

Cleaning up our act with a little help from little friends

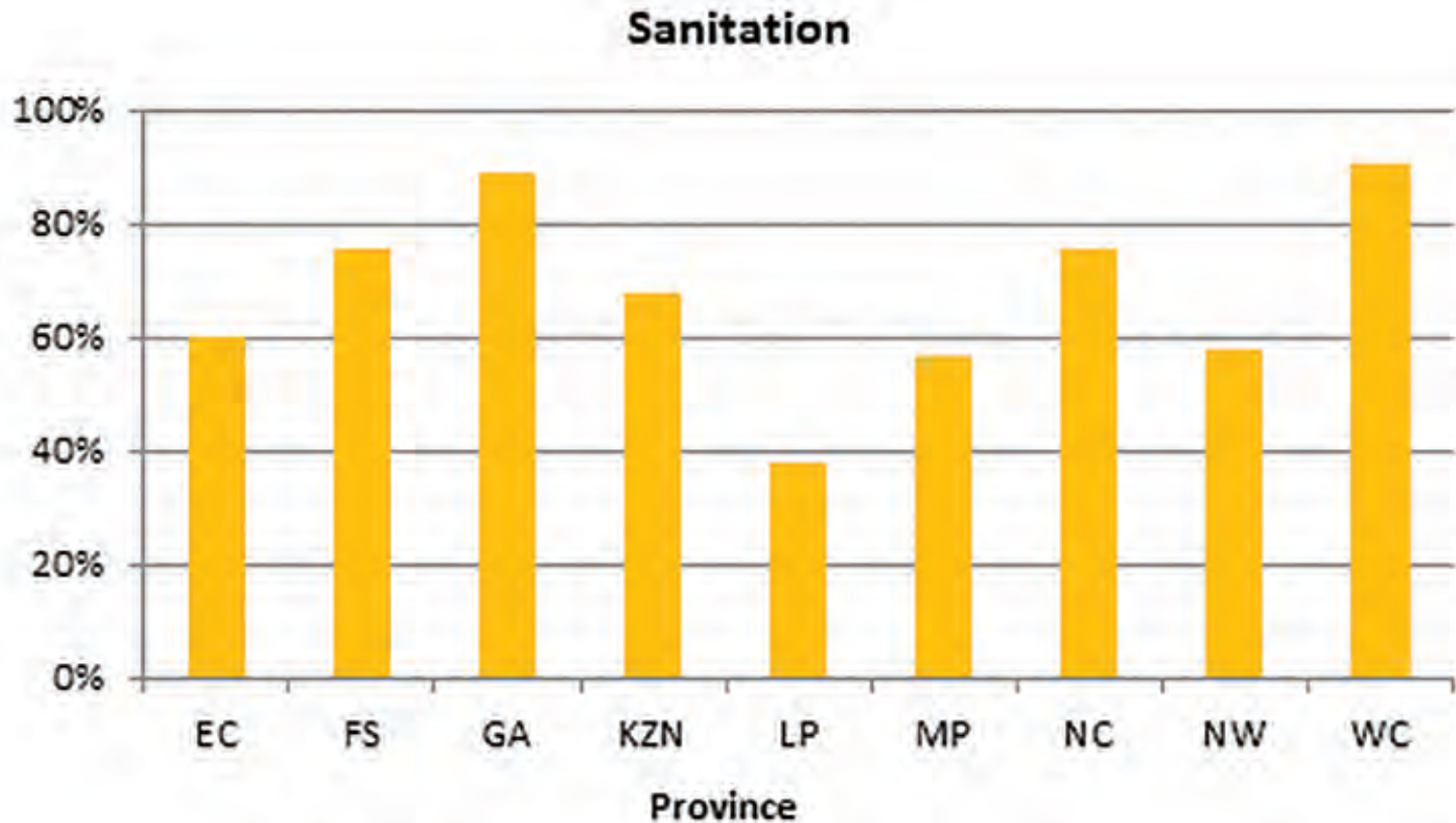
Using black soldier fly larvae to treat faecal sludge from urine diversion dehydrating toilets



