Investigating the feasibility of household and supermarket organic waste as feed for *Tenebrio molitor*

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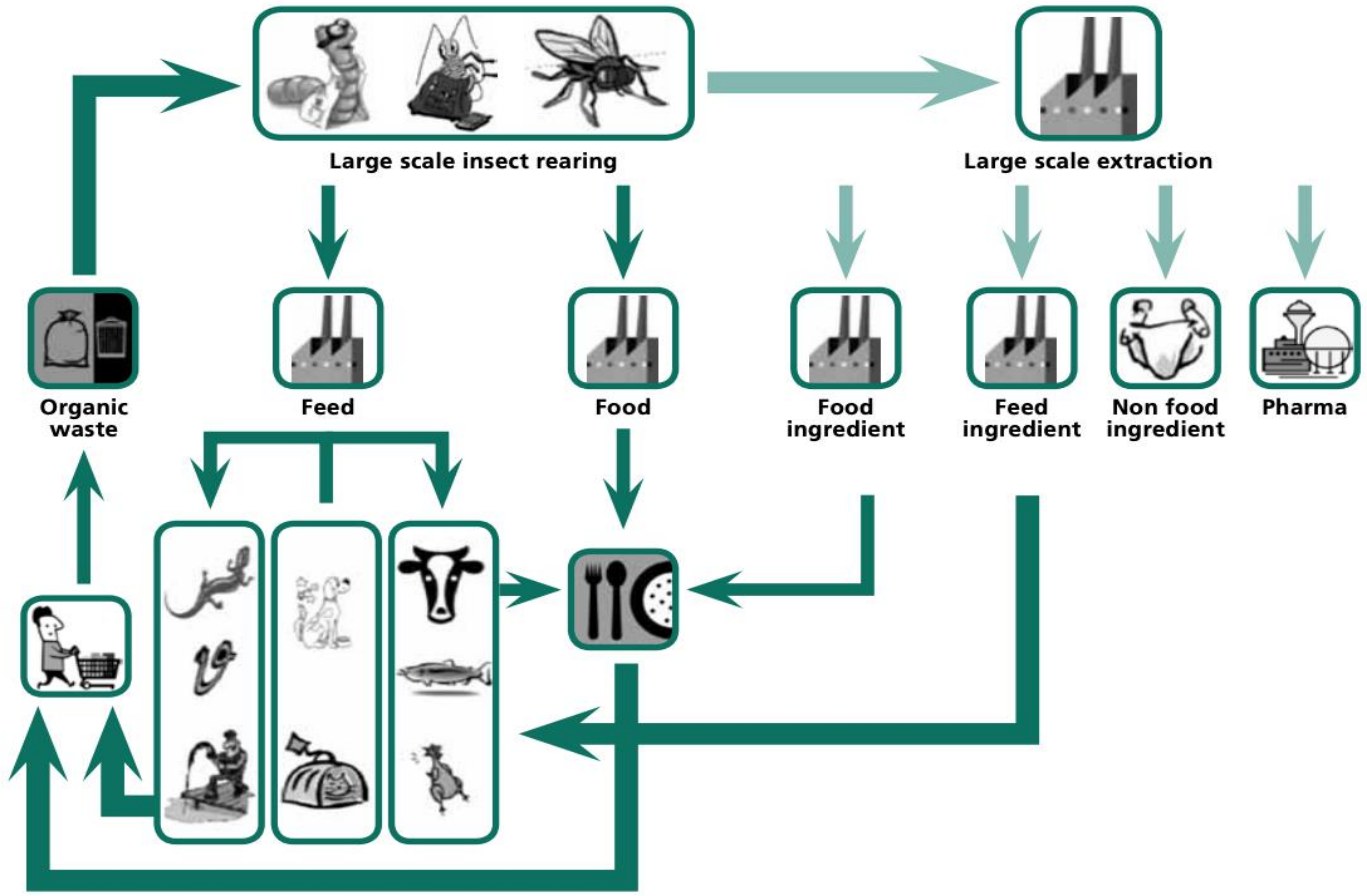
Introduction

FIGURE 9.3
Insects as the missing link: ecology designs a circular economy



Source: M. Peters, personal communication, 2012.

