Weight Vs Colony Size Results with instar as numeric

Ruth Sharpe

06 November, 2016

## Leg Vs. Colony Size

The model with the lowest AIC had colony size x instar age and the three-way interaction nest size x instar age x instar sex as fixed effects. Using this as the full model and all the terms that include nest size removed as the reduced model in the likelihood ratio test, we found that leg length increases as colony size increases (lmer; 2~4 ,7~= 63.64, p = < 0.001 \*\*\* , figure 1), but this effect was only detectable in the older instars (Table 1).

Not surprisingly, leg length was significantly correlated with instar age (lmer; 24 ,7= 4342.93, p = < 0.001 \*\*\* ).

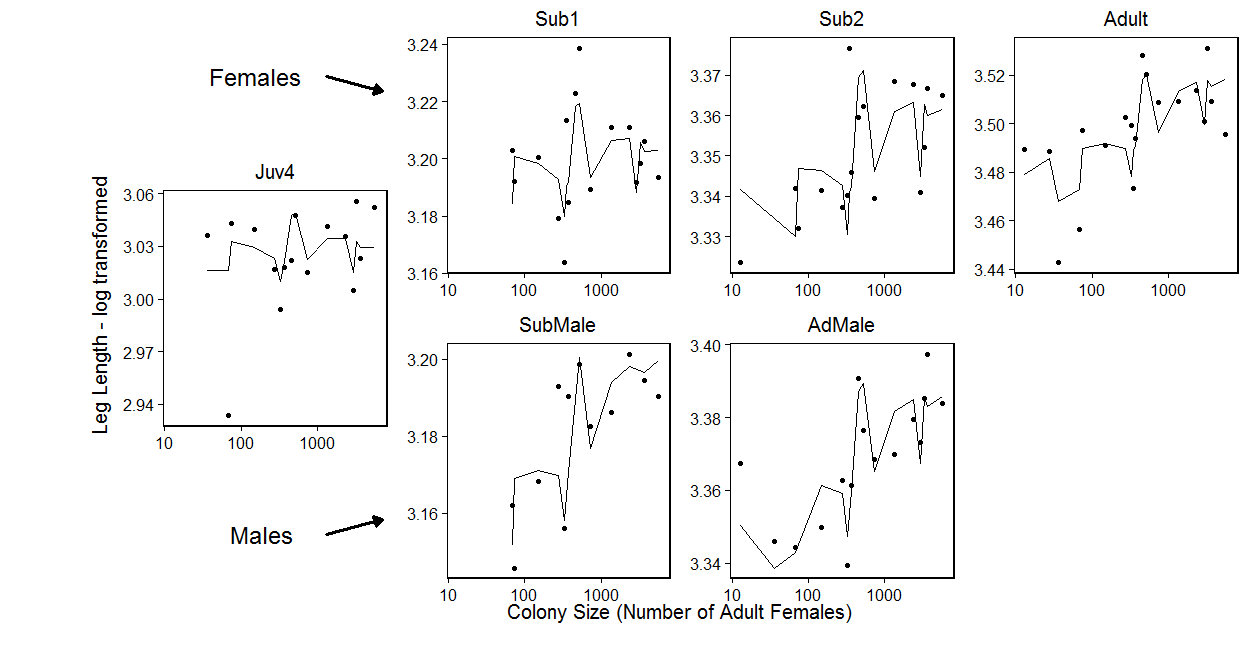
In addition, the interaction colony size x instar age x instar sex was significant, (lmer; 24 ,7= 4342.93, p = < 0.001 \*\*\* ), with male leg size changing faster with colony size compared to females (figure 1).

Testing each instar separately, the only juvenile stage 4 and subadult stage 1 spiders did not show a significant decrease in leg length with colony size (table 1).

|  |  |  |
| --- | --- | --- |
| Instar | 2 | p value |
| Juv4 | 1.48 | 0.224 |
| Sub1 Female | 0.29 | 0.588 |
| Sub2 Female | 10.66 | < 0.001 \*\*\* |
| Adult Female | 8.54 | 0.003 \*\* |
| Sub Male | 6.7 | 0.01 \*\* |
| Adult Male | 11.8 | < 0.001 \*\*\* |

Table 1: Statistical results of leg length against colony size for each instar tested individually

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead



1. Figure: Leg length against colony size. Overall leg length increased with colony size (p = < 0.001 \*\*\* ), but only for the older instars (there was a significant interaction with instar (p = < 0.001 \*\*\* ). N = 19 nests.