Vivian Maleba

Supervisor: Dr. Nicola Rodda

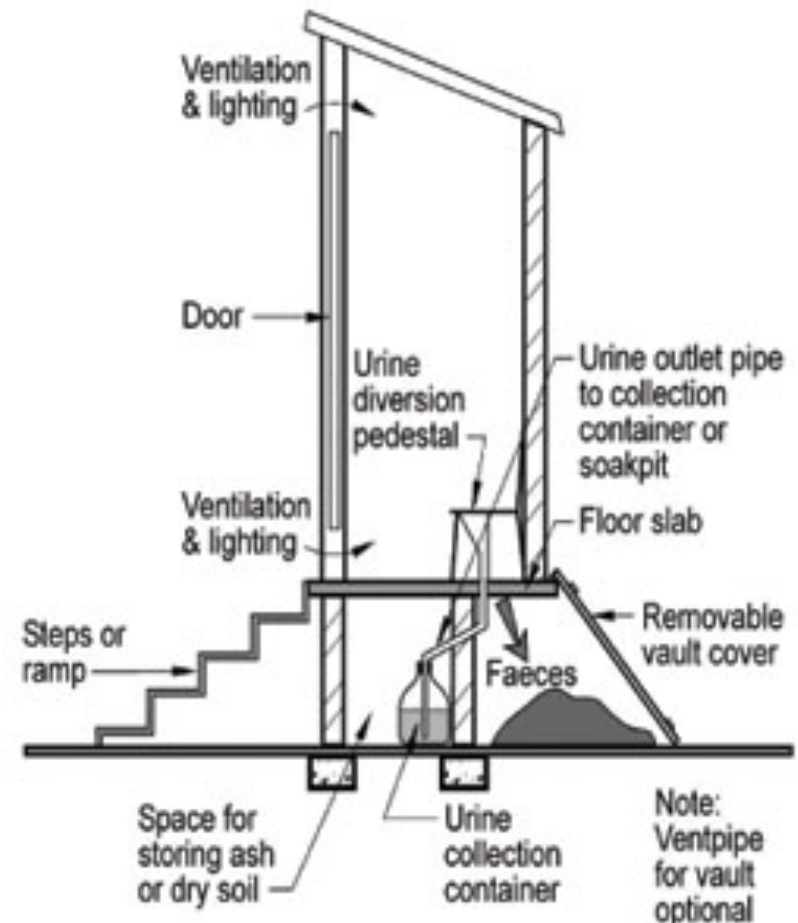
Level of Access to Sanitation in South Africa, by Province (October 2011)



One solution

- Use of **urine diversion toilets** (UD toilets)
- Do not require water to dispose urine and faeces (conserve water).
- Allow safe on-site disposal or treatment of human waste.
- Have the potential to provide safe nutrient-rich fertilizer for improved household food security.

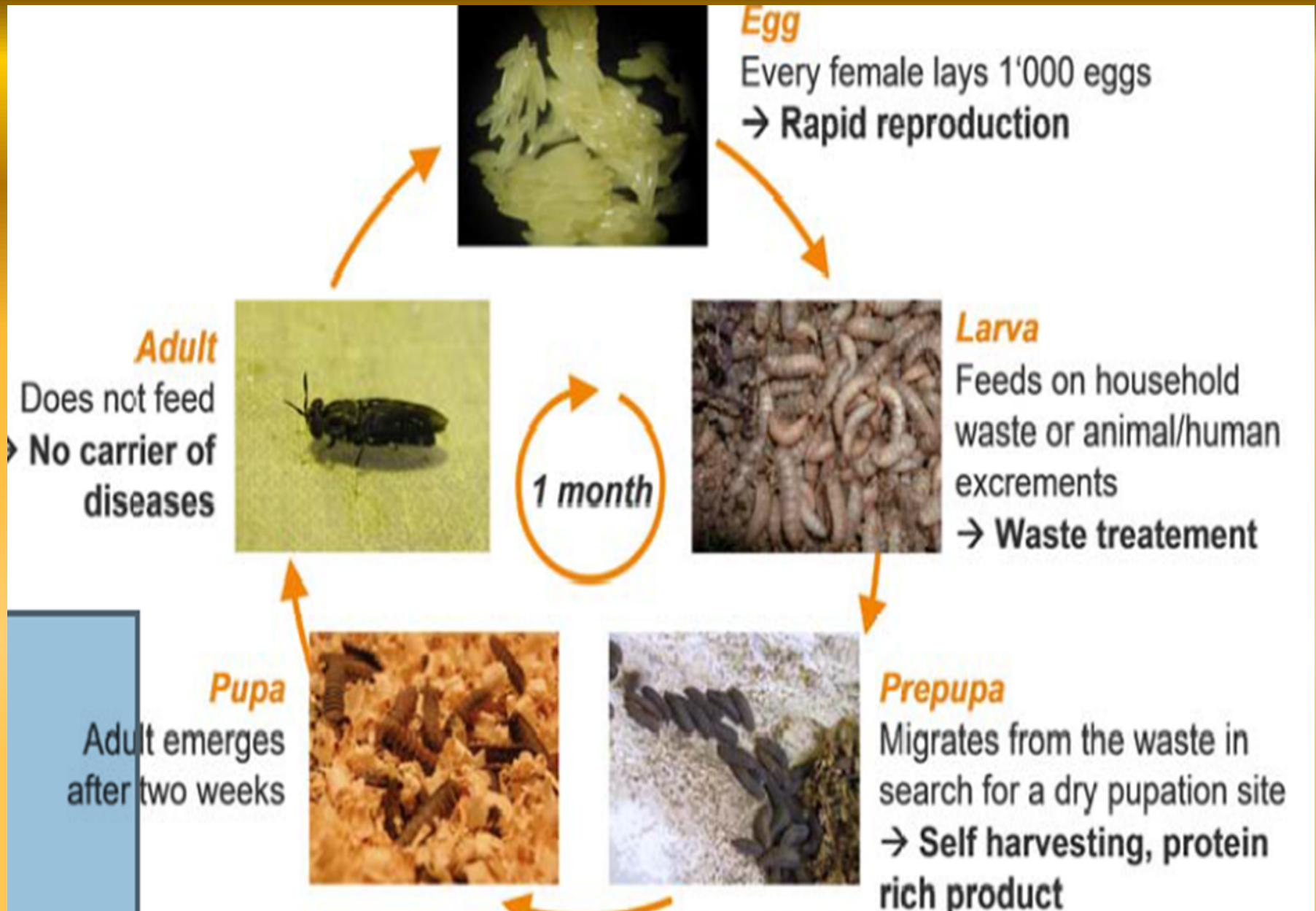
Pedestal and schematic representation of urine diversion(UD) toilet



Management and processing of UD faecal sludge

- Use black soldier flies larvae in processing the faecal sludge
- Consist of 36–48% protein and 31–33% fat, so potential for use as animal feed.
- Reduction in biomass of waste.
- Antibacterial activity in excretion/secretion.

