Prediction 1: Males previously housed with rival males will reduce the lifespan of their mates compared to males housed alone

Statistical approach: Here, we analyzed two models to estimate the influence of various factors on female survivorship. The first approach involved constructing a linear mixed model to analyze the square-root transformed lifespan, assuming a gaussian distribution. The second approach involved using a cox survival model to analyze the hazard of mortality over time.

Table 1: The fixed effects from our linear mixed model analyzing female lifespan. The coefficients were determined using the summary() function, while the 95% CI were calculated using the confint(,family = boot) function, and p-values using the lmerTest package.

Source of Variance	Coefficient Estimate	Upper & Lower 95% CI	Degrees of Freedom	p-value
sqrt(Lifespan)				
Intercept	4.530	4.968 4.092	37.638	<0.0001
Treatment (single)	0.312	0.894 -0.269	231	0.295
Population (wild)	1.923	2.505 1.341	231	<0.0001
Treatment x Population	0.155	0.978 -0.667	231	0.712

Table 2: The random effects from our linear mixed model analyzing female lifespan. Variance components were estimated using the summary() function, 95%CI using the confint(,family = boot) function, and p-values estimated using a permutation approach with 1000 repetitions.

Source of Variance	Variance	Upper & Lower 95% CI	p-value
Lifespan			
Line	0.041	0.542 0	0.215
Residual	2.659		

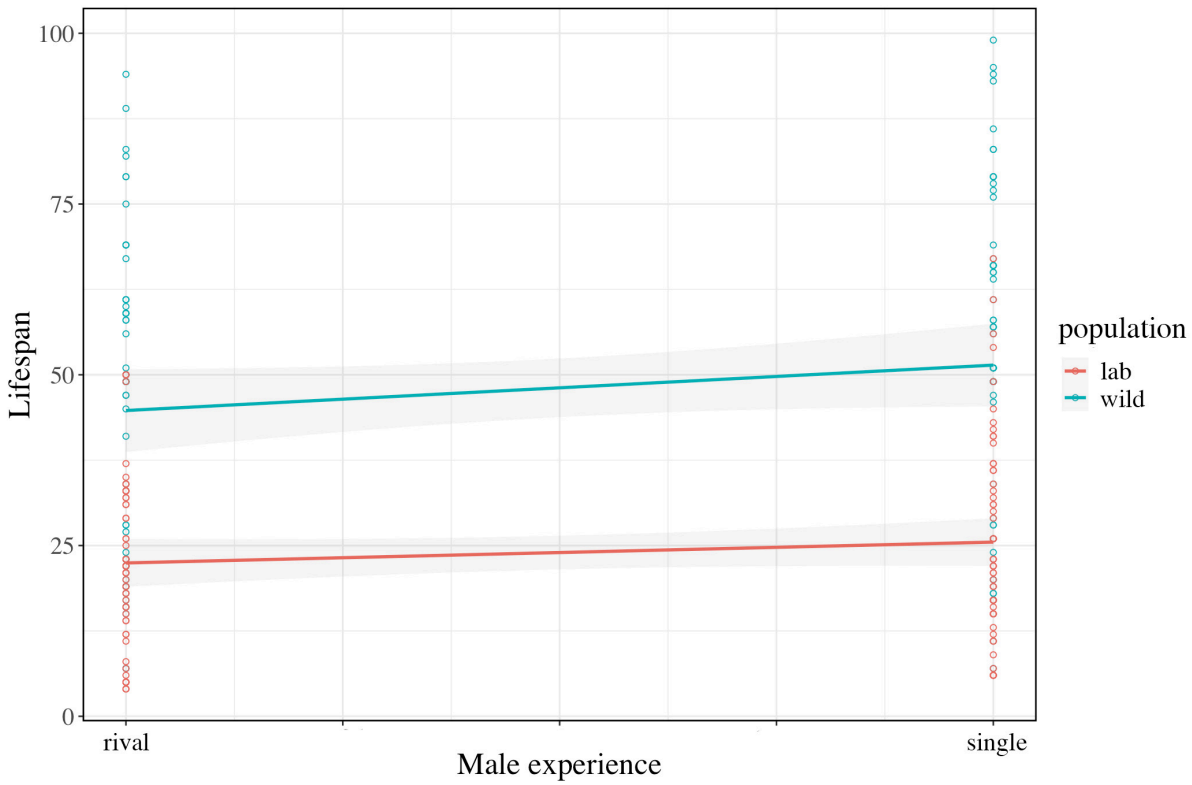

Figure 1: Regression lines predicted by our linear model for female lifespan. The shaded region around each line represents the 95% CI, and the points on each side of the figure represent the actual lifespan of each individual.

Table 3: The fixed effects of our cox survival model analyzing the hazard of female mortality. Test statistics were determined from using the summary() function.