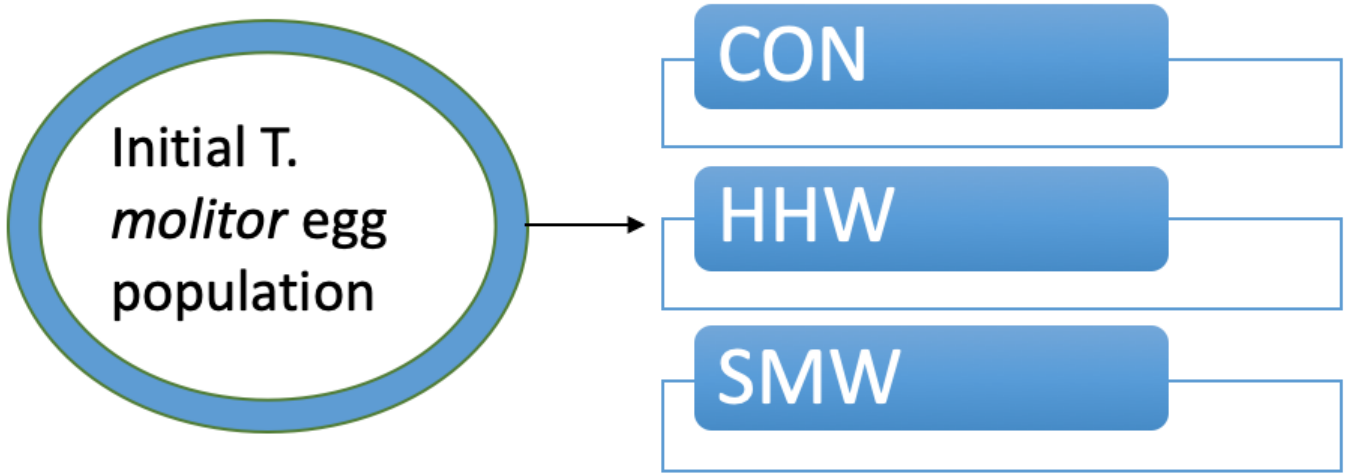
Objectives

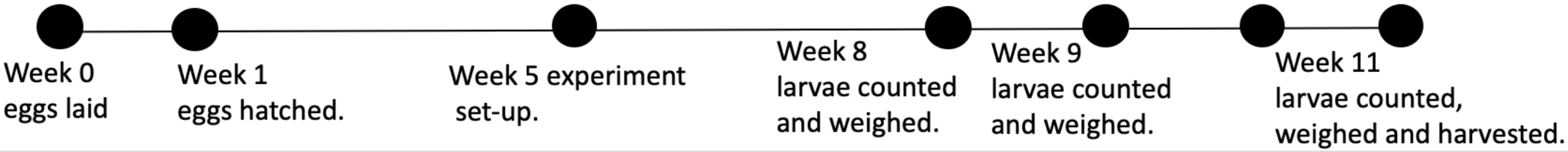
1. Successfully rear *T. molitor* on different waste streams including organic waste from supermarkets and households as feed