Life cycle of black soldier flies (BSF)



Hypothesis:

The yield of BSFL is affected by the type of sludge and by the proportion of sludge to readily biodegradable organic substrate.

Aims:

1. To compare BFSL yield when reared on different sludges (UD, pit latrine and digested activated sludge).
2. To assess the effect of proportion of UD sludge to organic substrate on yield of BSFL.

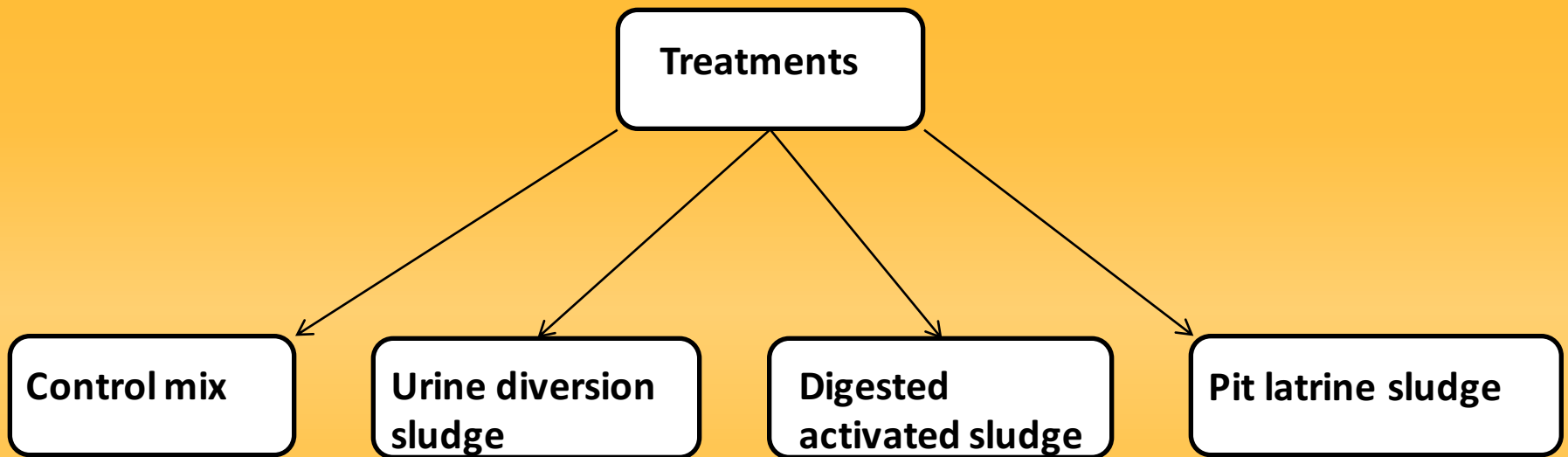
Objectives:

1. Test effect of different sludge on prepupae (growth, dry mass, protein and fat).
2. Test effect of different proportion of UD sludge on prepupae (growth, dry mass, protein and fat).

