

# A Lover or a Fighter? Alternative Mating Tactics among Male *Acheta domesticus*

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## Environmental Influence on Behavior

- The **alternative mating behaviors** can result from genetic effects (**strategies**), or from environmental effects (**tactics**)<sup>1</sup>
- Conditional tactics** are further defined as being set by internal or external environmental cues<sup>1,2</sup>
- Majority of work on conditional tactics have been on internal cues (body condition, age, etc.)<sup>1</sup>; effects of external cues such as social environment have been less studied (but see 3-5)
- Juvenile environments such as **rearing population density** can have large effects on adult behavior<sup>6-7</sup>.
- Here, we ask whether **juvenile social environment affects mating tactics** in the commercially available house cricket, *Acheta domesticus*

## *Acheta domesticus*



- Individuals of this species use ambient calling to estimate population size<sup>6</sup>
- Social environment in the final instar is thought to have large effects on individual personalities<sup>8</sup>
- Males have distinct aggressive, calling, and courtship songs: aggressive songs directed at conspecific males; calling and courtship songs directed at females.<sup>9-11</sup>
- Therefore, **males could invest energy either in more aggressively defending territory from competitors, or in producing more attractive calls to attract mates.**
- Cricket rearing setup: Crickets were reared individually in containers held at either high density (with ambient male song) or low density (in silence)



## Question

Does juvenile rearing density lead to alternative mating tactics in *Acheta domesticus*, resulting in variance in either male-male aggression or in male calling song production?

## Predictions

**High density: More energy to attracting mates**

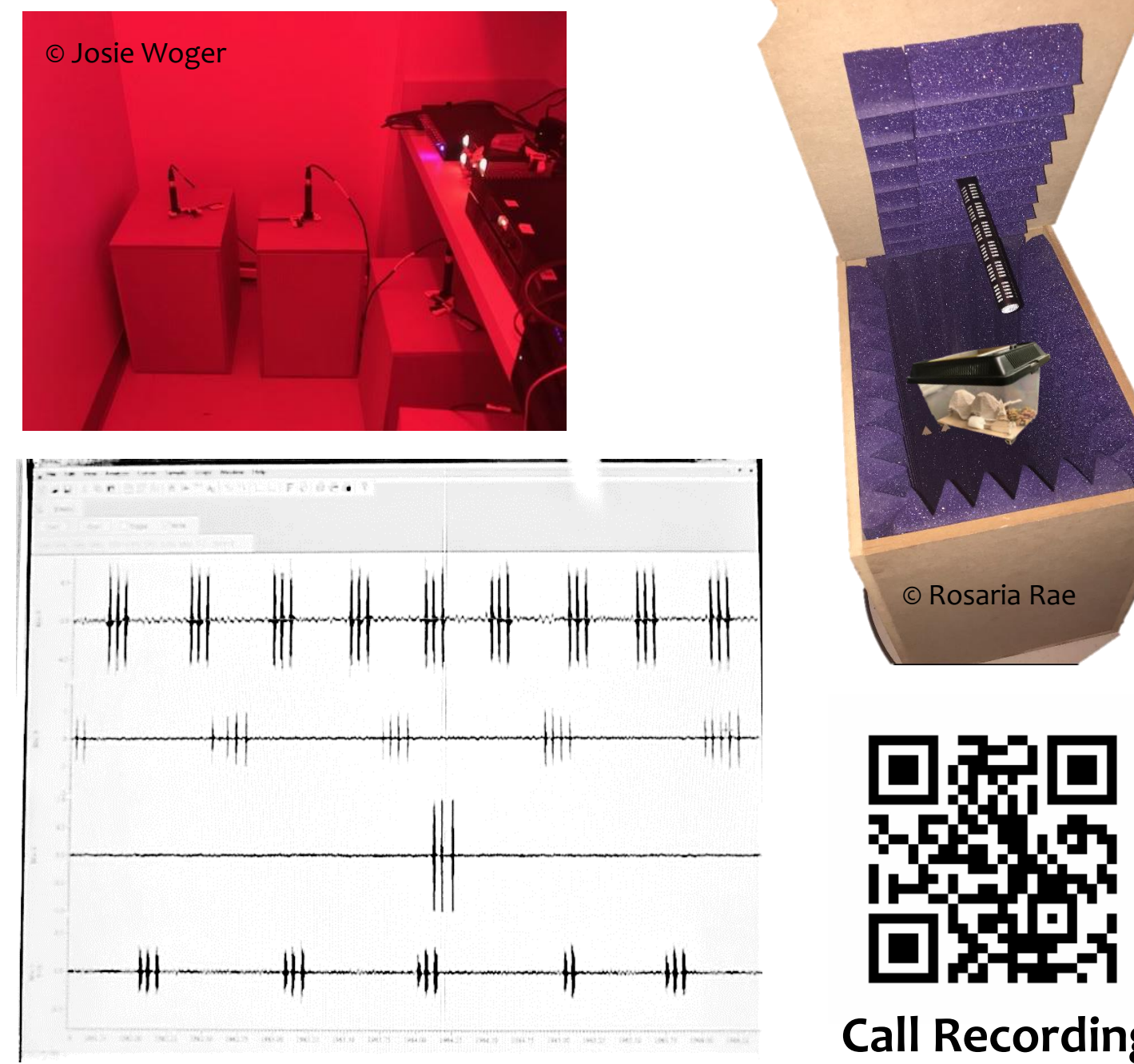
**Less energy to aggressive territory guarding**

