

Optimizing the reproduction of *Tenebrio molitor*

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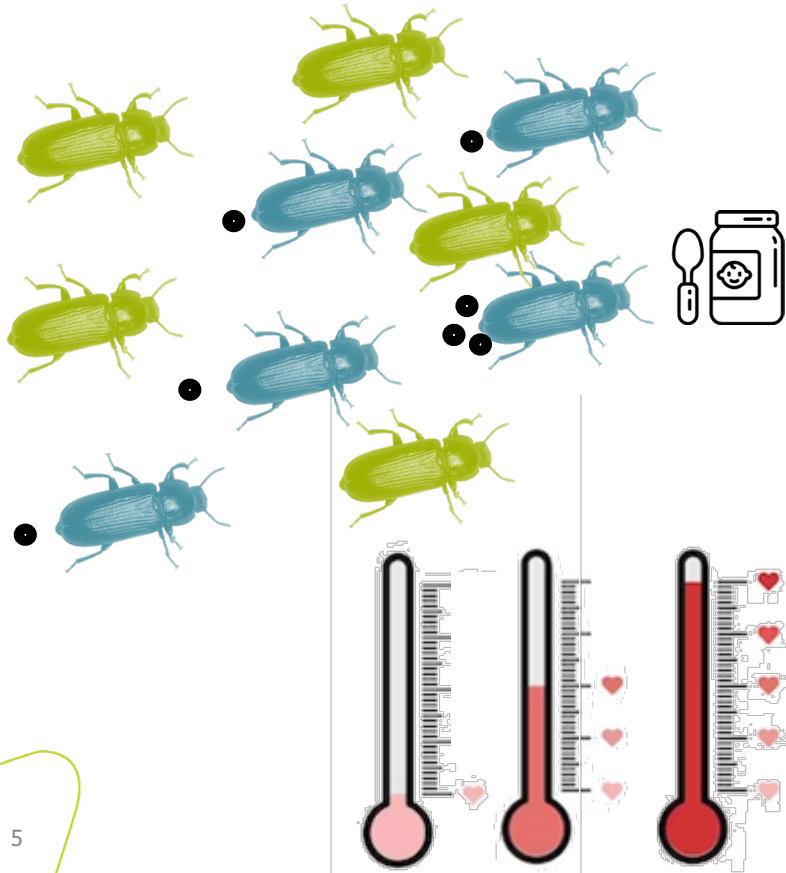
Why?

Reproducing mealworms

takes up a lot of
space and time

How?

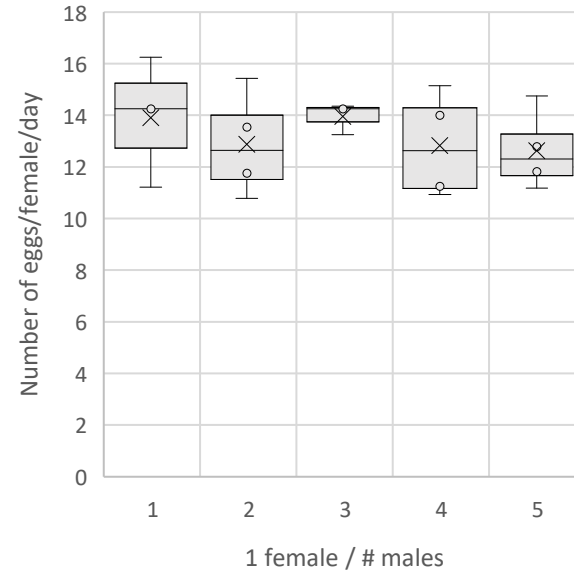
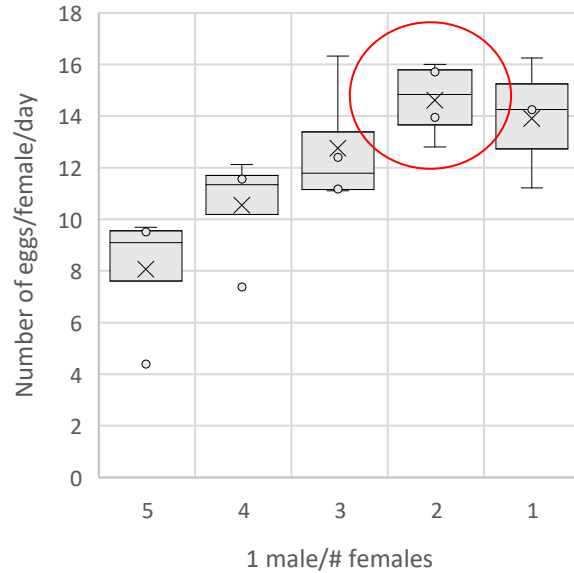
Experimental design(s)