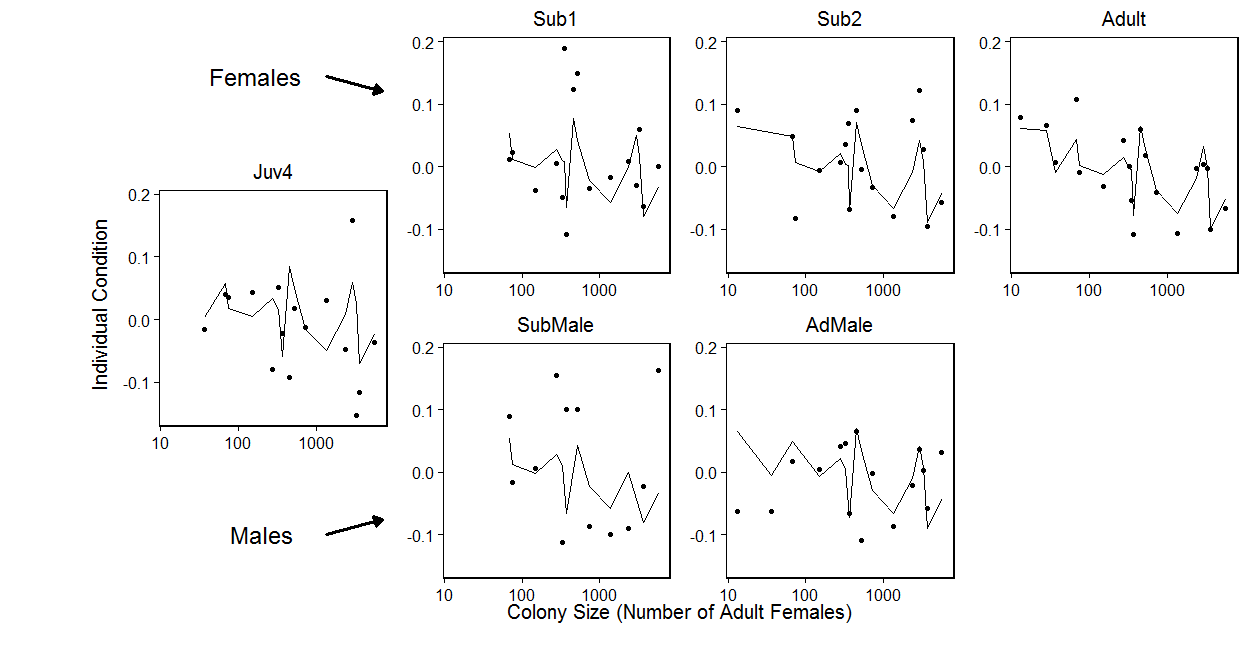
## Condition Vs. Colony Size

The model with the lowest AIC included instar age x colony size interaction, but did not include instar sex. Colony size was significant (lmer; 23,5 = 11.12, p = 0.004 \*\* )

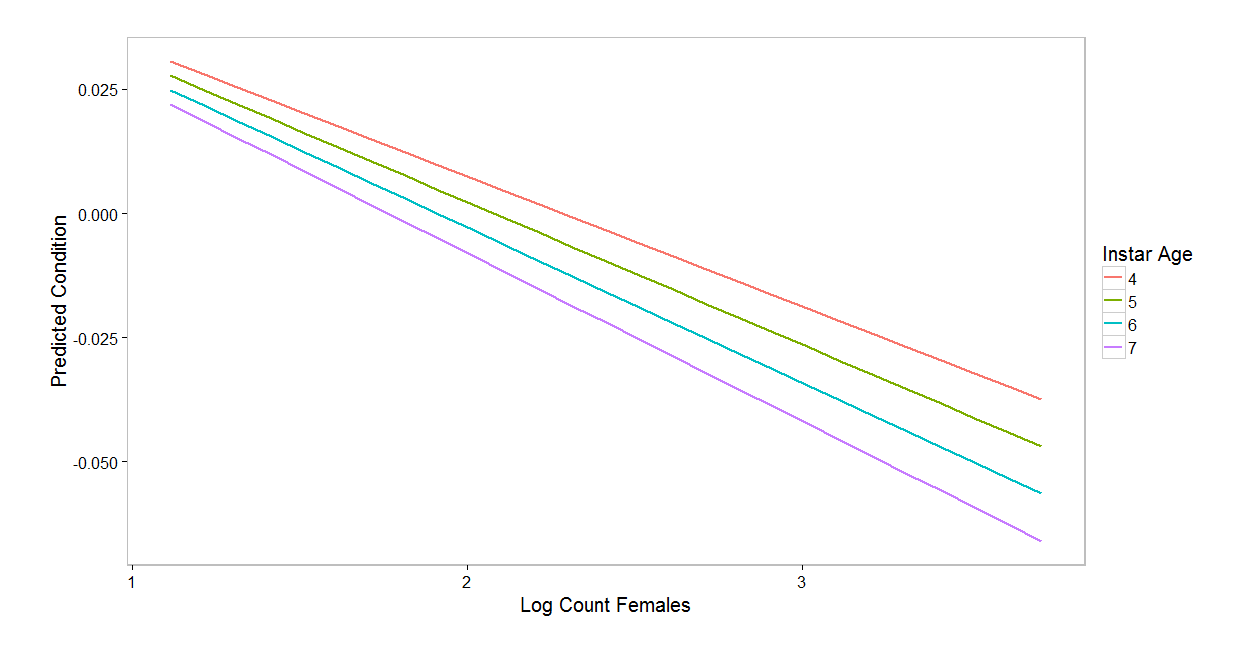
and there was a significant interaction between instar and colony size (lmer; 24,5 = 1.15, p = 0.284 ), with condition appearing to decrease faster with nest size as the instars increase in age (figure 3).

