Molecular sexing in Black Soldier Flies

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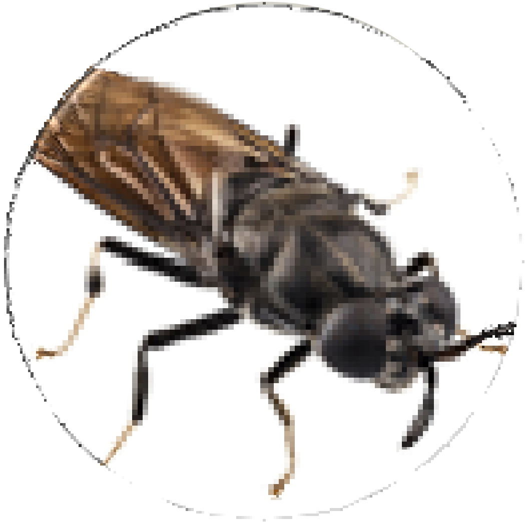

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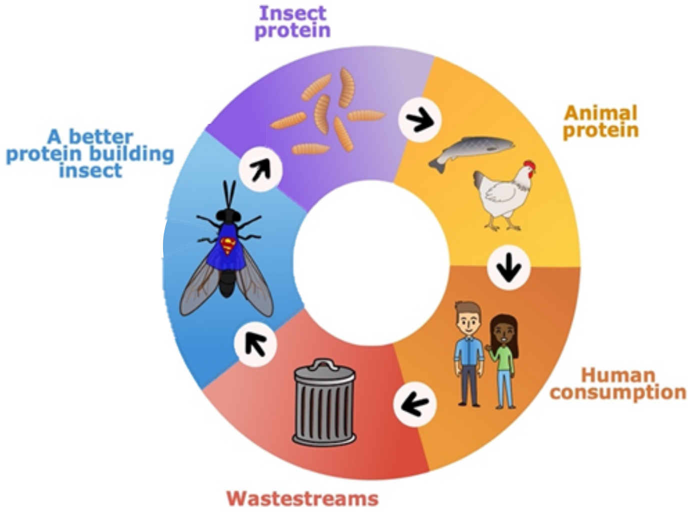
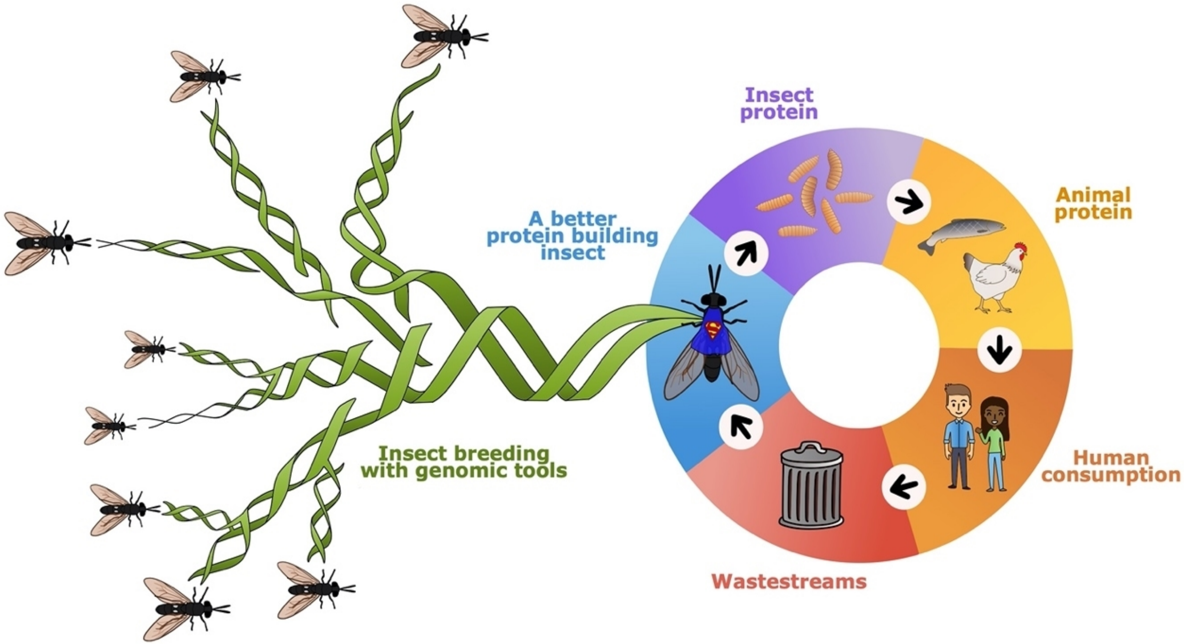
Role of BSF in protein transition

