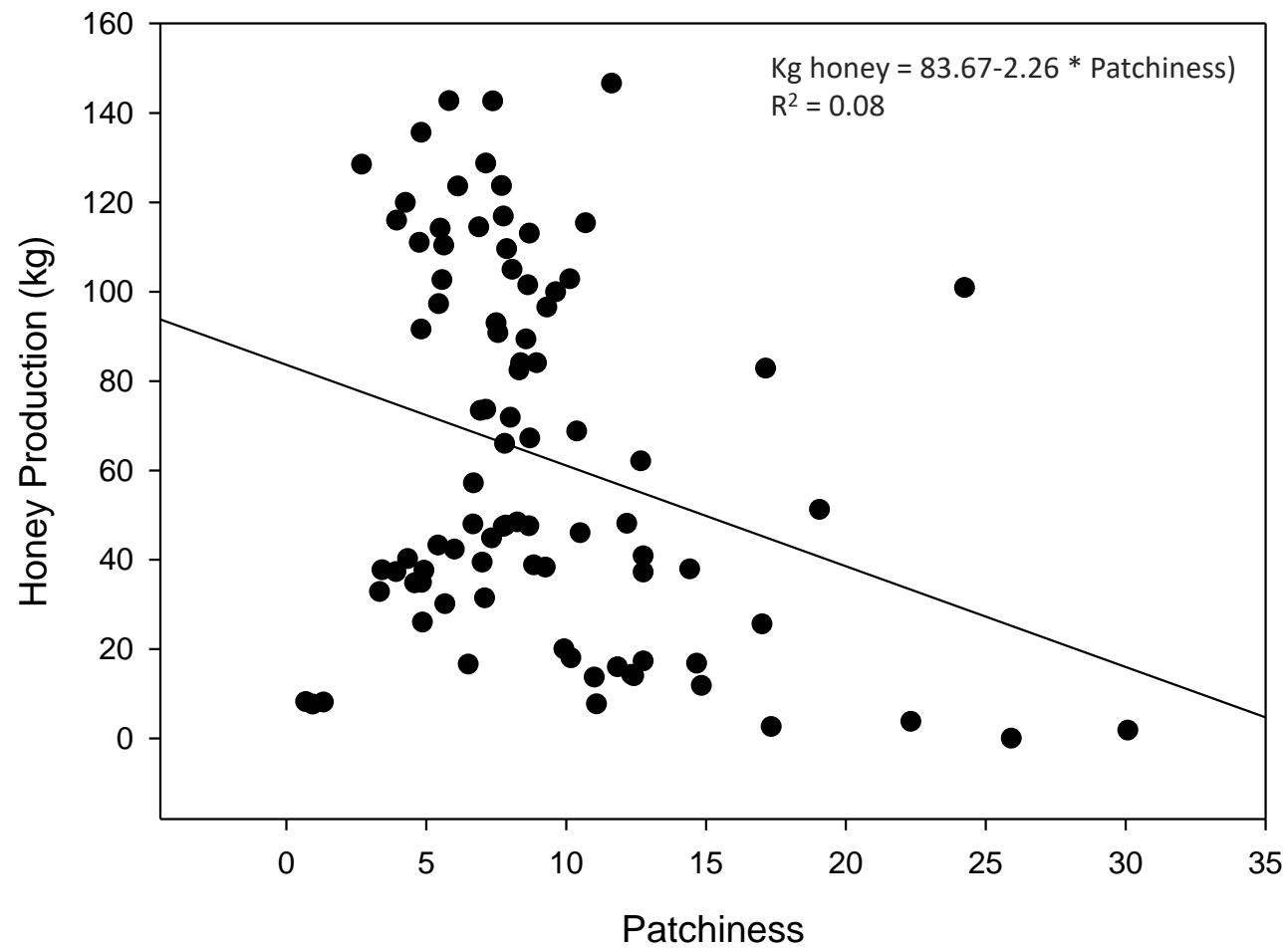


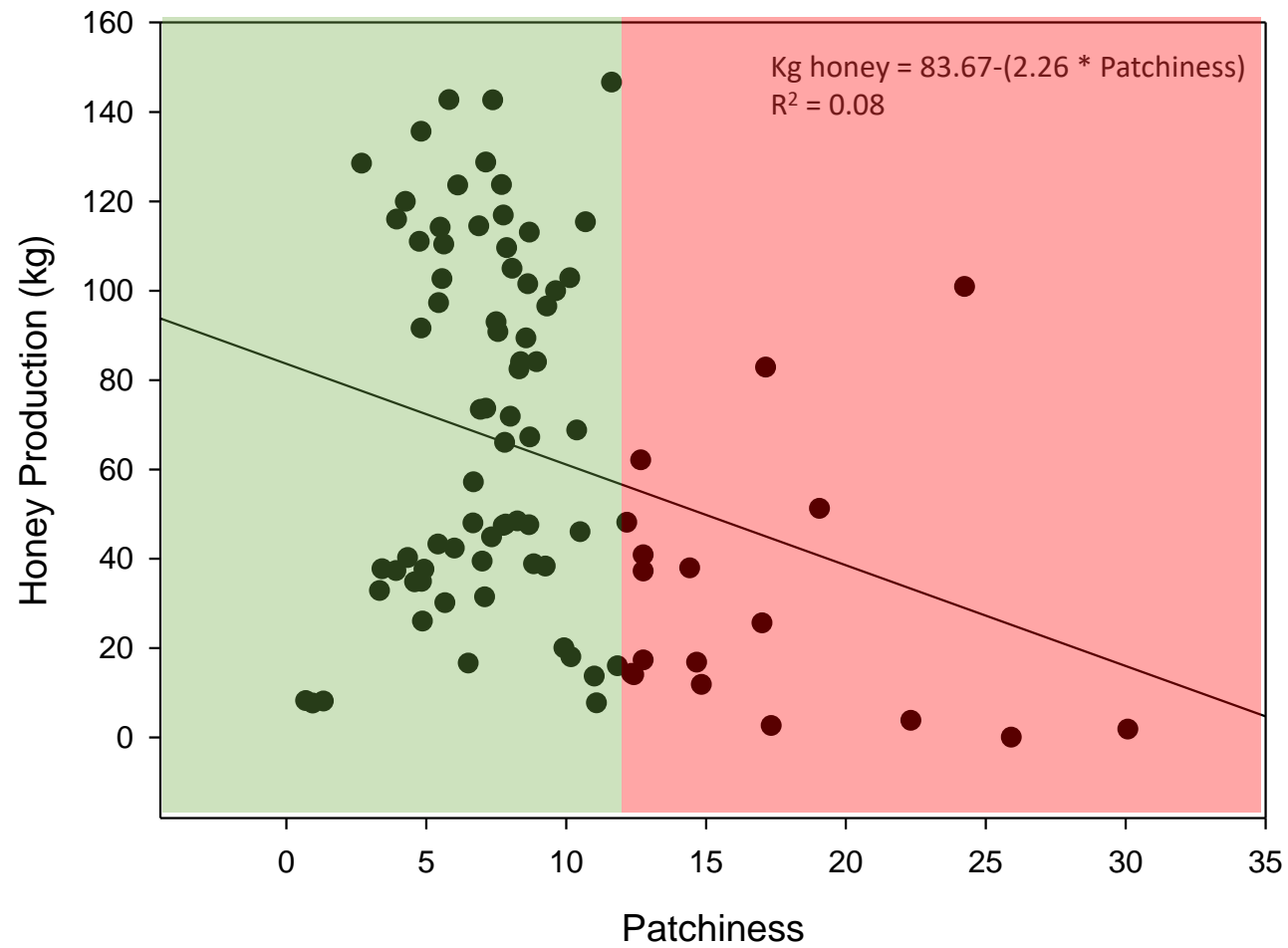
Kruskal –Wallis $H_2=32.13$, $P<0.001$

...but same honey production

