

**Table 1.** Results from the analyses of queen honey bees identified as failing or healthy. Results are separated by beekeeper.

Beekeeper	Queen Status	n	Sperm viability (% live sperm)		Live sperm (millions)		Vitellogenin		Deformed Wing Virus-A type		Deformed Wing Virus-B type	
			Avg	StDev	Avg	StDev	Avg	StDev	Avg	StDev	Avg	StDev
A	Healthy	2	82.7	2.6	5.73	2.61	18.8	0.6	113	160	3,561	5,036
	Failing	2	81.6	1.6	3.63	2.84	19.7	1.1	1,032,043	1,459,529	2,089,875	2,952,658
B	Healthy	3	76.9	6.3	4.73	2.09	18.9	1.1	367	381	7,472	5,880
	Failing	3	80.5	13.7	5.88	1.22	18.6	0.7	423	98	6,333	2,204
C	Healthy	4	85.5	3.6	6.39	1.36	19.0	0.2	1,390,517	2,780,625	1,969,167	3,890,397
	Failing	4	82.6	11.6	3.80	3.25	18.5	1.3	1,544	3,088	13,891,233	4,615,072
D	Healthy	9, 6*	84.4	5.0	5.92	1.73	19.1	0.6	1,384	3,389	238	584
	Failing	9, 6*	79.6	14.3	4.69	1.48	18.4	1.0	590,307	1,442,520	1,356	2,383
E	Healthy	2	94.9	0.7	5.69	1.50	Na**	Na	Na	Na	Na	Na
	Failing	2	76.7	8.6	1.55	1.07	Na	Na	Na	Na	Na	Na

Beekeeper	Queen Status	n	Queen weight (mg)		Queen head width (mm)		Queen thorax width (mm)		Queen spermatheca diameter, ocular (mm)	
			Avg	StDev	Avg	StDev	Avg	StDev	Avg	StDev
A	Healthy	2	216.4	29.9	3.79	0.21	4.69	0.31	6.63	0.88
	Failing	2	192.0	24.3	3.74	0.01	4.65	0.24	6.46	0.06
B	Healthy	3	223.4	10.2	3.86	0.20	4.95	0.12	6.70	0.19
	Failing	3	223.6	19.0	3.73	0.20	4.91	0.14	6.78	0.27
C	Healthy	4	214.4	3.9	3.86	0.04	4.92	0.10	6.90	0.36
	Failing	4	194.9	12.3	3.88	0.06	4.86	0.06	7.06	0.31
D	Healthy	9, 6*	223.8	28.4	3.79	0.09	4.92	0.15	6.78	0.33
	Failing	9, 6*	218.9	20.2	3.85	0.06	4.97	0.09	6.96	0.24
E	Healthy	2	211.9	37.5	3.59	0.15	4.77	0.02	6.55	0.64
	Failing	2	240.9	14.6	3.63	0.01	4.58	0.21	6.55	0.07

\* 9, 6 = three queen samples were lost and, therefore, not used in the qPCR analysis to quantify Vitellogenin or either type of Deformed Wing Virus.

\*\*Na = results not available

**Table 2.** Results of the analyses of worker bees and beeswax in colonies identified as having a failing or healthy queen bee. Results are separated by beekeeper.

Beekeeper	Queen Status	n	<i>Varroa destructor</i> in worker bees (mites per 100 bees)		<i>Nosema</i> spp. spores per bee in worker bees		Pesticide hazard quotient in beeswax	
			Avg	StDev	Avg	StDev	Avg	StDev
A	Healthy	2	0.3	0.4	3,425,000	3,146,625	36	28
	Failing	2	0.2	0.2	1,850,000	141,421	34	15
B	Healthy	3	0.3	0.5	383,333	160,728	42	20
	Failing	3	0.8	1.2	216,667	175,594	25	13
C	Healthy	4	0.8	0.9	300,000	129,099	35	28
	Failing	4	0.5	0.6	650,000	445,346	38	33
D	Healthy	9, 6*	1.5	1.9	305,556	186,153	2,085	2,934
	Failing	9, 6*	1.4	1.2	94,444	52,705	1,030	1,061
E	Healthy	2	0.0	0.0	175,000	35,355	7	1
	Failing	2	0.0	0.0	150,000	141,421	3	1

\* Three pairs of wax samples were not submitted for pesticide analysis due to expense.