However, when performing ad-hoc tests on the instars individually we find that only adult condition decreases with colony size (lmer; 23,4 = 7.64, p = 0.006 \*\* ).

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead



1. Figure : Individual condition against colony size. Overall condition decreases with colony size (p = 0.004 \*\* ) and there was a significant interaction with instar(p = < 0.001 \*\*\* ).



1. Figure : The results of the linear model showing individual condition of each instar age against colony size with both sexes combined as instar sex was insignificant. However only adults had a significant effect. N = 19 nests.

## Within Colony Variance Vs. colony size

### Leg Length Variance

Note: Rows removed with 2 or fewer data points.

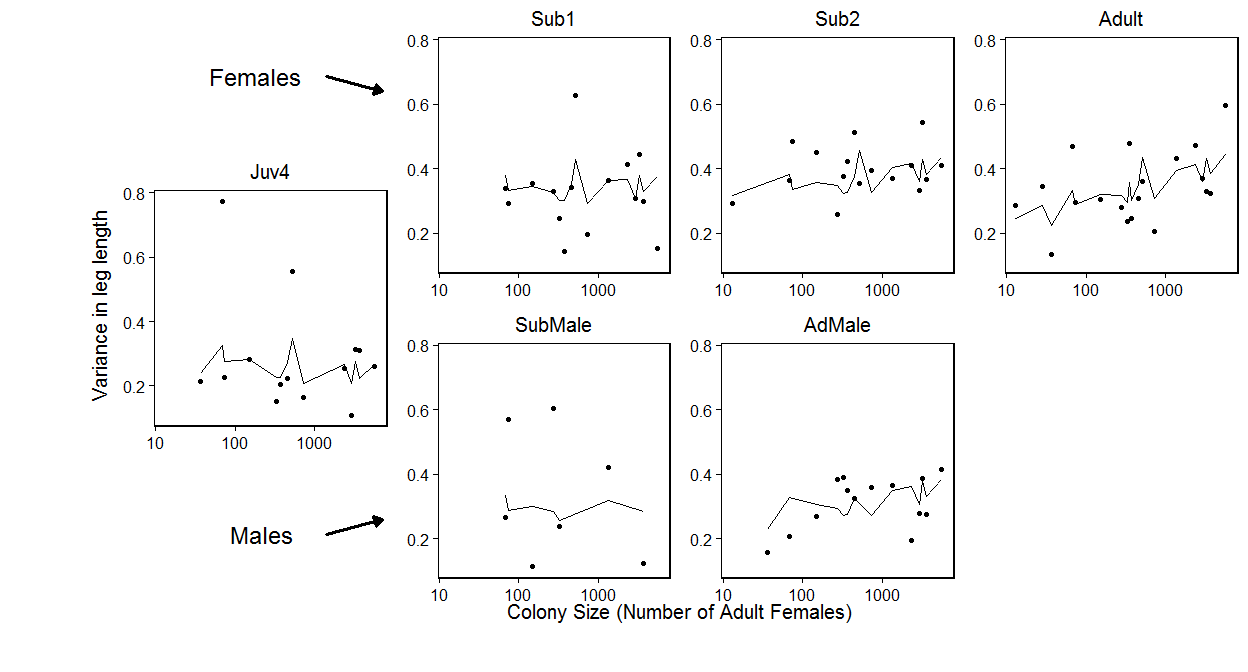
The model with the lowest AIC value had instar age x instar sex, nest size x instar age and the square of instar age as fixed effects.