Materials and Methods

Experiment 1 and 2

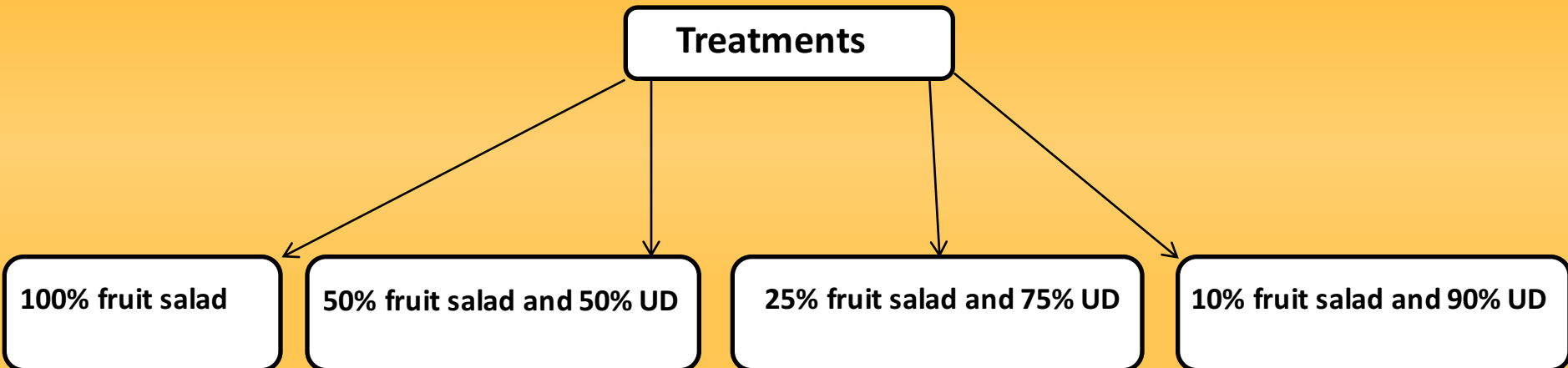
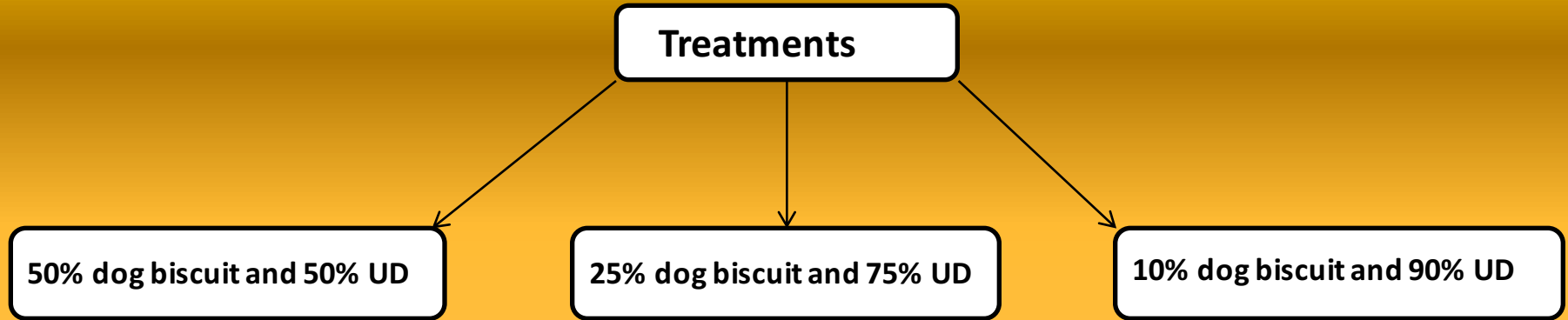
Compare BFSL growth in different sludges (UD, VIP and digested activated sludge).