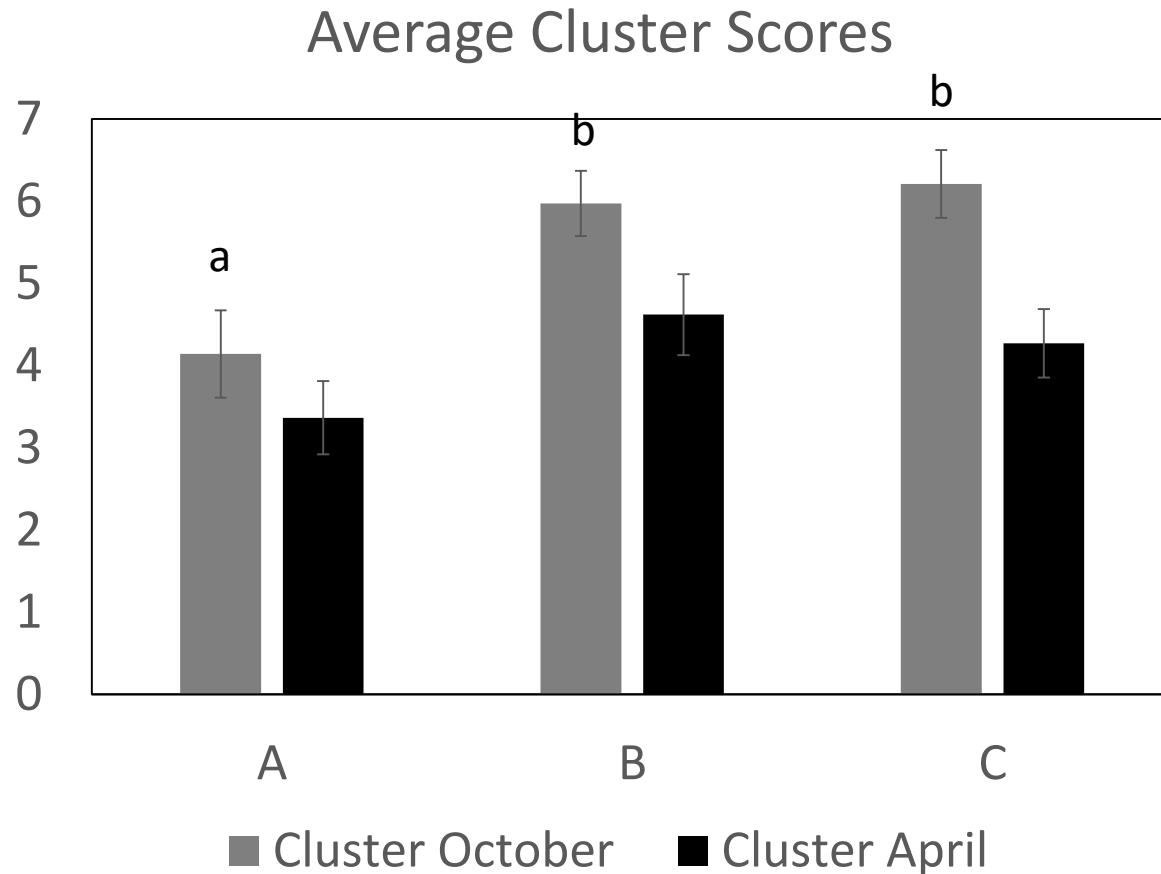


No differences in honey production





...leads to reduced cluster sizes



Stock A had smaller fall (but not spring) clusters