**Low density: Less energy to attracting mates**

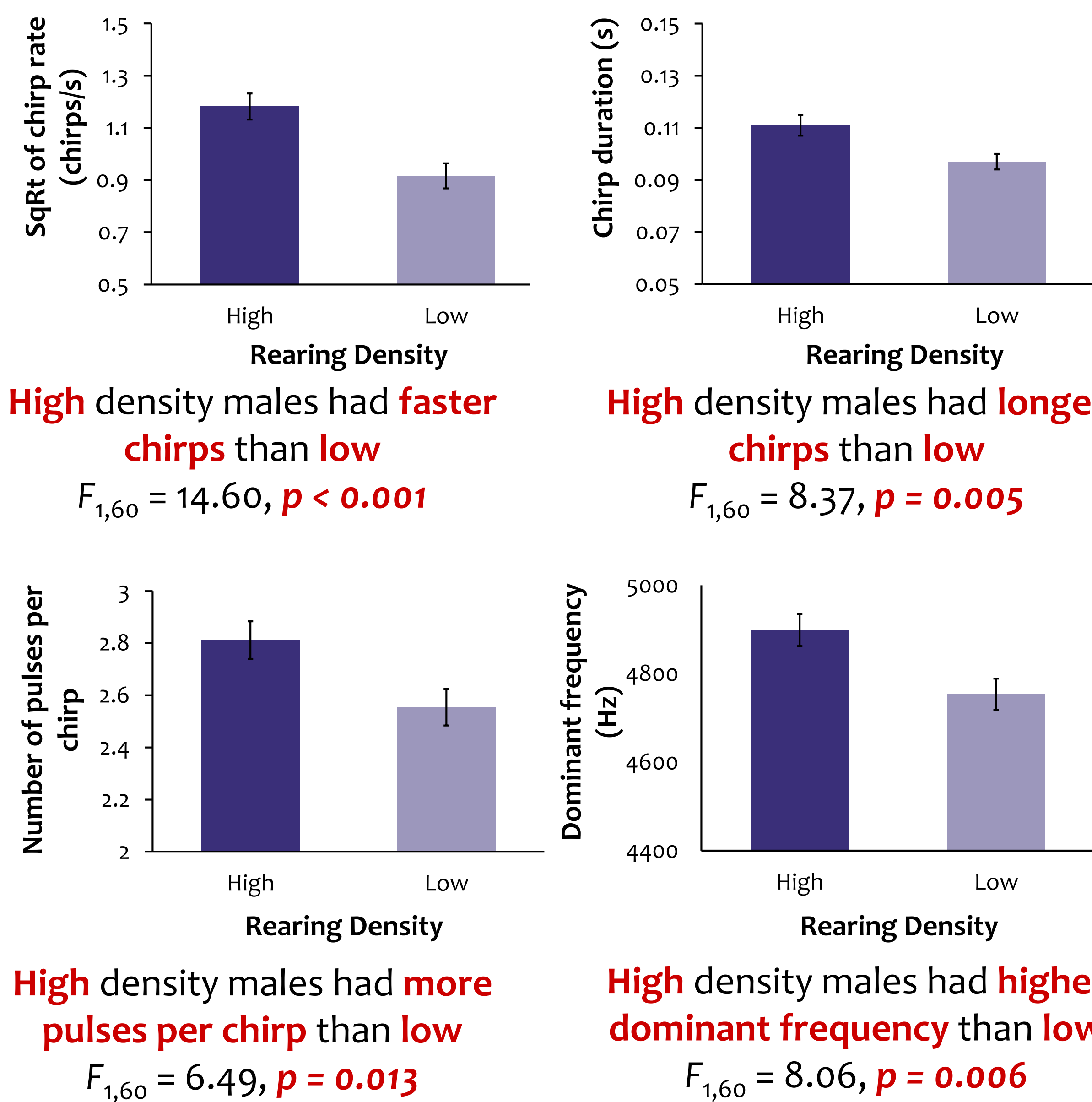
**More energy to aggressive territory guarding**

## Variation in Calling Songs

- Male calling song recorded, and five minute period of consistent calling analyzed
- Call characteristics measured: chirp rate; chirp duration, number of pulses; dominant frequency



## Calling Songs Differ Significantly



## Variation in Male-male Aggression

- Males paired for by age and weight
- Thirty minute observation in red light
- Video analysis for aggressive behaviors