- OPTIMAL SEX RATIO
- SIZE PREFERENCE IN MATING
- SIZE INFLUENCE ON REPRODUCTION
- TEMPERATURE INFLUENCE ON REPRODUCTION
- FEED FOR REPRODUCTION

Results

Optimal sex ratio

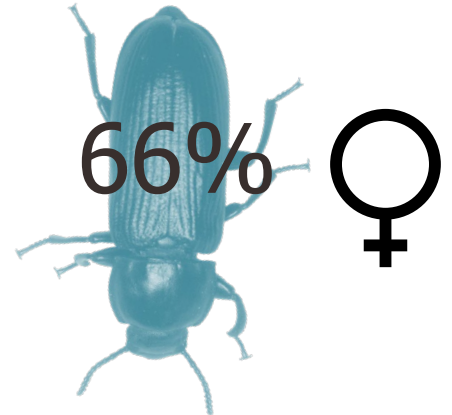


Size preference

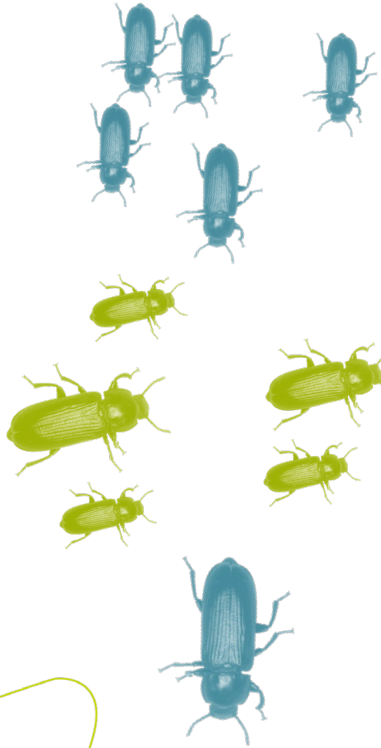


?