Materials and Methods

Experiment 3 and 4

Effect of different proportion of UD sludge on prepupae



Harvesting, drying and nutrient analysis



Killed by
immersing
in boiled
water

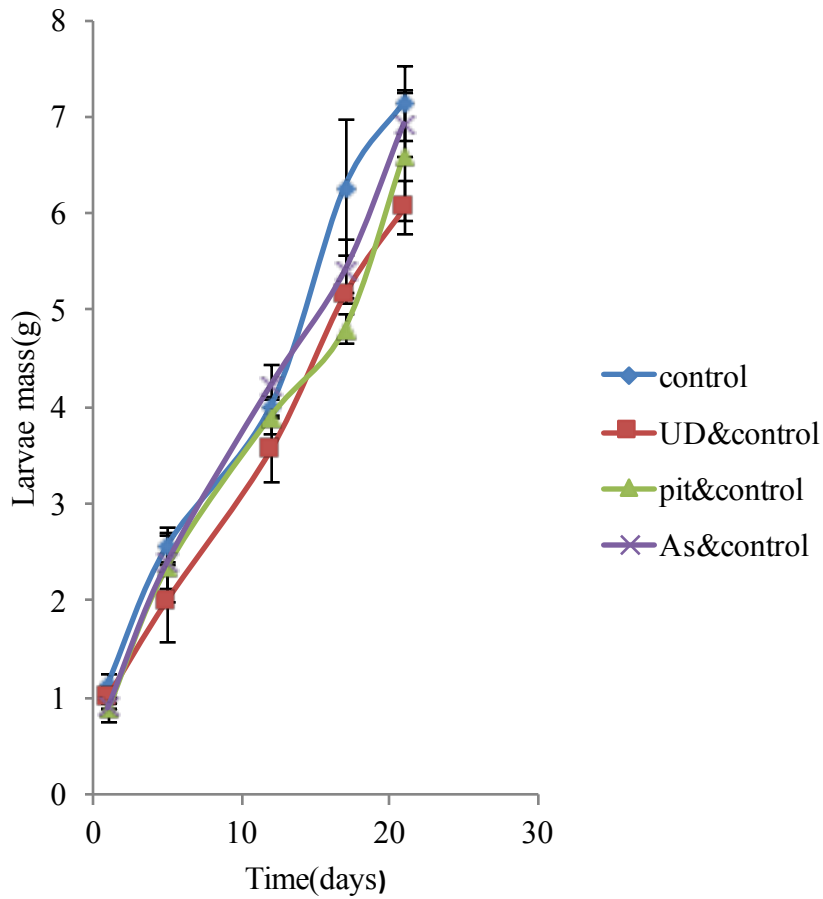
Dried in
oven @80°C
for 72hours

Protein
analysis

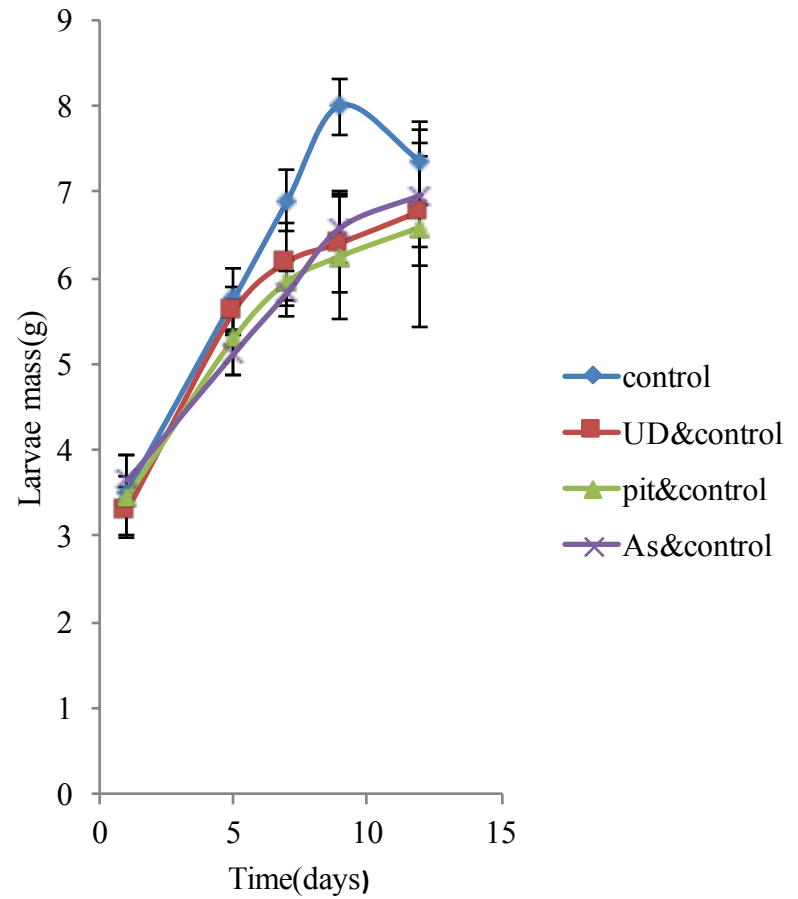
Lipid
analysis

Results

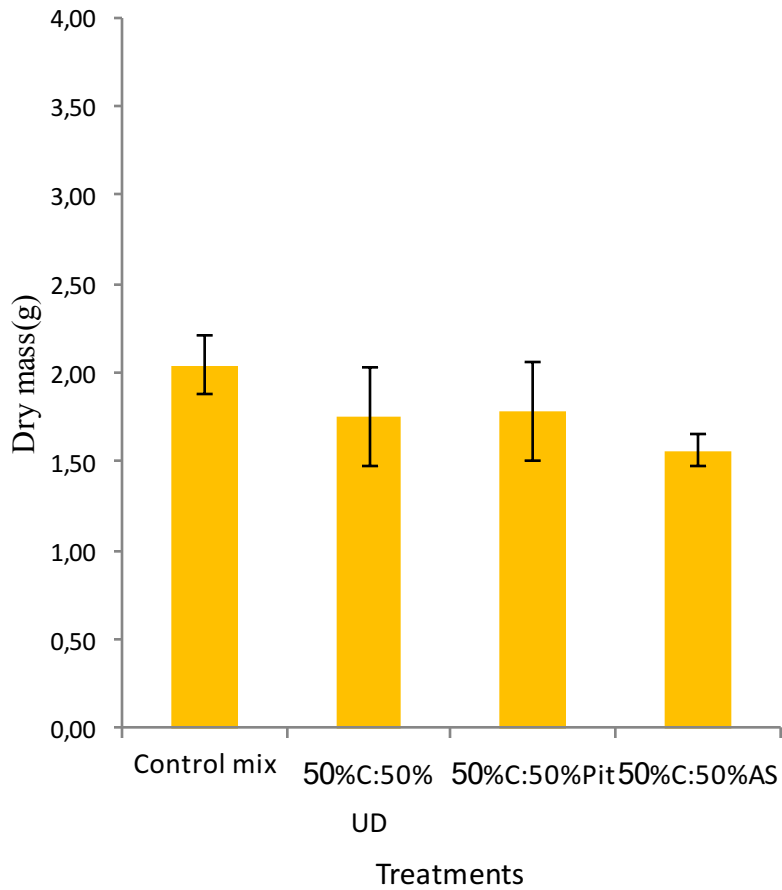