2. Analyze *T. molitor* reared on organic waste for nutrition content and safety measures for human consumption

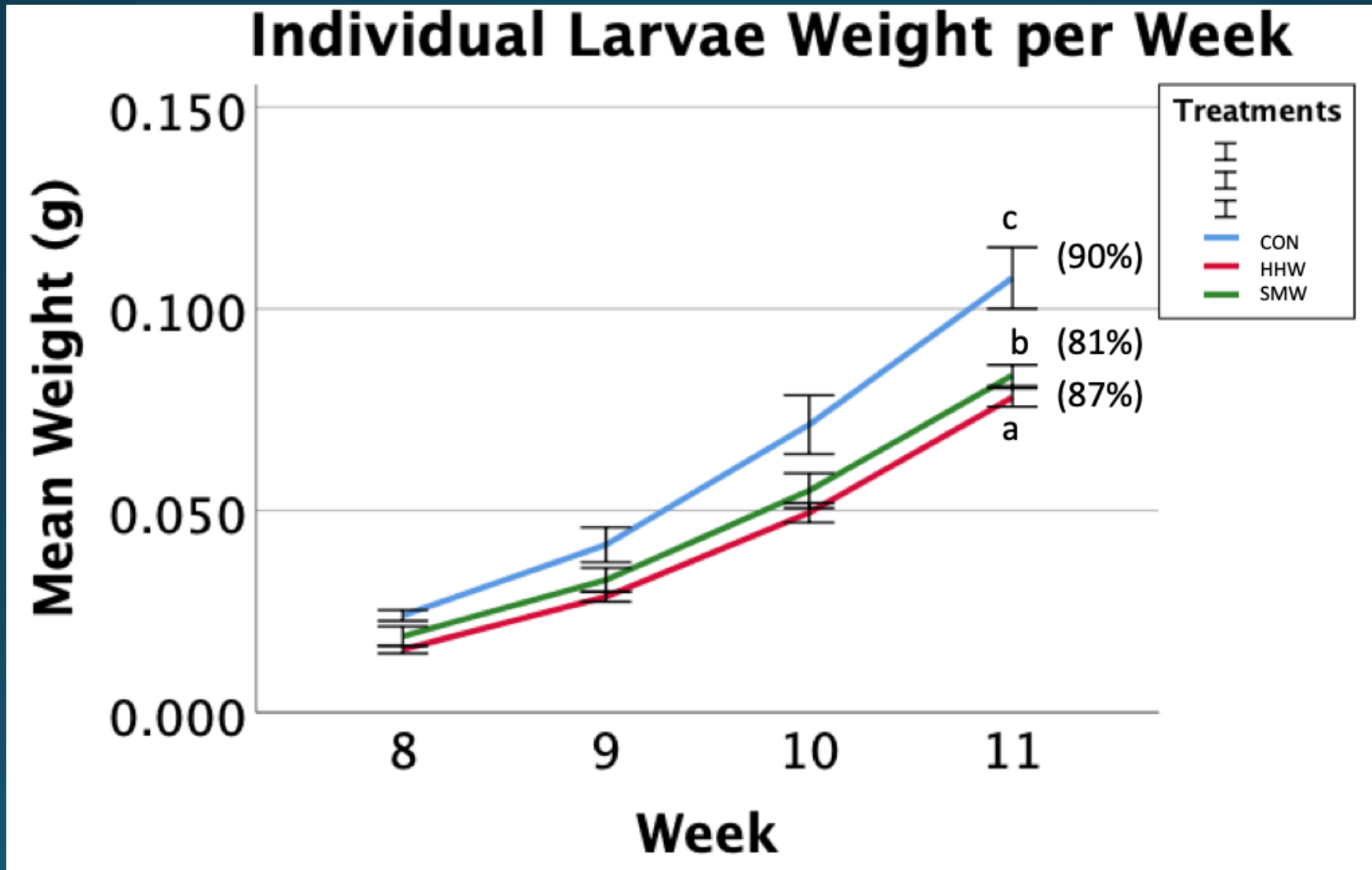
3. Examine if *T. molitor* can biodegrade or avoid certain microplastics within organic waste