- Upcycle waste streams
- Key players in protein transition



Role of BSF in protein transition



To improve insect protein production genetic improvement is the key

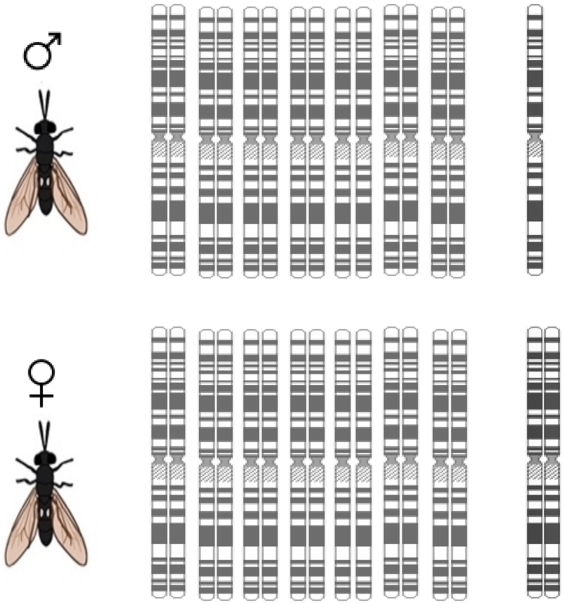
Sex determination in BSF

Current sex determination

- Phenotypically
- Only in adult flies

Genome-based sex determination

- 6 autosomes[1]
- Sex chromosome[1]
  - Half coverage in males



[1]Generalovic et al., 2021

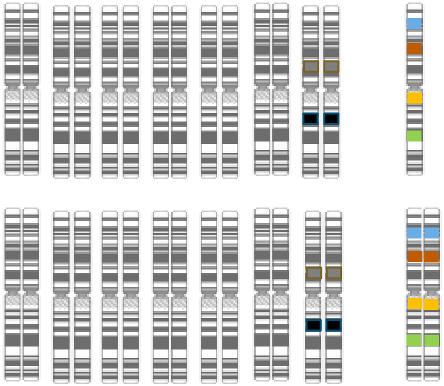
Develop a tool for BSF sex determination using molecular methods