Experiment 1



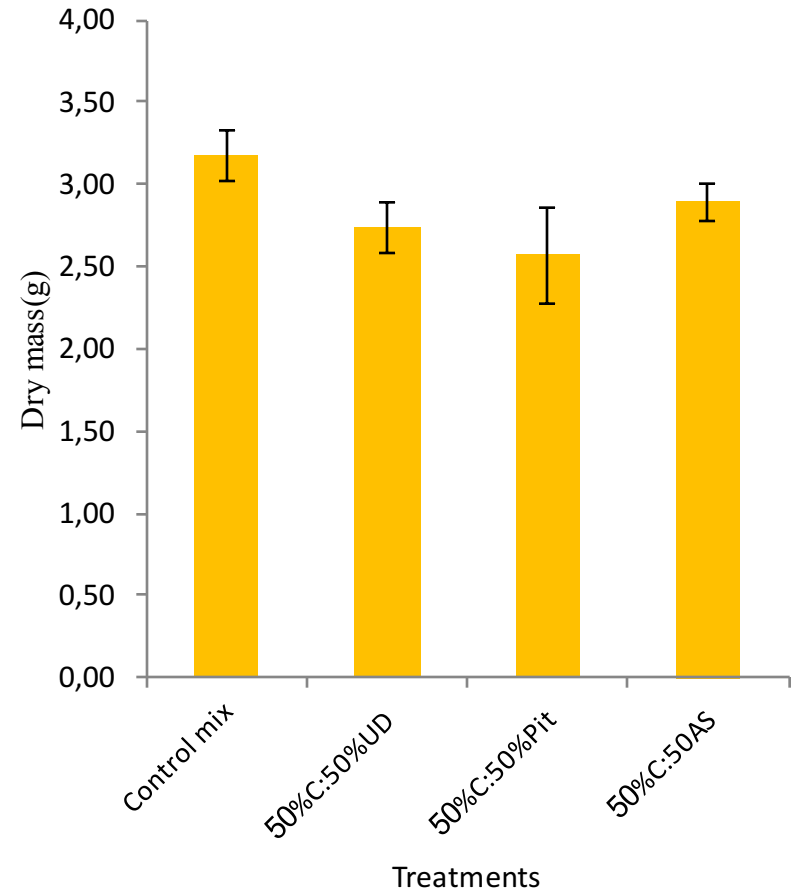
Experiment 2



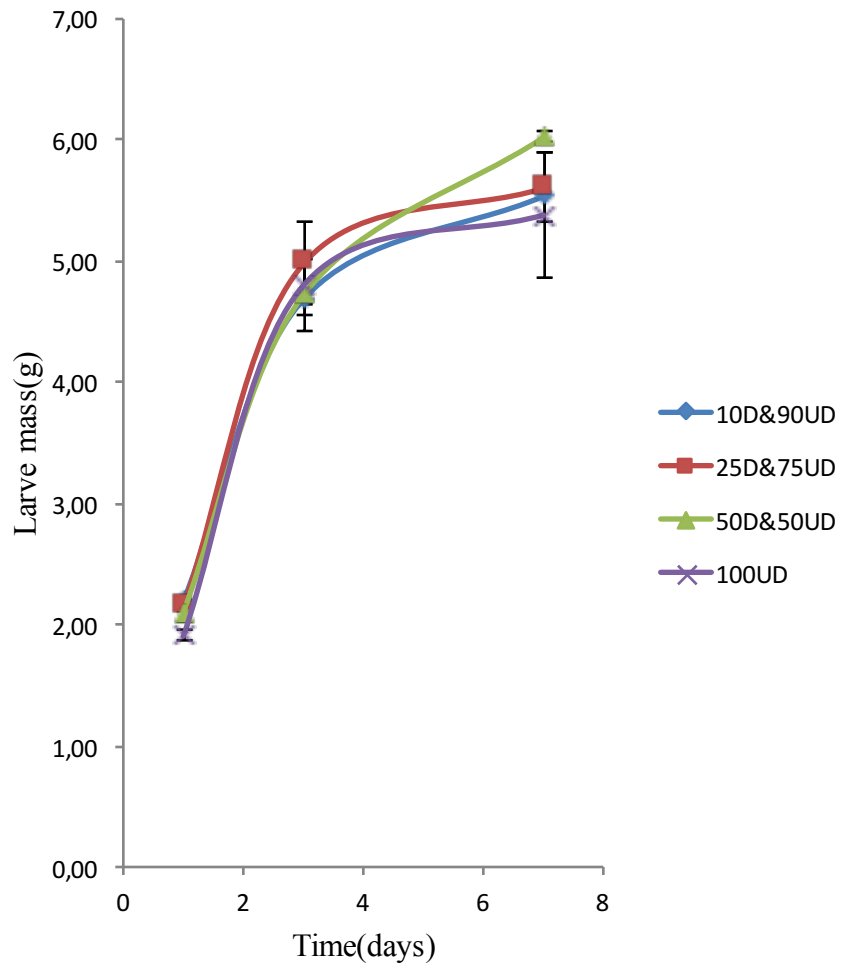
Experiment 1



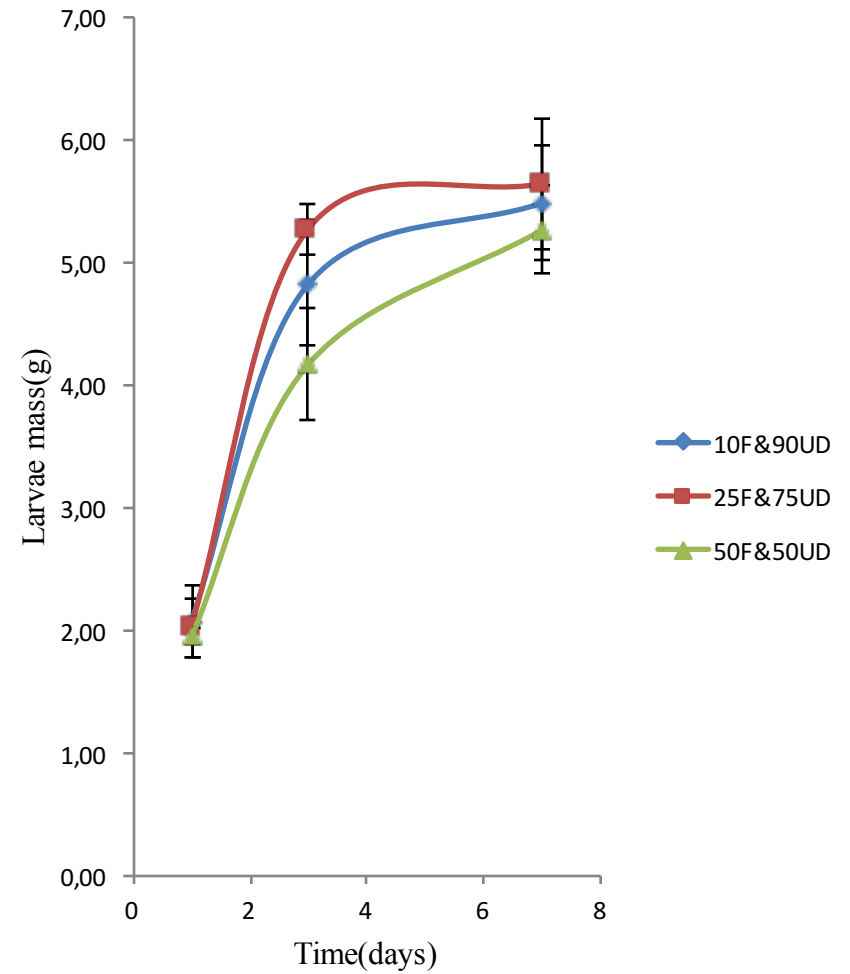