$F(2,79) = 6.3, P = 0.003$

HB, Stings

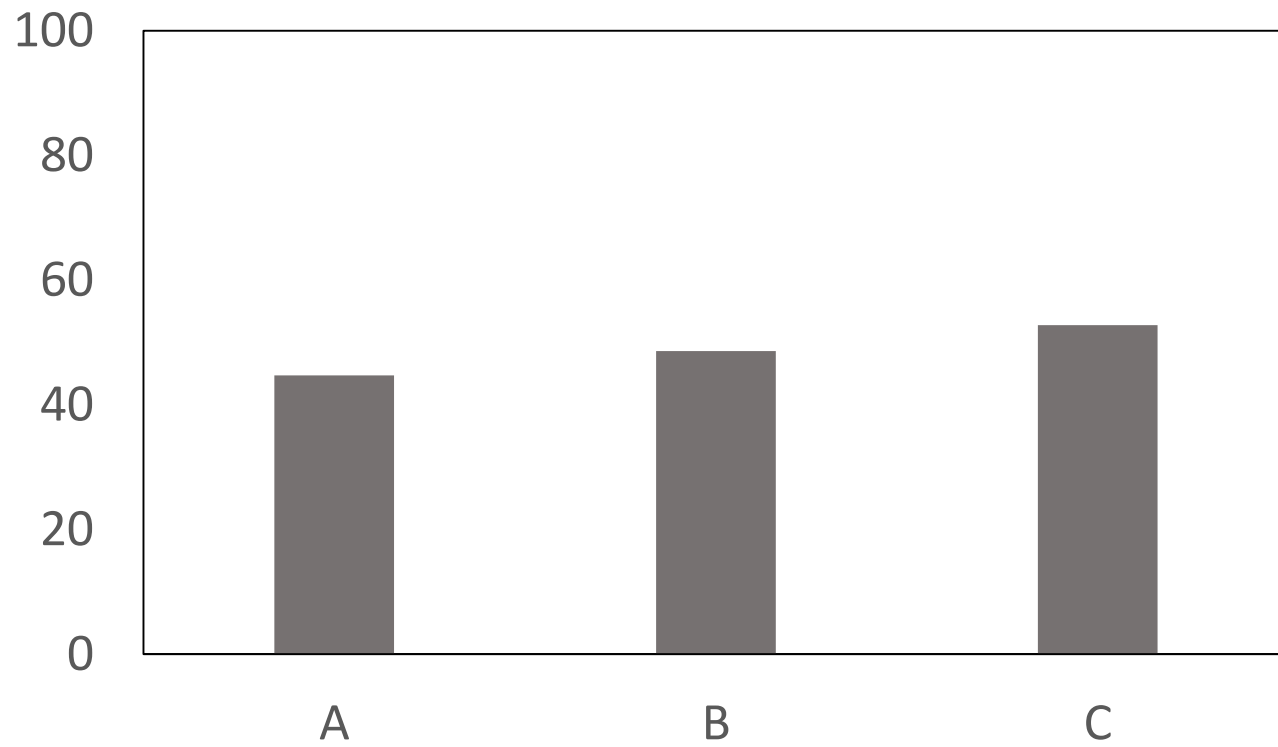
- No difference in hygienic behavior or defensive behaviour among stocks