Source of Variance	Coefficient Estimate	Standard Error	p-value
Surv(Lifespan)			
Treatment (single)	-0.230	0.184	0.21
Population (wild)	-1.335	0.203	<0.0001
Treatment x Population	-0.096	0.261	0.71

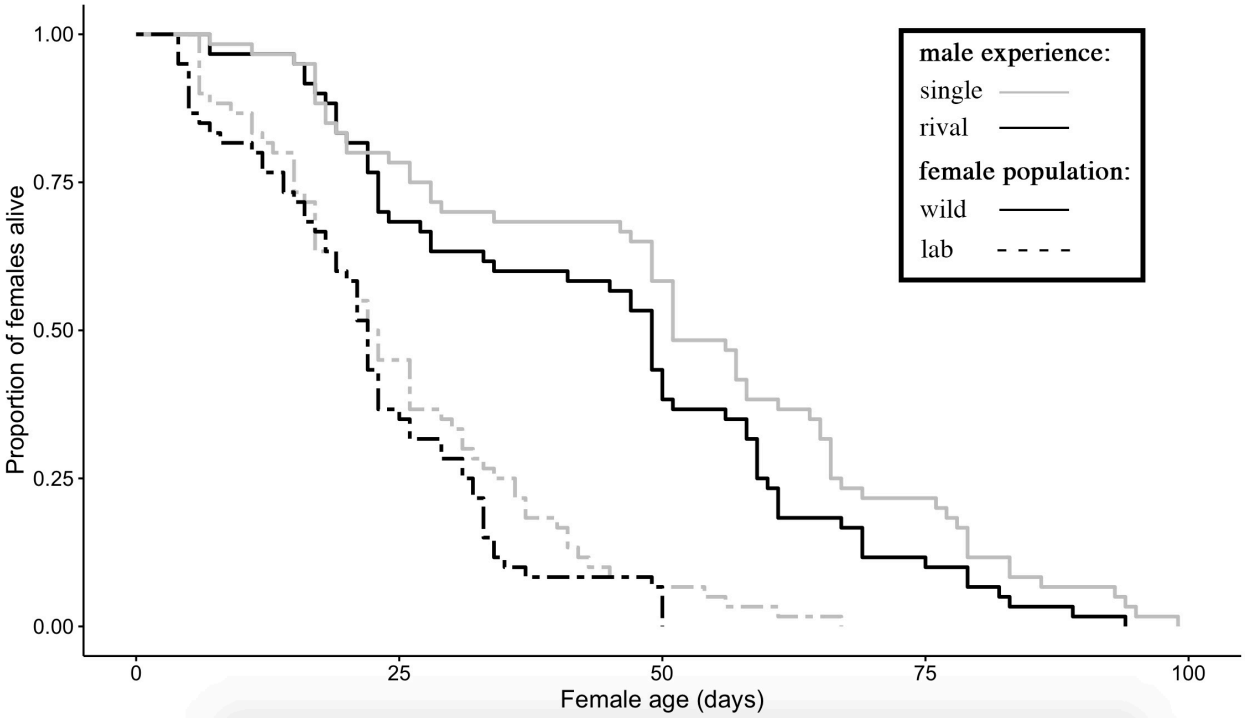

Figure 2: Survival curves demonstrating the hazard of mortality over time for each treatment combination

Conclusions: Although they look at slightly different response variables, our two models yield similar results. The biggest factor influencing female survivorship appears to be the base population she descended from, where females coming from the wild population live longer on average compared to females from the lab population. The effect of male experience has a much smaller effect, where females that mate with males housed alone live slightly longer on average compared to females mated with males housed with rivals, as we predicted. Finally, it appears that male genetic background has a very small effect on the survivorship of his mates.

Prediction 2: Males previously housed with rivals will reduce the lifetime offspring production of their mates compared to males housed alone

Statistical approach: We constructed a generalized linear mixed model analyzing offspring production as negative binomial response.

Table 3: Summary of test statistics for our generalized linear mixed model analyzing offspring production. The coefficients and p-values were determined using the summary() function, while the 95% CI were calculated using the confint(,family = uniroot) function.

Source of Variance	Coefficient Estimate	Upper & Lower 95% CI	p-value
Offspring			
Intercept	5.317	5.477 5.160	<0.0001
Treatment (single)	-0.141	0.078 -0.361	0.207
Day	-0.099	-0.087 -0.111	<0.0001
Population (wild)	-0.856	-0.640 -1.073	<0.0001
Treatment x Day	0.020	0.036 0.003	0.016
Treatment x Population	-0.028	0.274 -0.330	0.856
Day x Population	0.102	0.118 0.086	<0.0001
Treatment x Day x Population	-0.008	0.013 -0.030	0.445

Table 4: The random effects from our generalized linear mixed model analyzing offspring production. Variance components were estimated using the summary() function, 95%CI using the confint(,family = uniroot) function.