Experimental Set-up

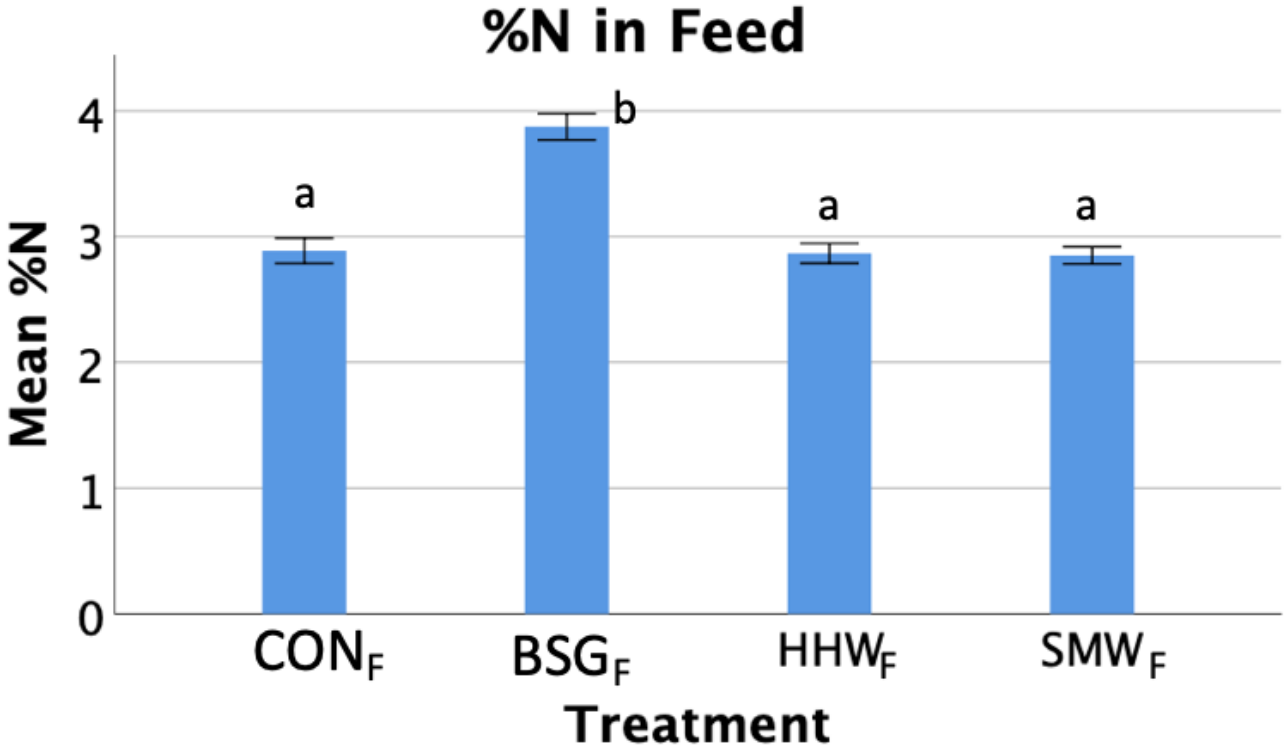


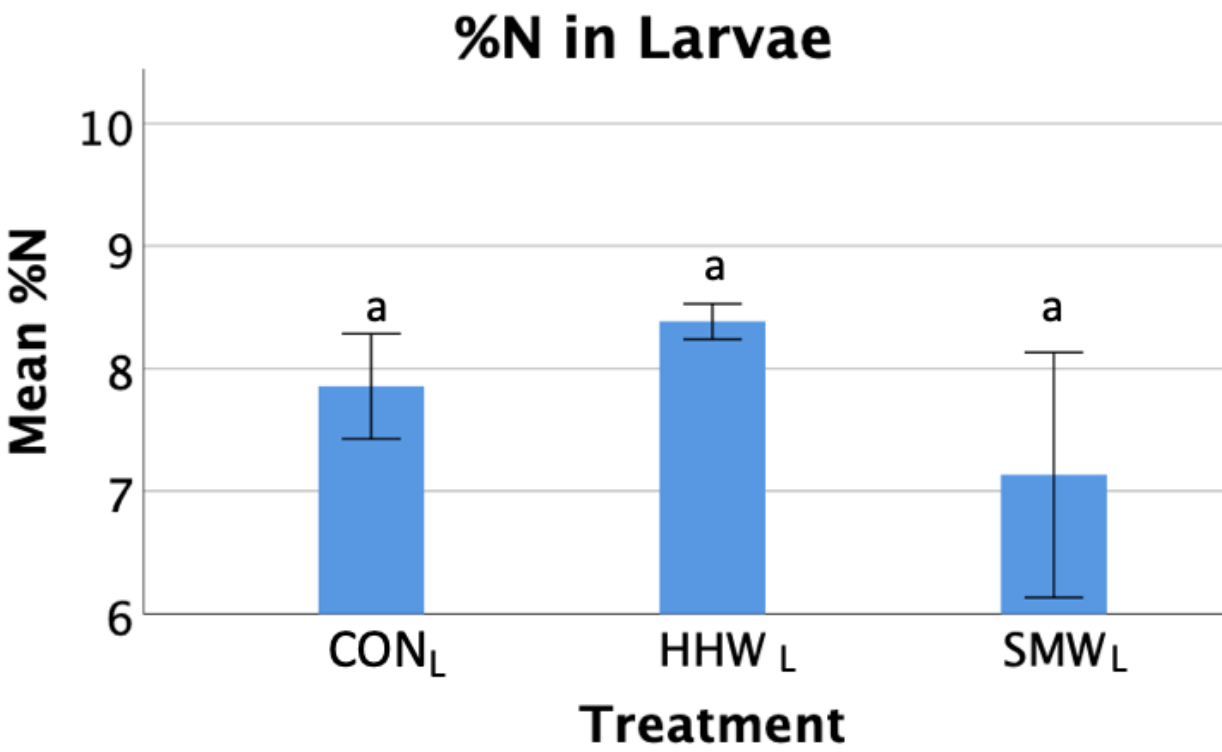


Larvae Survival

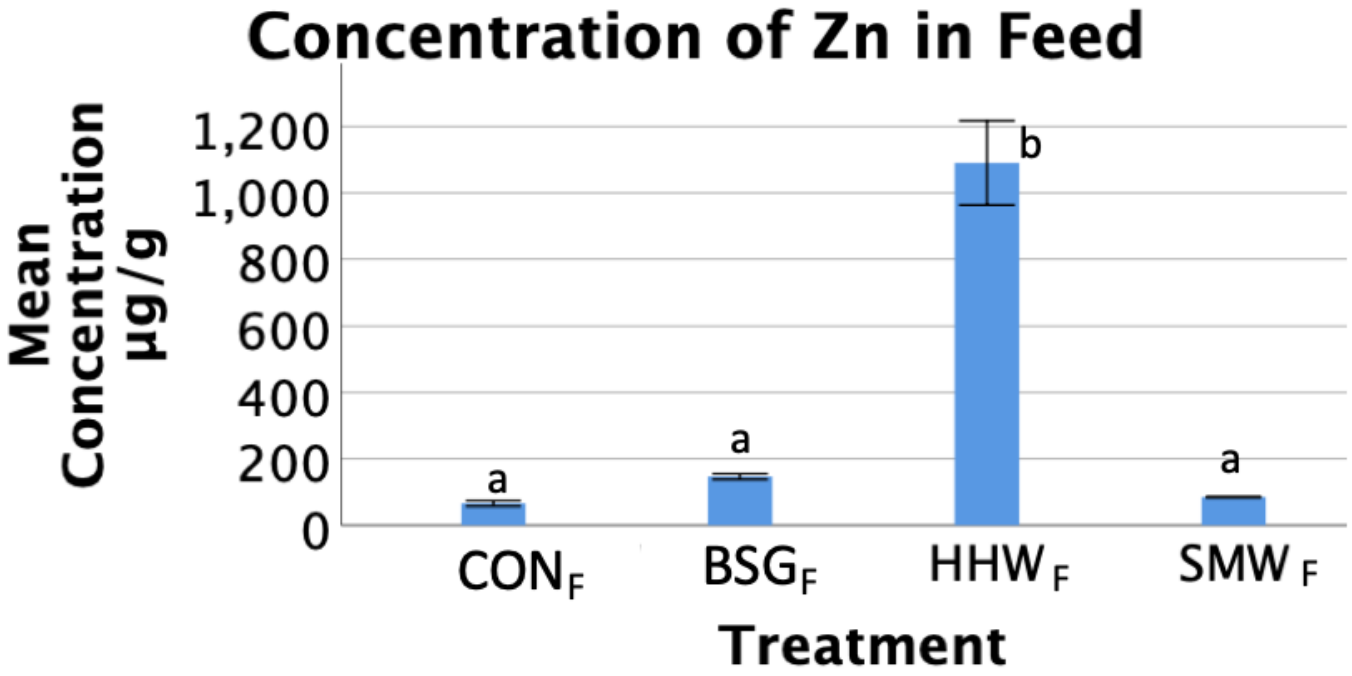


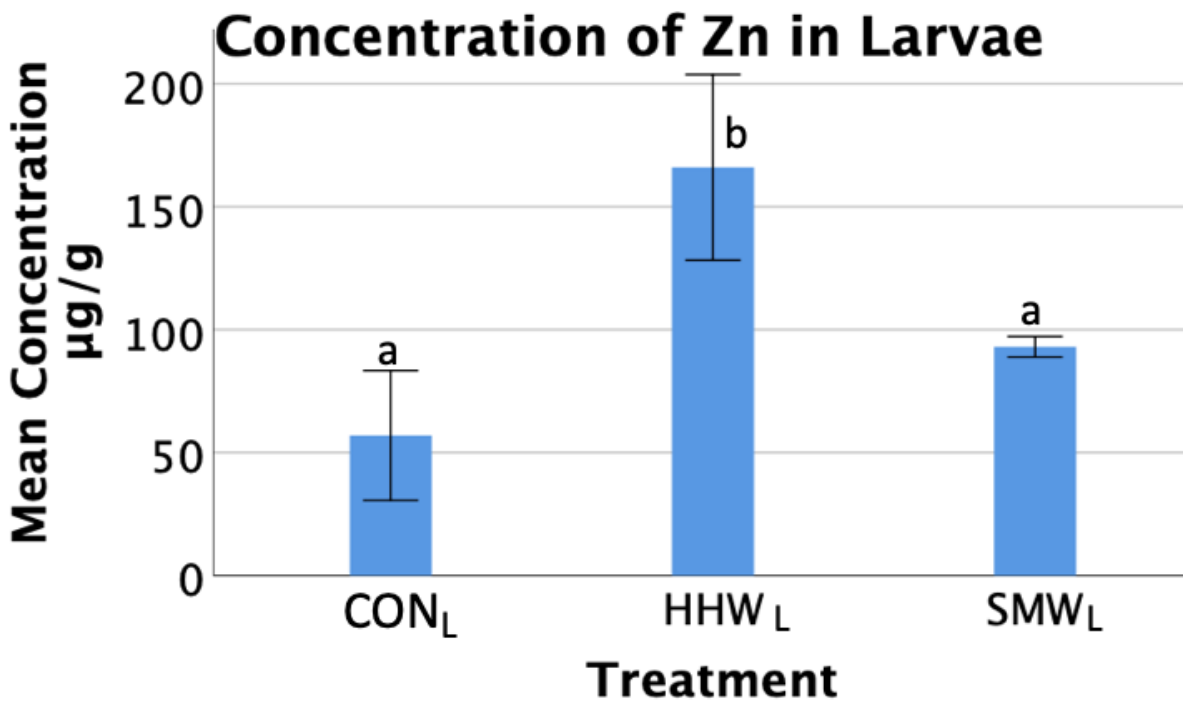
Nitrogen Analysis





Heavy Metal Analysis