If not sperm viability, what is the cause?

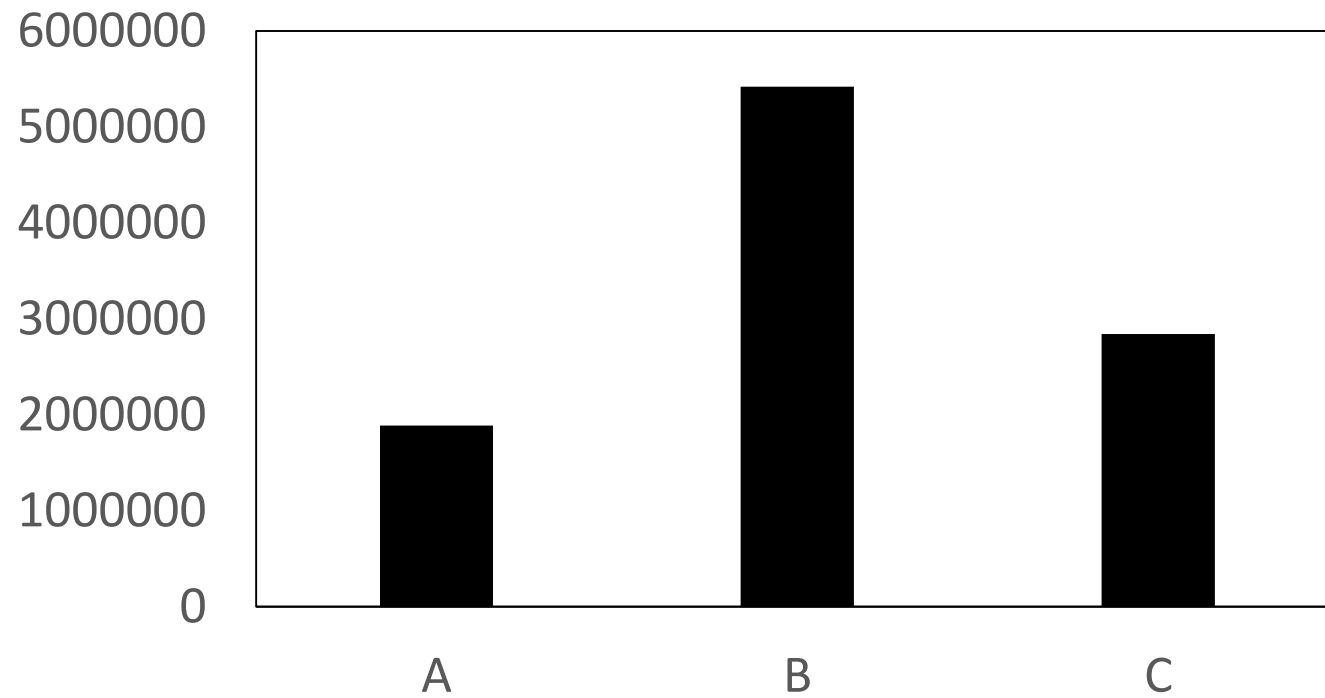
Stock	Colonies with any brood pathogen observed
A	69%
B	35%
C	40%

Pathogens?