Nest size combined with the nest size x instar age interaction was significant (lmer; 2~6 ,8~= 6.8, p = 0.033\* ).

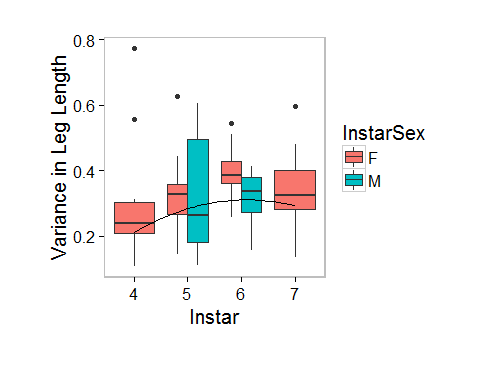
Tested together all the instar age terms, including the square of the instar age, were significant (lmer; 2~4 ,8~= 16.24, p = 0.003 \*\* ) with the variance in leg length within nests being a curved function, peaking at subadult instars (figure 5).

However, even though it was included in the lowest AIC model, the instar age x instar sex interaction was not significant (lmer; 2~7 ,8~= 2.15, p = 0.143 ). Doing adhoc tests on each instar age individually against nest size we found that none were significant (figure 4).

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead



1. Figure : Variance in leg length against colony size. N = 19 nests.



1. Figure :Leg length variance within colonies by instar. Overlaid is the linear model with a significat quadratic instar term.

### Condition Variance

Only colony size, instar age by sex interacion and instar age squared by sex were significant.

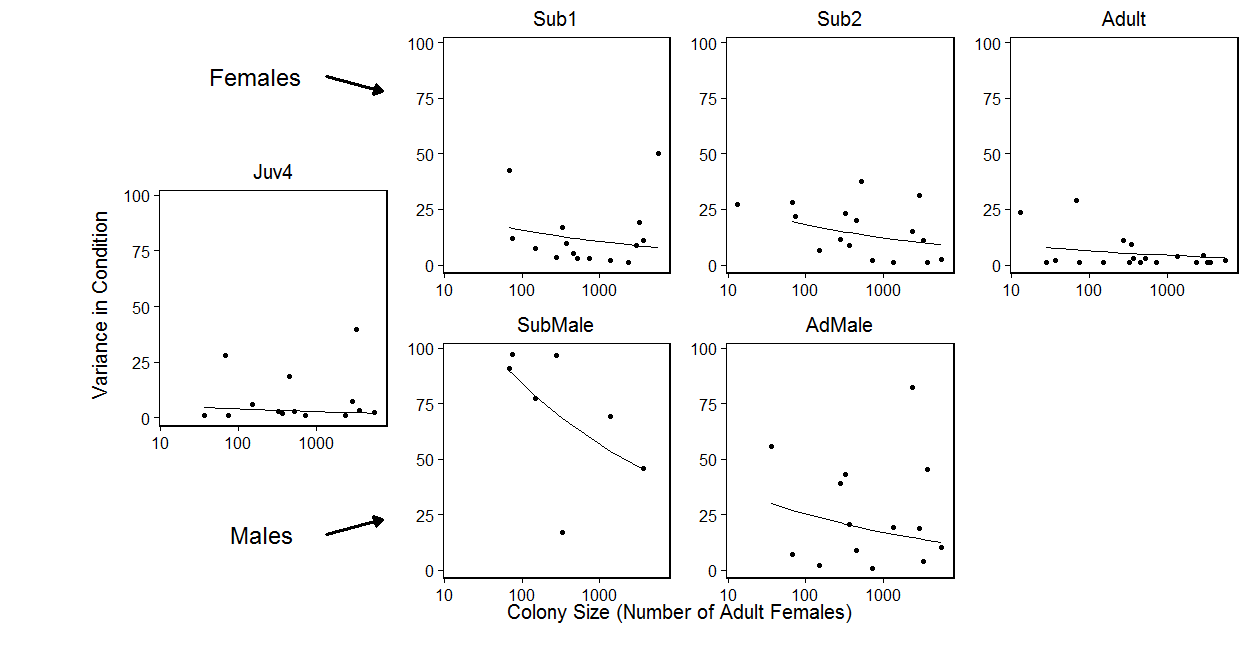
Colony size was significant (glmmPQR; 21 = 7.244, p = 0.007 \*\*),

as was instar age crossed with sex (glmmPQR; 22 = 30.525, p < 0.001 \*\*\*)

and instar age squared crossed with sex (glmmPQR; 22 = 25.315, p < 0.001 \*\*\*).