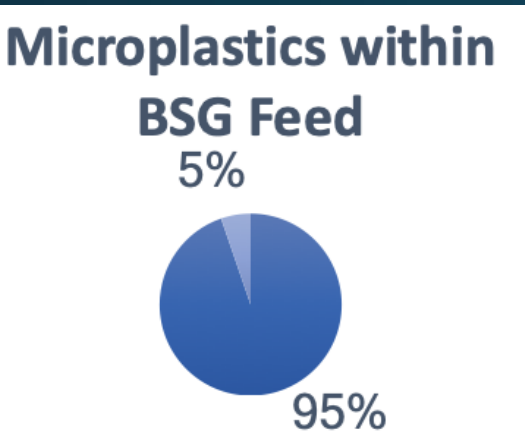
Heavy Metal Analysis

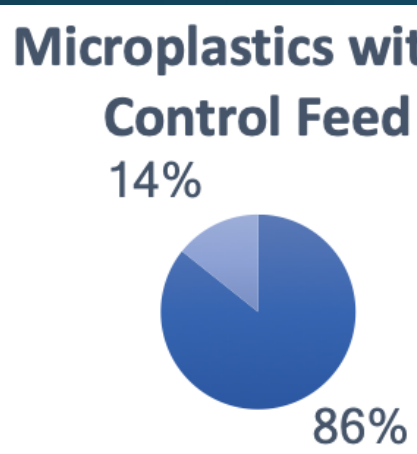
Heavy Metal	CON_F to CON_L	HHW_F to HHW_L	SMW_F to SMW_L
Cu	269.6/1	925.43/1	154.04/1
Co	17.35/1	19.27/1	81.88/1
Fe	40.23/1	60.24/1	138.5/1
