

1 **Table S1. Model selection table showing candidate models for each analysis.** Models in *italic* are the ones within
2 the 95% confidence set that were used for model averaging.

Pollen collection ~	AICc	ΔAICc	Weight
Diet * Parasite * Day + (1 Colony:Microcolony) (Gamma distribution, log link)			
Diet * Parasite * Day	1242.8	7.21	0.026
Diet * Parasite	1509.6	273.98	0
<i>Diet * Day</i>	1235.6	0	0.974
Diet	1504.8	269.18	0
Parasite * Day	1352.1	116.47	0
Parasite	1564.6	328.95	0
Day	1350.3	114.73	0
Null	1562.6	326.99	0

Syrup collection ~ Diet	AICc	ΔAICc	Weight
* Parasite * Day + (1 Colony:Microcolony) (Gamma distribution, log link)			
<i>Diet * Parasite * Day</i>	3515.8	3.24	0.165
Diet * Parasite	4582.9	1070.35	0
<i>Diet * Day</i>	3512.6	0	0.835
Diet	4577.8	1065.22	0
Parasite * Day	3986.1	473.52	0
Parasite	4609.7	1097.16	0

Day	3985.5	472.99	0
Null	4608.0	1095.43	0

Larval ejection ~ Diet * Parasite + (1 Colony:Microcolony) (Binomial distribution, logit link)	AICc	ΔAICc	Weight
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<i>Diet * Parasite</i>	632.2	0	0.777
<i>Diet</i>	634.7	2.49	0.223
Parasite	681.9	49.72	0
Null	682.6	50.34	0

Pollen efficacy ~ Diet * Parasite + (1 Colony) (Gamma distribution, log link)	AICc	ΔAICc	Weight
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<i>Diet * Parasite</i>	-90.8	4.22	0.108
<i>Diet</i>	-95.0	0	0.892
Parasite	-7.7	87.3	0
Null	-9.9	85.11	0

Pollen dilution ~ Diet * Parasite + (1 Colony) (Gamma distribution, log link)	AICc	ΔAICc	Weight
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<i>Diet * Parasite</i>	272.7	4.5	0.095
<i>Diet</i>	268.2	0	0.905
Parasite	318.0	49.8	0
Null	316.5	48.24	0

Worker mortality ~ Diet * Parasite + (1 Colony) (Cox Proportional Hazard Model)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	415.2	0.82	0.194
<i>Diet</i>	414.3	0	0.292
<i>Parasite</i>	414.6	0.32	0.249
<i>Null</i>	414.5	0.20	0.265
Number of eggs ~ Diet * Parasite + (1 Colony) (Negative binomial distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	644.0	5.48	0.026
<i>Diet</i>	639.7	1.25	0.212
<i>Parasite</i>	638.5	0	0.396
<i>Null</i>	638.7	0.16	0.366
Number of non-isolated larvae ~ Diet * Parasite + (1 Colony) (Negative binomial distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	699.6	5.87	0.047
<i>Diet</i>	693.8	0	0.886
<i>Parasite</i>	701.2	7.44	0.021
<i>Null</i>	699.7	5.93	0.046

Number of pre-defecating larvae ~ Diet * Parasite + (1 Colony:Microcolony) (Poisson distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	472.1	0	0.73
<i>Diet</i>	474.1	1.99	0.27
Parasite	522.1	49.93	0
Null	520.0	47.85	0
Number of post-defecating larvae ~ Diet * Parasite + (1 Colony:Microcolony) (Poisson distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	307.8	5.21	0.069
<i>Diet</i>	302.6	0	0.931
Parasite	357.2	54.64	0
Null	355.3	52.74	0
Number of pupae ~ Diet * Parasite + (1 Colony) (Negative binomial distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	452.9	0	0.645
<i>Diet</i>	454.1	1.20	0.355
Parasite	506.3	53.37	0
Null	504.2	51.24	0

Number of non-emerged males ~ Diet * Parasite + (1 Colony) (Poisson distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	185.1	3.79	0.084
<i>Diet</i>	181.3	0	0.559
<i>Parasite</i>	185.0	3.63	0.091
<i>Null</i>	182.8	1.49	0.266
Number of emerged males ~ Diet * Parasite + (1 Colony) (Negative binomial distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	574.4	5.71	0.054
<i>Diet</i>	568.7	0	0.946
<i>Parasite</i>	651.4	82.72	0
<i>Null</i>	649.5	80.78	0
Total mass of hatched alive offspring ~ Diet * Parasite + (1 Colony) (Gamma distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Parasite</i>	398	5.01	0.076
<i>Diet</i>	393.0	0	0.924
<i>Parasite</i>	487.7	94.66	0
<i>Null</i>	485.6	92.63	0

Parasite load ~ Diet * Day + (1 Colony:Microcolony) (Negative binomial distribution, log link)	AICc	ΔAICc	Weight
<i>Diet * Day</i>	10459.4	0	0.991
Diet	10747.0	287.61	0
Day	10468.8	9.43	0.009
Null	10752.3	292.91	0
Fat body content ~ Diet * Parasite * Caste + (1 Colony) (Gamma distribution, logit link)	AICc	ΔAICc	Weight
<i>Diet * Parasite * Caste</i>	-966.2	0	0.994
<i>Caste</i>			
Diet * Parasite	-955.7	10.58	0.005
Diet * Caste	-952.1	14.09	0.001
Diet	-937.4	28.81	0
Parasite * Caste	-916.0	50.20	0
Parasite	-909.5	56.70	0
Caste	-898.7	67.56	0
Null	-890.5	75.75	0
Centroid size ~ Diet * Parasite + (1 Colony) (Gamma distribution, log link)	AICc	ΔAICc	Weight

	<i>Diet * Parasite</i>	449.1	0	0.998
	Diet	461.8	12.66	0.002
	Parasite	881.7	432.57	0
	Null	882.3	433.17	0
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Size FA ~ Diet *	AICc	ΔAICc	Weight	
Parasite + (1 Colony)				
(Gamma distribution, log link)				
	<i>Diet * Parasite</i>	-4882.8	3.35	0.158
	<i>Diet</i>	-4886.2	0	0.842
	Parasite	-4841.5	44.73	0
	Null	-4842.4	43.76	0
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Size FA (without outliers) ~ Diet *	AICc	ΔAICc	Weight	
Parasite + (1 Colony)				
(Gamma distribution, log link)				
	<i>Diet * Parasite</i>	-4849.3	4.30	0.068
	<i>Diet</i>	-4853.6	0	0.581
	<i>Parasite</i>	-4850.3	3.36	0.108
	<i>Null</i>	-4851.9	1.74	0.243
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Shape FA ~ Diet *	AICc	ΔAICc	Weight	
Parasite + (1 Colony)				
(Gamma distribution, log link)				
	<i>Diet * Parasite</i>	-2331.6	5.59	0.058
	<i>Diet</i>	-2337.1	0	0.942

Parasite	-2298.2	38.92	0
Null	-2300.0	37.14	0

Shape FA (without outliers) ~ Diet * Parasite + (1 Colony) (Gamma distribution, log link)	AICc	Δ AICc	Weight
Diet * Parasite	-2447.3	6.10	0.045
<i>Diet</i>	-2453.4	0	0.955
Parasite	-2421.9	31.45	0
Null	-2423.9	29.49	0