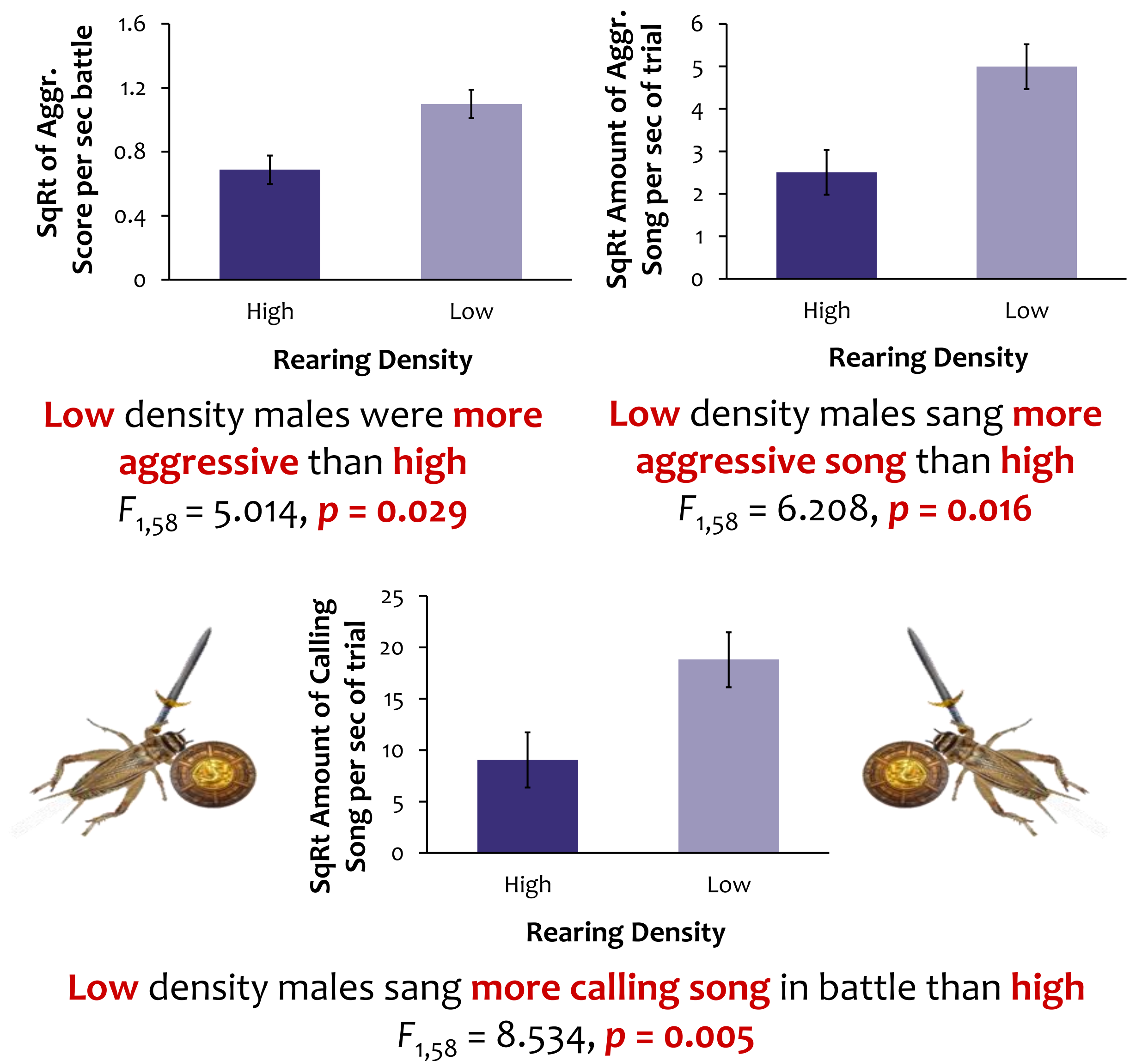
Table 1: Ethogram adapted from Adamo et al., 1995<sup>9</sup>

Rank	Behavior	Description
0	Pause	Immobile 15+ seconds
	Withdraw	Move away from opponent
1	Antennal Fencing	Cricket's antennate
	Threat Posture	Steadied with legs spread
2	Aggressive Song	Fast aggressive song
	Body Rocking	Cricket rocks back and forth rapidly
3	Mandible flare	Hyperextension of the mandible
	Chase	Runs after opponent
4	Bite	Use mandible to pinch opponent
	Lunges	Runs up on opponent with mandibles flared
5	Grapple	Cricket in full combat
	Male flipped	Cricket flips opponent on back



Sample Aggression trial video

## Male-male Aggression Differs Significantly



## Differences in Juvenile Rearing Density Results in Alternative Mating Tactics

- Perceived rearing density has large effects on the behavior of adult males in *Acheta domesticus*
- Males reared in a **high density** environment produced calling songs with **higher chirp rates, longer chirp durations, and more pulses per chirp.**
- Previous work has shown that **females prefer calling songs with these characteristics** (high chirp rates, long chirp durations, and more pulses per chirp)<sup>12</sup>
- This supports our hypothesis that **high density males prioritize production of attractive songs.**
- In contrast, males reared in a **low density** environment exhibit more aggressive behaviors towards conspecific males, supporting our hypothesis that **low density males prioritize territory defense.**
- Therefore, **male *Acheta domesticus* follow alternative mating tactics** based on the **juvenile social environment** they encounter.

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