Zn	1.15/1	6.57/1	**0.91/1**
Cr	**0.71/1**	2.4/1	3.1/1
Cd	14.52/1	**0.34/1**	**0.41/1**
Pb	12.11/1	74.91/1	65.26/1
Ni	16.64/1	49.5/1	13.95/1

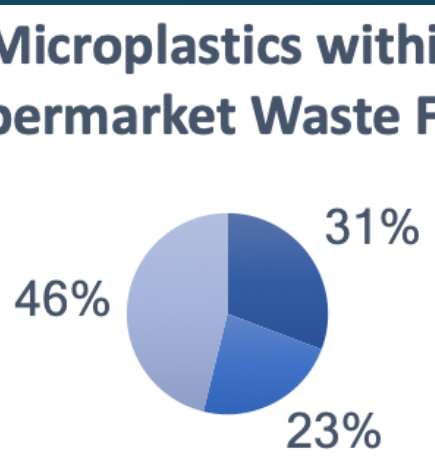
Microplastic Analysis

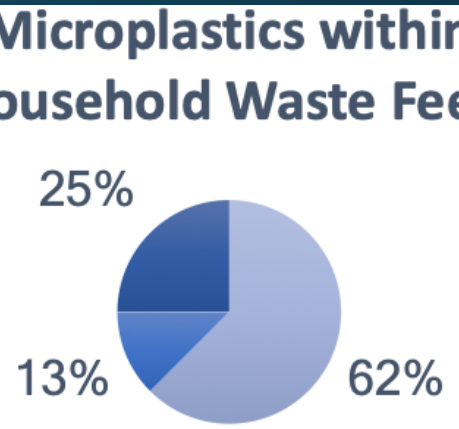
Feed Treatment	Amount identified	Percent taken %	Amount analyzed
CON_F	195	10	19
BSG_F	144	10	14
HHW_F	161	10	16
SMW_F	126	10	13
Larvae Treatment	**Amount identified**	**Percent taken %**	**Amount analyzed**
CON_L	4	50	2
HHW_L	6	50	3
SMW_L	4	50	2