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead

Warning: Removed 1 rows containing missing values (geom\_path).  
  
Warning: Removed 1 rows containing missing values (geom\_path).

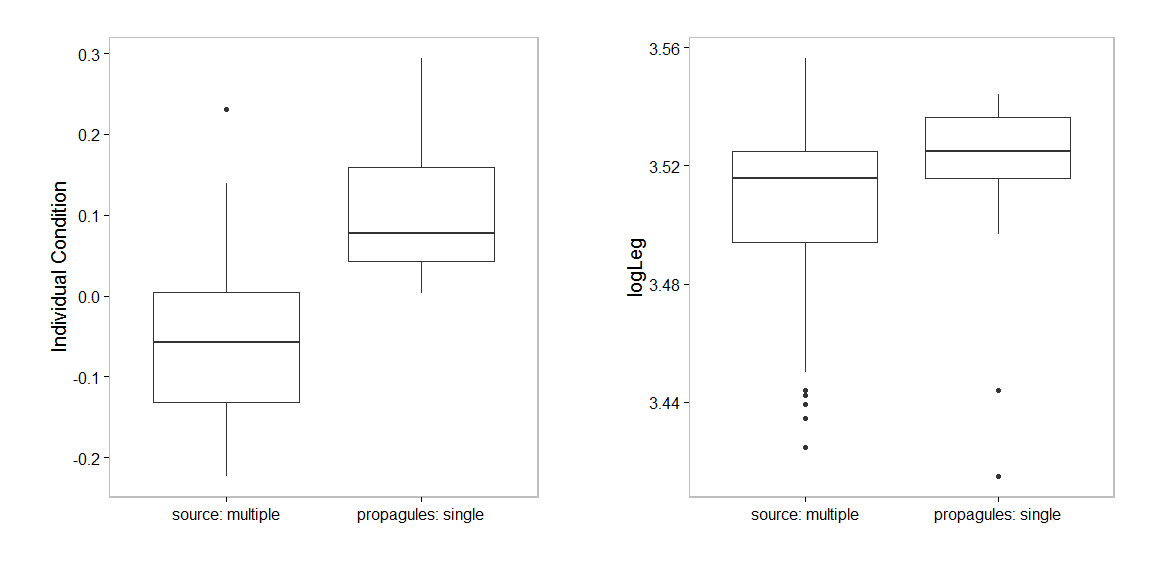


1. Figure : Variance in condition against colony size, n = 19 nests.
2. Figure :Condition Length variance within colonies by instar. Overlaid is the linear model with a significant quadratic term.

# Original Colony Vs Propagule

Leg length was larger in propagules compared to the source colony (lmer; 24,5= 3.9, p = 0.048 \* ).

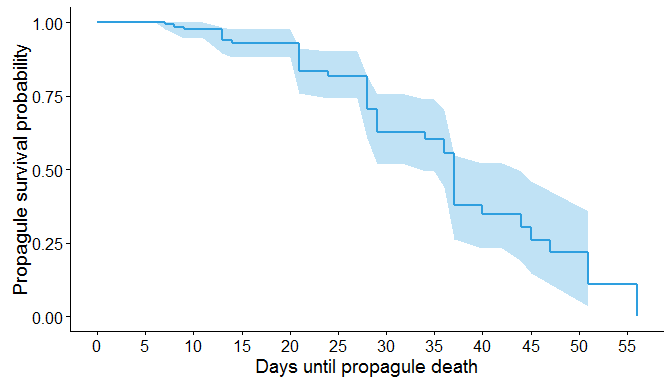
as was condition (lmer; 24,5= 9.45, p = 0.002 \*\* ), with those in propagules having a greater condition compared to those in the source colony.



1. Figure: Condition and leg length of adult females in propagues and their source colony

## Propagule survival

We found that colony with single female spiders had a very low survival rate (figure 5).



1. Figure: The survival function of 40 propagules from 10 source colonies.

## List of full models used

|  |  |
| --- | --- |
| test | fullModel |
| Leg length | NA = NA |
| Condition | NA = NA |
| Leg variance | NA = NA |
| Single nest leg | NA = NA |
| Single nest condition | NA = NA |