Growth and chemical composition of insects reared on "yet to be" legally authorised residual streams

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Introduction









Growing population

30-40% food waste

Black soldier fly

Alternative protein and frass source

"yet to be" legally authorised substrates can unleash the insect sector







Materials

Experimental diets (residual streams): 30% dry matter

Starting larvae: 7 days old 2000 larvae/kg of diet

Control:

Chicken feed (CF)

Broiler manure (BM)

Vegetables and fruits mixture (GFE)

> Supermarket mix (SM)



Methodology



 28°C
70% day 0→5 50% days 6-7
0:24 h light: dark
5 replicates/ diet

- Larval growth performance
- Waste reduction index (WRI)
- Efficiency of conversion of Ingested feed (ECI)

Chemical analysis:

- Starting substrate
- Larvae
- Frass

The chemical composition (% as DM) of the four different diets at the beginning of the study





The effect of diets on the live weight of larvae at harvest (LW, mg), growth rate (mg/day), waste reduction index (WRI), and Efficiency Conversion of Ingested feed (ECI)



CF: Chicken feed (control) GFE: Vegetables and fruits BM: Broiler manure SM: Supermarket mixture

The effect of the 4 diets on the final larval masses (fig a) and nutrient conversions (fig b) of dry matter (DM), crude protein (CP), and fat



SM: Supermarket mixture



The chemical composition (% as DM) of the harvested larvae reared on the four different diets





The chemical composition (% as DM) of the frass produced by larvae reared on the four different diets





Discussion

- Fruits and vegetable mix: nutritionally poor \rightarrow more consumption but low growth
- Supermarket mix: fat and fibre \rightarrow less consumption but best growth
 - Highest fat in larvae and no fat in the frass
- Broiler manure: protein-rich \rightarrow high-protein larvae but not best growth!
- Diets and frass: Fibres and N-free substances rich \rightarrow larvae deposited a bit!





Conclusion

- The diet's protein and fat content affect the larval protein and fat contents → optimising the diet
- The diet's fat may impact more the larval growth performance and diet's protein may affect more the larval protein.
- BSFL "eat to requirement" \rightarrow excess of certain nutrients was found in frass
- The fibre and N-free substances were higher in the diet and the frass compared to the larvae:
 - 1. Consumed but not deposited in the larvae \rightarrow defecated
 - 2. Not consumed



Thank you

Safety analysis presented by Elise Hoek!

Questions?