- 1 AVERAGE MALE VS 2 FEMALES OR OTHER WAY
- 14 DAY OLD BEETLES, WITH A SIZE DIFFERENCE BETWEEN 5-80MG
- 76 REPLICATES



Size influence on reproduction



80-100 mg

- 10 MALES + 10 FEMALES



101-120 mg

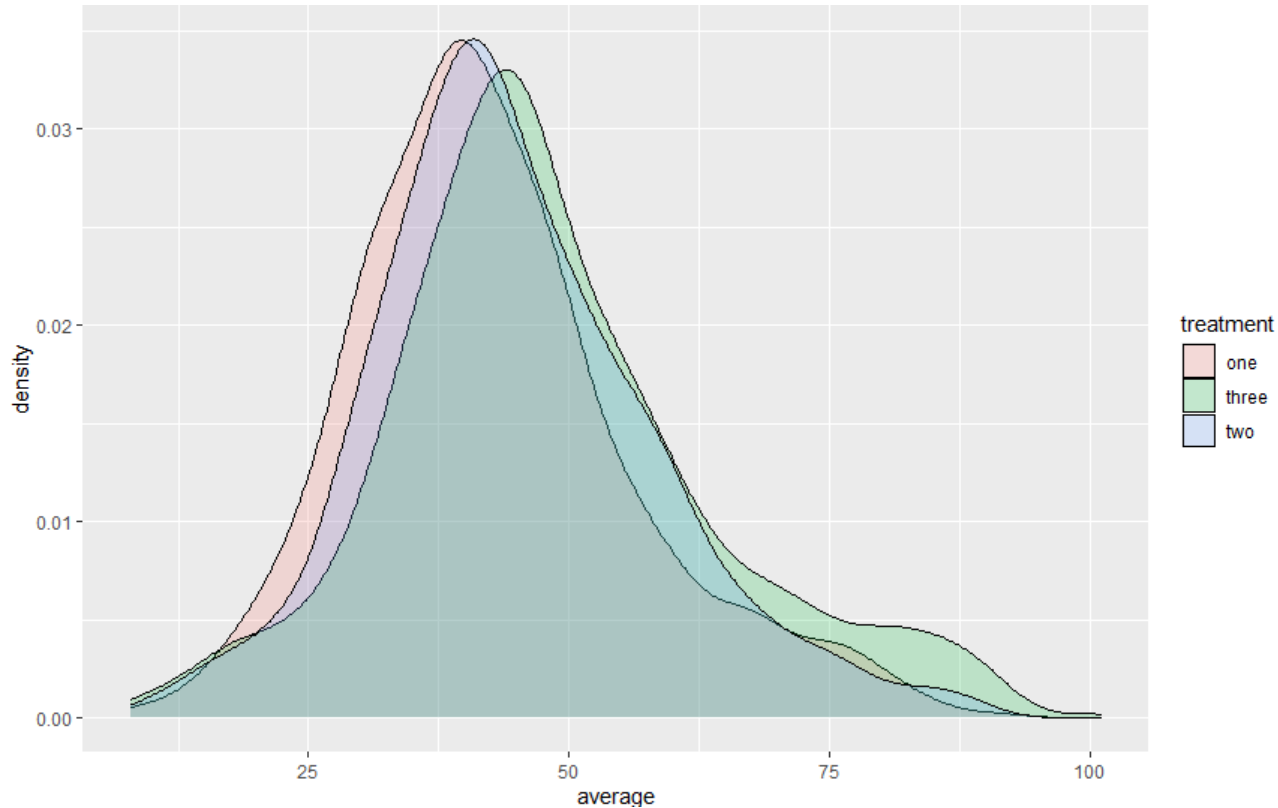
- ALL SAME SIZE CLASS



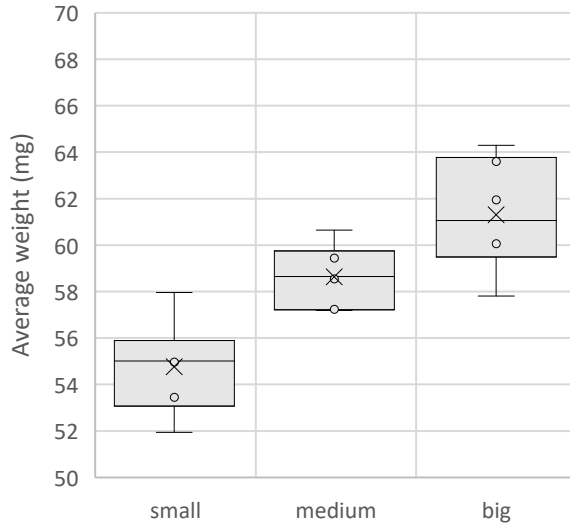
121-140 mg

- 4*1 WEEK OVIPOSITION

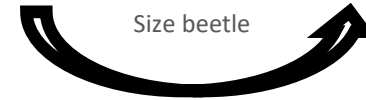
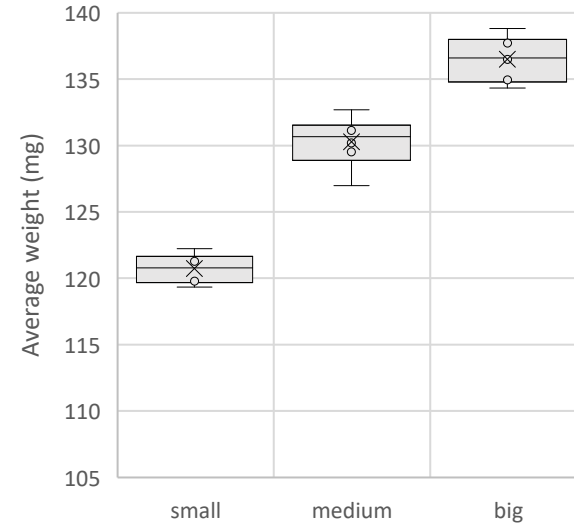
Size influence on reproduction