Source of Variance	Variance	Upper & Lower 95% CI
Offspring		
Line	1.413×10^{-9}	inf 0

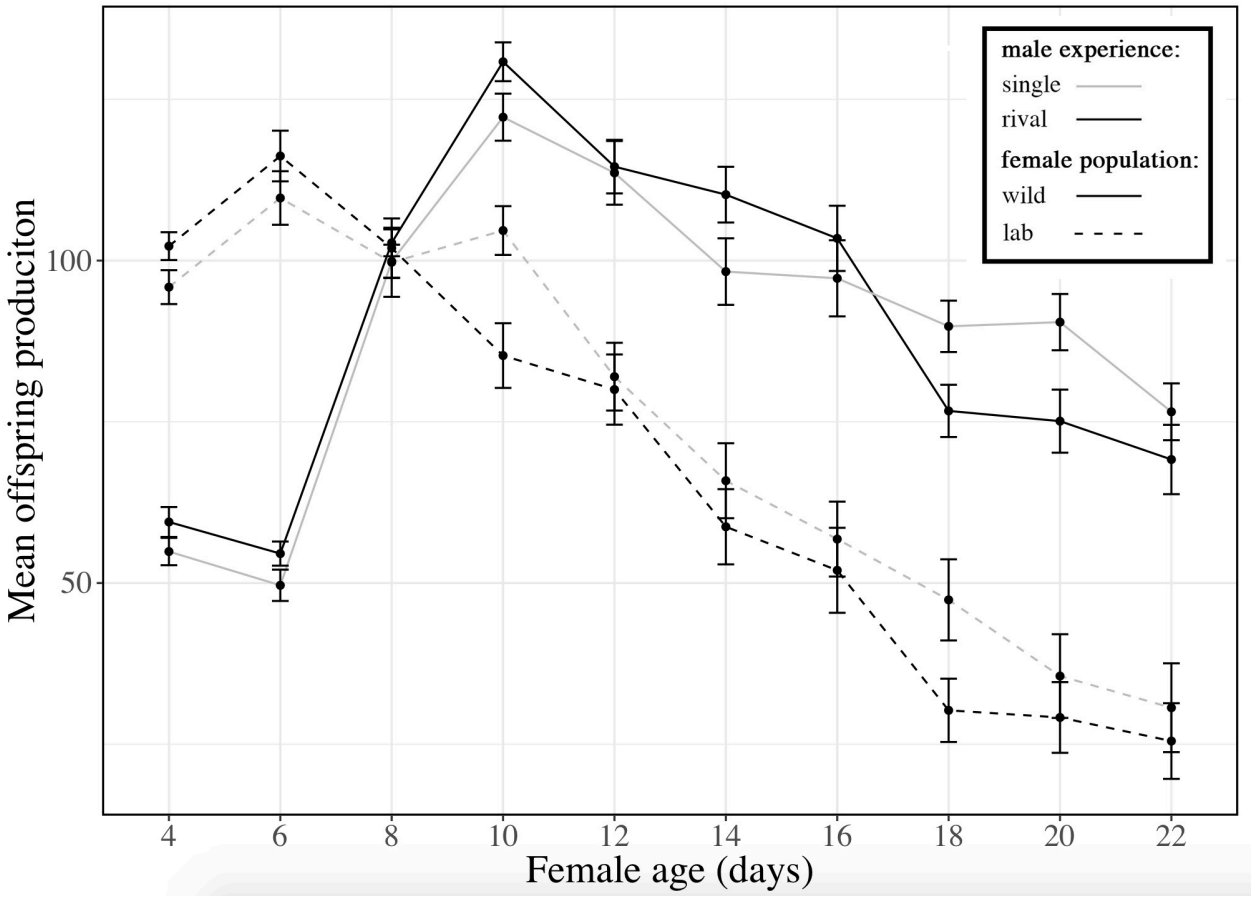

Figure 2: Offspring curves demonstrating the mean amount of offspring produced over time for each treatment combination. Error bars represent the standard error of each mean.

Conclusions: Not surprisingly, females varied significantly in their offspring production depending on the day of egg-laying. It was however interesting to see how big the difference was between females from the lab and wild populations. Overall, females from the wild population appear to produce more offspring over their lifetime. It is also interesting to see a strong interaction between population and day. This can be seen by looking at the population trends over time, where the wild population has a quadric shape, and the lab population has a negative linear curve.

Contrary to our prediction, it appears the effect of male experience does not have a strong effect on the overall lifespan production of his mates. However, there is an interesting significant interaction between male experience and day, where in both populations, it appears that females produce more offspring early on in life and less later on in life when mated to males housed with rivals. Similar to lifespan, it appears that male genotype does not have a very strong influence on the offspring production of his mates.