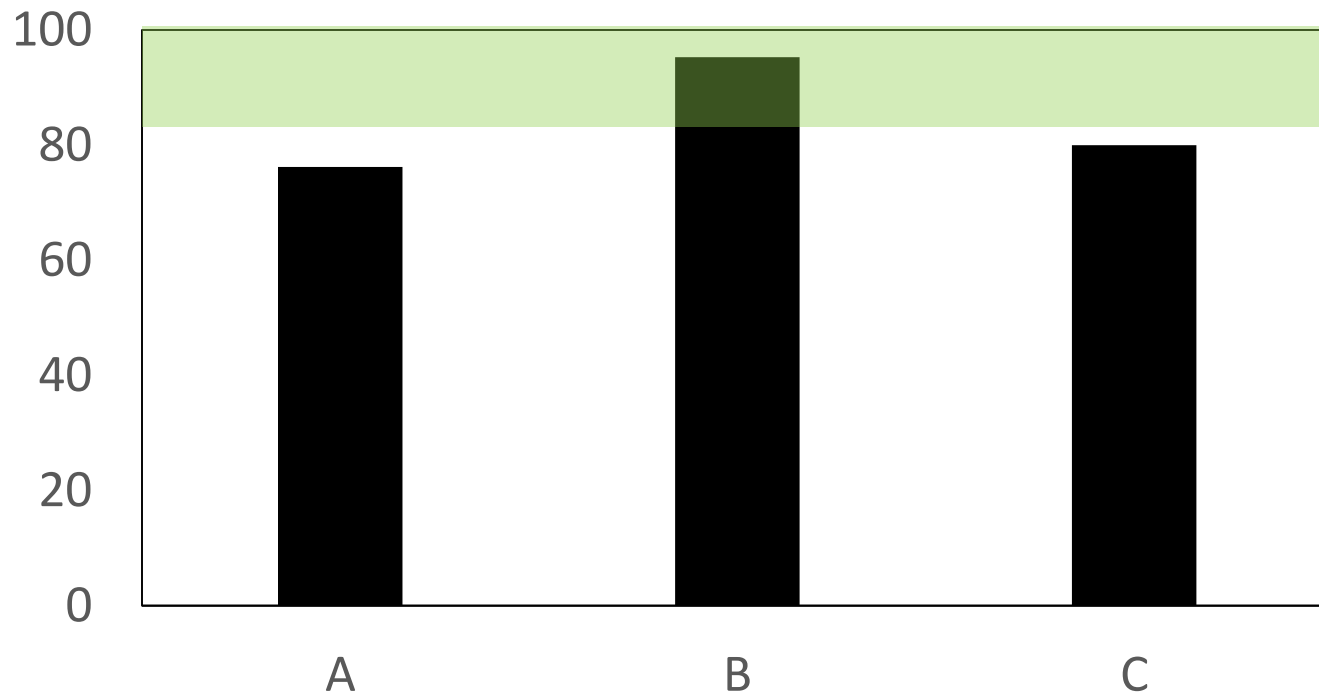
Survival with queen



August 2018 Final Sperm count



August 2018 Final Sperm Viability



In Review

- Brood patchiness leads to reduced worker population
- Differences among stocks not due to sperm viability - so mating and shipping were likely good
- Honey production variable, but trend to reduced honey with increased patchiness and reduced brood
- Working on pathogen data
- Reduced sperm counts and viability observed after 1.5 years
- Will continue to analyse data with goal of providing Q quality recommendations - for now, use temperature loggers

Thank you OBA / CAPA / CHC

Lynae Ovinge
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Steve Pernal
Abdullah Ibrahim
Michael Pierson
Amanda Gregoris
Patricia Wolf-Viega
Kiwi Brian's Honey
Landen Stronks
Gabriel Calixte



Alberta Beekeepers



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