Size influence on reproduction



Growth: 12% (± 1)

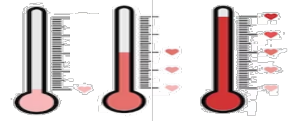


13% (± 0.3)

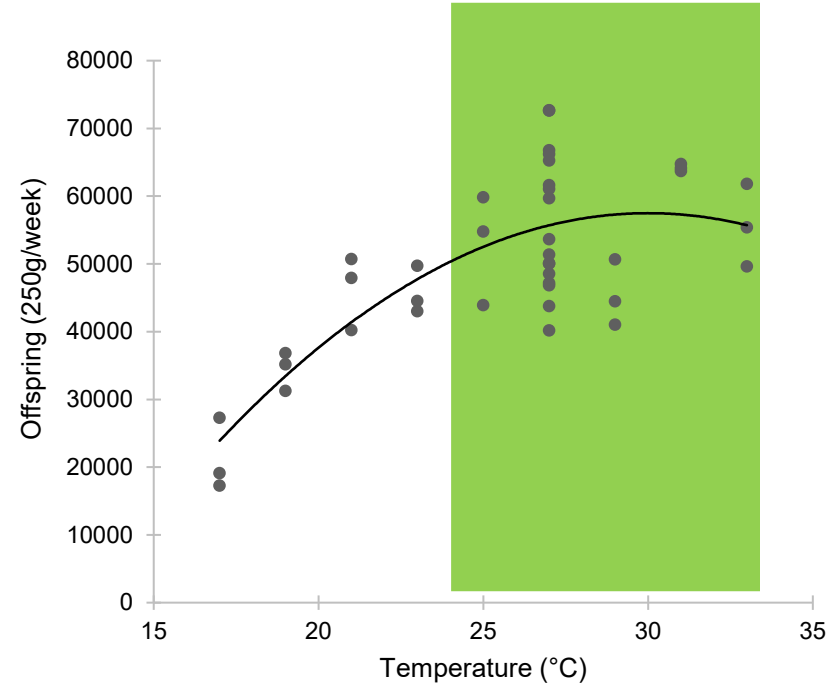
Similar pattern at 3,4 and adult stage

Difference in beetles = 44% (130/90) -> So we 'retain' about 30%

Temperature influence on reproduction



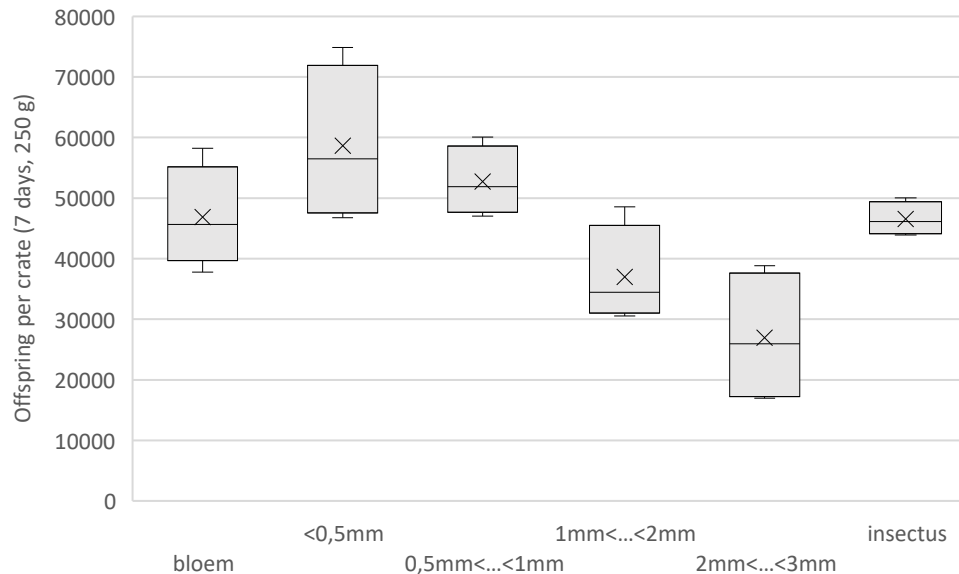
- 250G BEETLES, 1 WEEK OVIPOSITION
- 60*40 CRATE ON A SCREEN
- DIFFERENT TEMPERATURES, SPREAD IN TIME
- A BROAD TEMPERATURE RANGE IS POSSIBLE FOR ADEQUATE EGG PRODUCTION