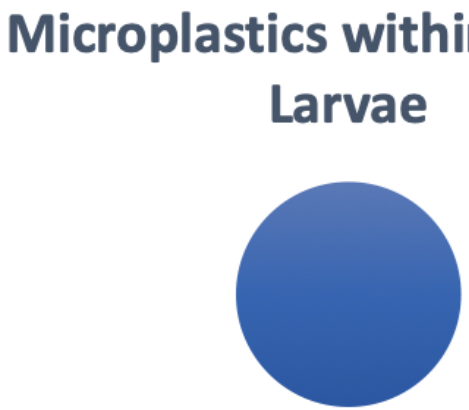
Microplastic Analysis

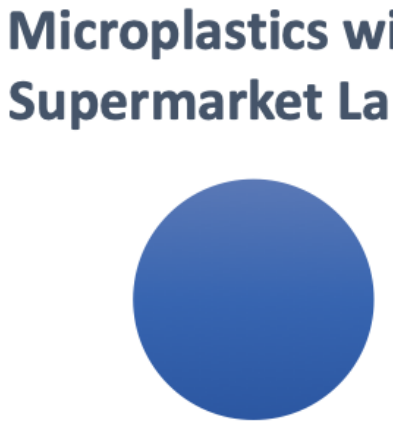


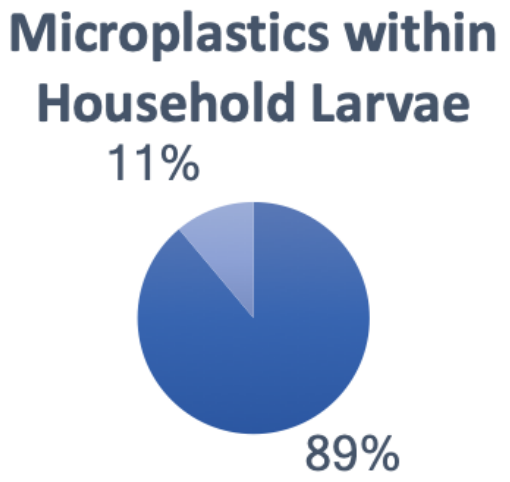












Not Plastic Polyethelyne Polyoctadecyl Acrylate

Conclusion

- *Tenebrio molitor* has the potential to be successfully reared off of household and supermarket organic waste as dry feed
- *Tenebrio molitor* accumulated nearly three times the amount of N
- The concentration of heavy metals were not bioaccumulated
- The larvae were able to biodegrade or avoid microplastics within the organic waste

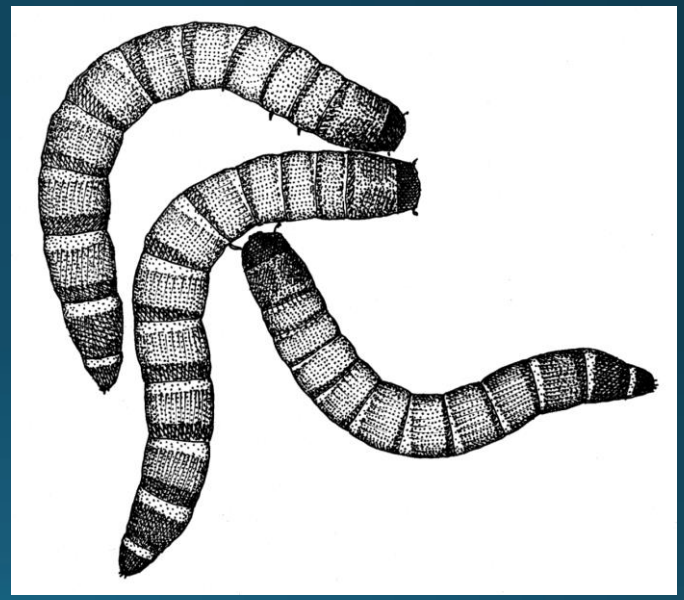
Outlooks

- Utilizing other waste stream sources
- Treatments of organic waste
- Optimizing the heavy metals detection
- Nutrient extraction from organic waste, *T. molitor* and feces
- Microplastics and nutritional analysis of feed and feces at the end of the larvae life cycle

Thank you!

Advisory Board:
Claudia Bieling
Annette Jensen
Antoine Lecocq
Jakob Magid

DTI (inValuable): larvae and control feeds
Biofos: Household Waste
Nature Energy: Supermarket Waste
Roskilde University (Annemtte Palmqvist and Comet Lab): lab equipment and technicians



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