Experimental setup

DNA isolation

6♀ 6♂

quantitative PCR



Design primers:
Reference: genes on autosome
Target: genes on sex chromosome

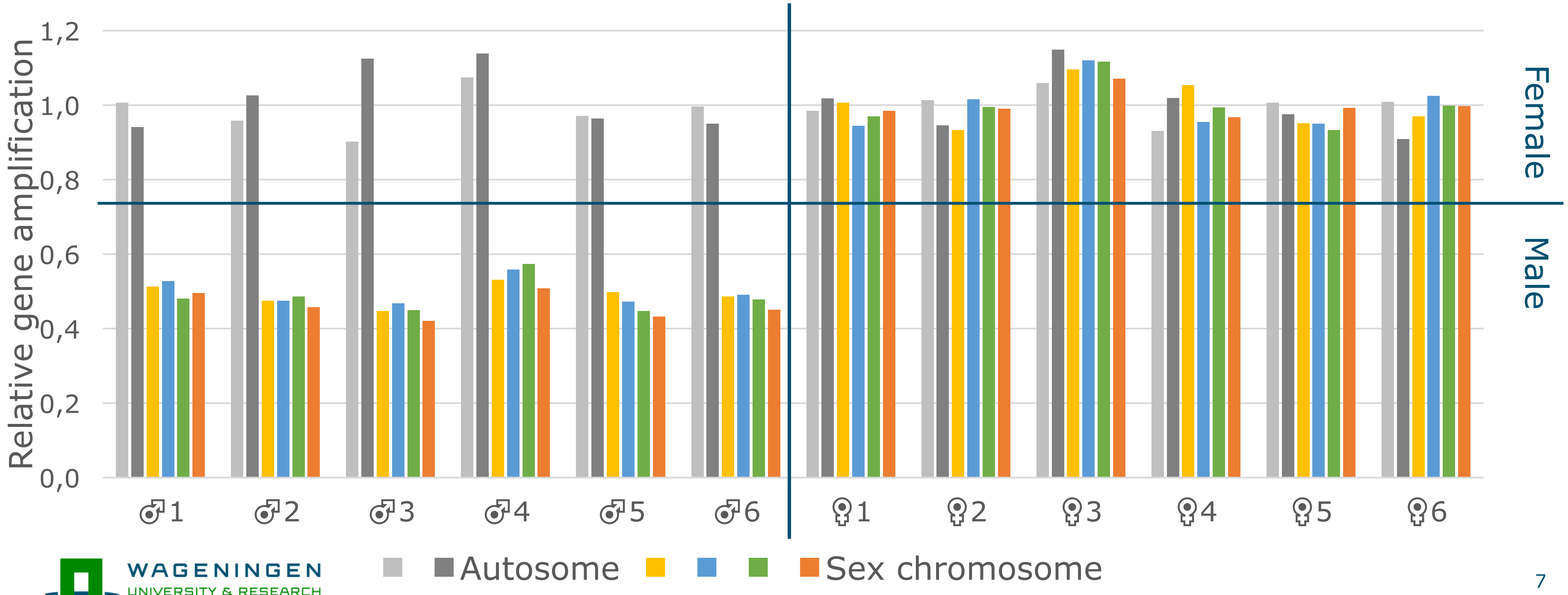
Statistics

VandeSompele method

- Multiple reference genes for normalization
- Use primer efficiency

Results: vandeSompele method

The quantity of qPCR product of sex chromosome genes in males is half in comparison females



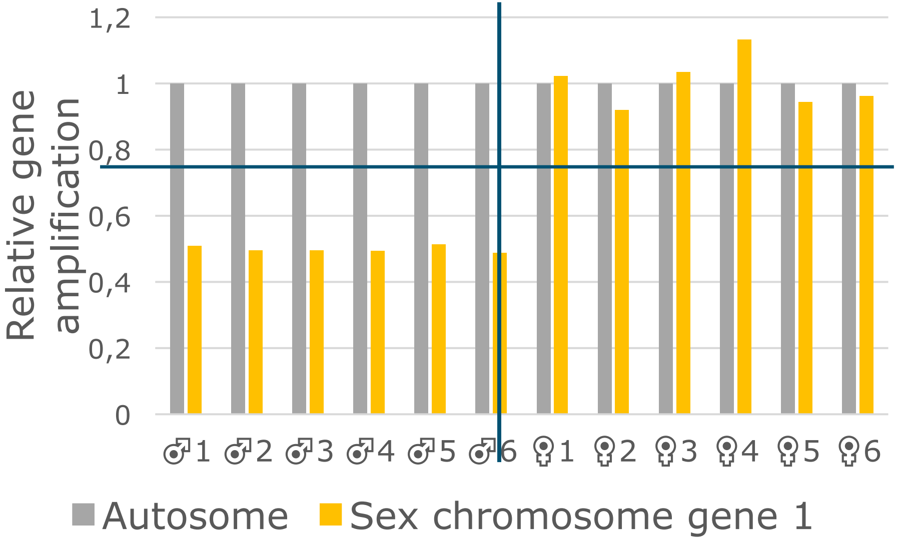
Method optimization for high throughput

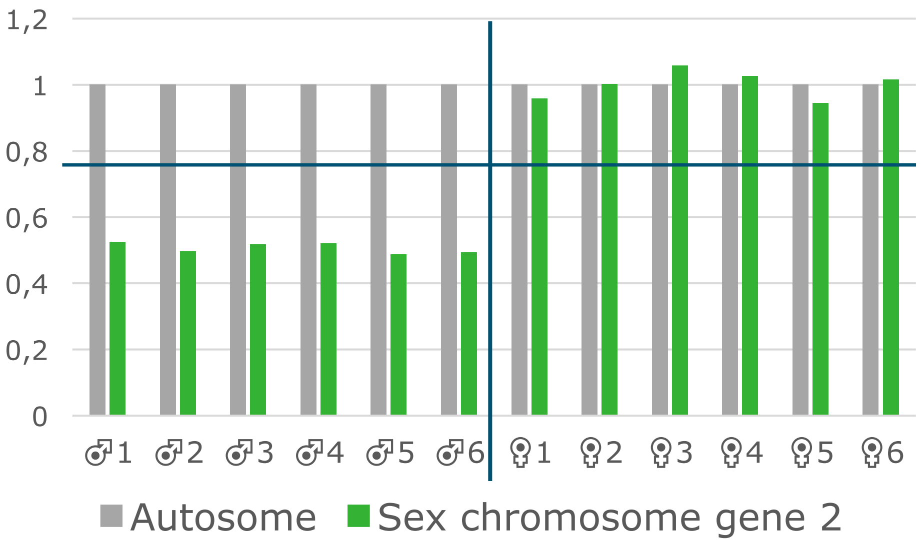
- Can we sex the BSF with less genes?
  - Less costs
  - Less hours

- Pfaffl method
  - One gene on autosome for reference
  - Use of primer efficiency

Results: Pfaffl method

The quantity of qPCR product of sex chromosome genes in males is half in comparison females





Conclusion

Developed a tool to determine the sex of BSF using qPCR

- Identified genes that could be used to molecularly sex BSF
    - one reference gene on autosome
    - One or two target genes on sex chromosome

Future research

- Validate on higher sample size
- Determine sex with shed skins of BSF larvae

Successful molecular sex determination tool of BSF

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