Feed influence on reproduction



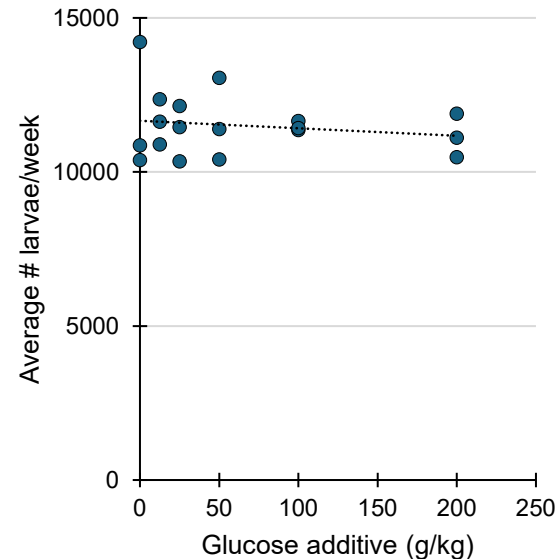
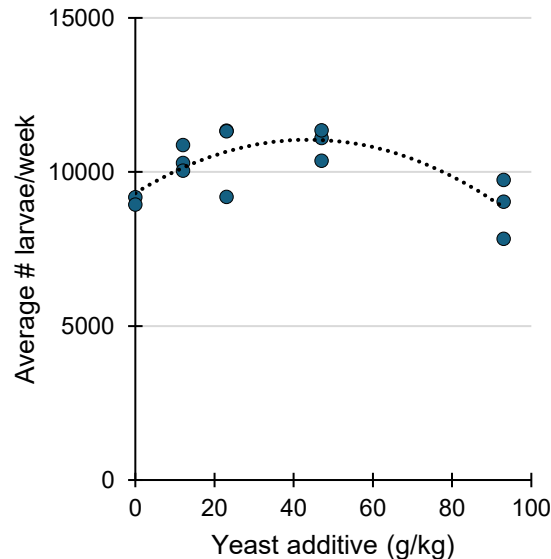
- 250G BEETLES, 1 WEEK OVIPOSITION, 60*40 CRATE ON A SCREEN
- 4 REPLICATES (IN TIME)
- CLEAR EFFECT OF REDUCED PARTICLE SIZE



Feed influence on reproduction



- 50G BEETLES, 1 WEEK OVIPOSITION, 60*40 CRATE ON A SCREEN
- 3 REPLICATES (2 OR 4 WEEKS)
- AGAR MIXED WITH YEAST (PROTEIN) OR GLUCOSE



Conclusion

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- DO NOT CHANGE THE SEX-RATIO MORE THAN 2-1 (F-M)
- SIZE DOES MATTER: $\text{ADULT} + X\% = \text{LARVAE} + 0.3 * X\%$
- TEMPERATURE MAY FLUCTUATE BETWEEN 25°C (MAYBE 23) AND 33°C
- SMALLER FEED PARTICLES ARE PREFERABLE
- ADDING PROTEIN TO WHEAT BRAN IMPROVES REPRODUCTION