Experiment 2



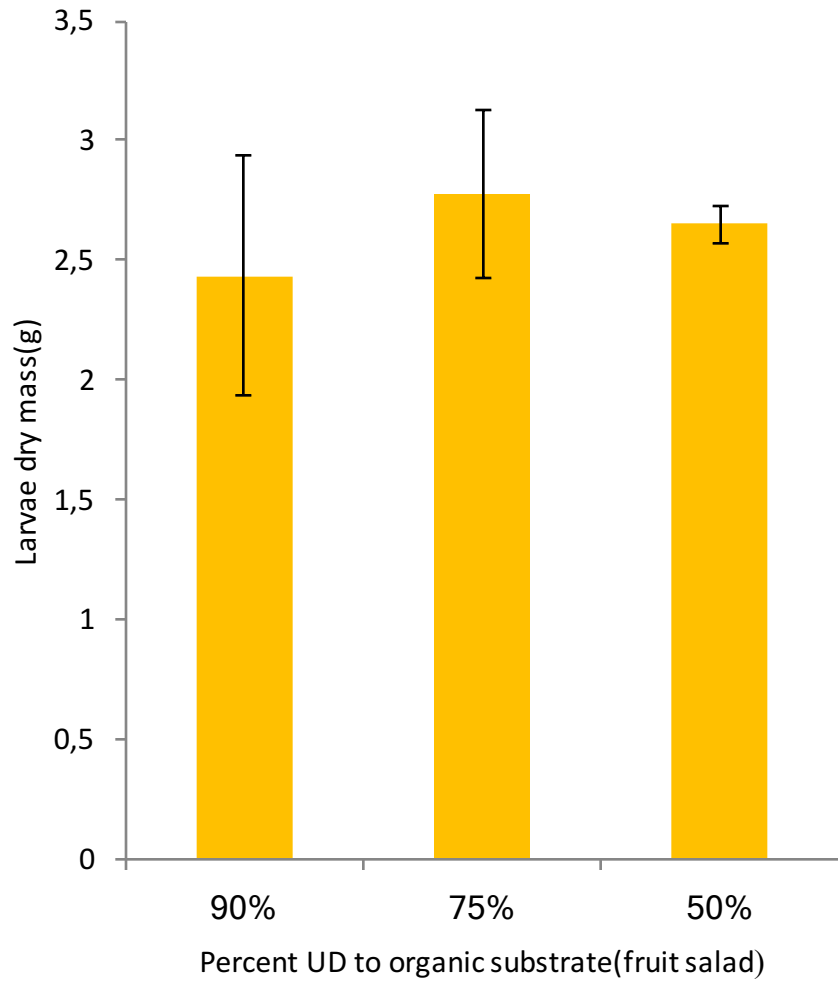
Experiment 3



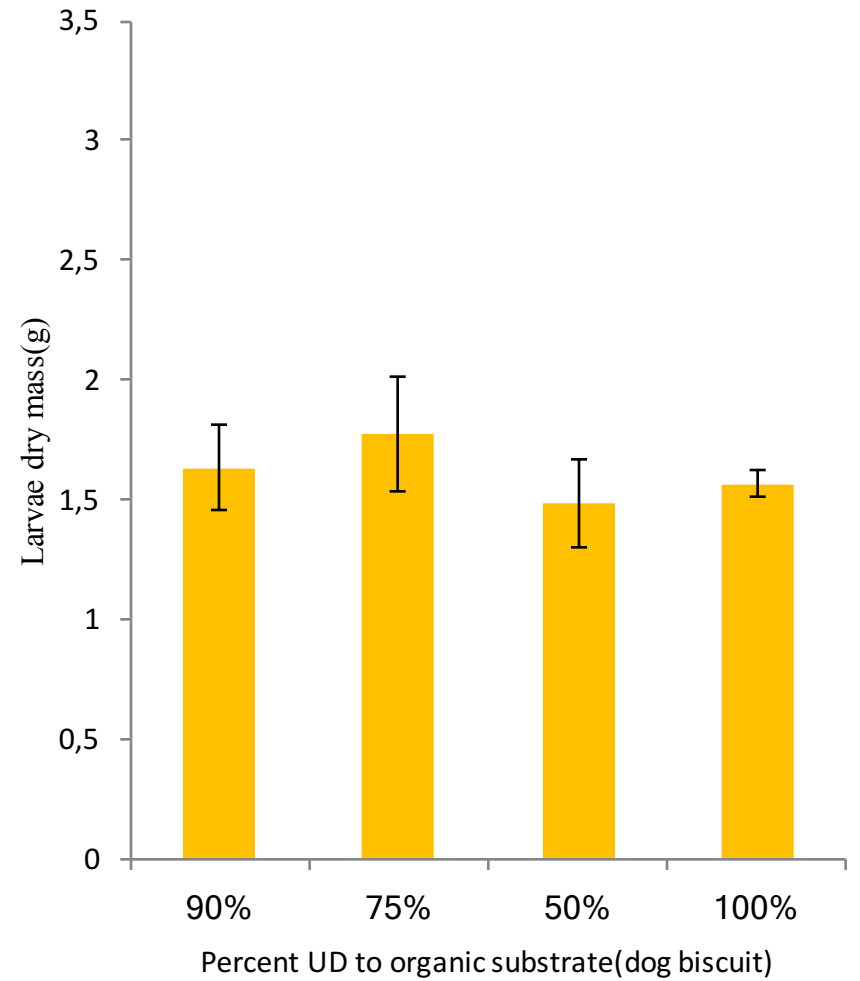
Experiment 4



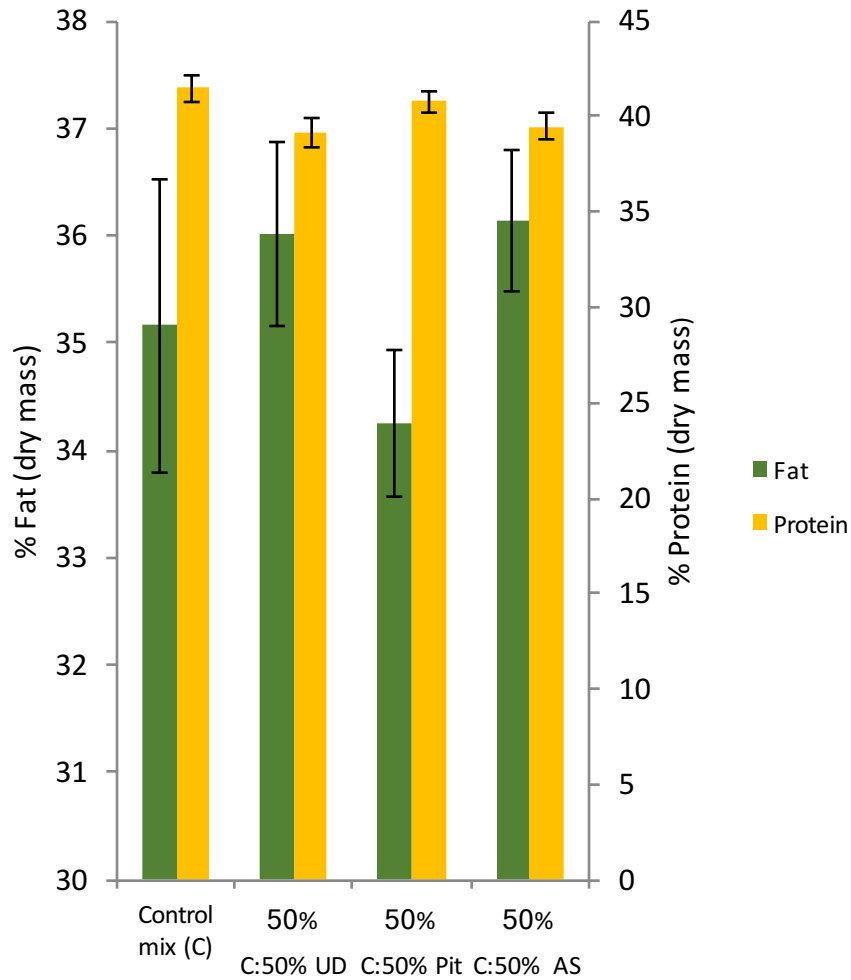
Experiment 3



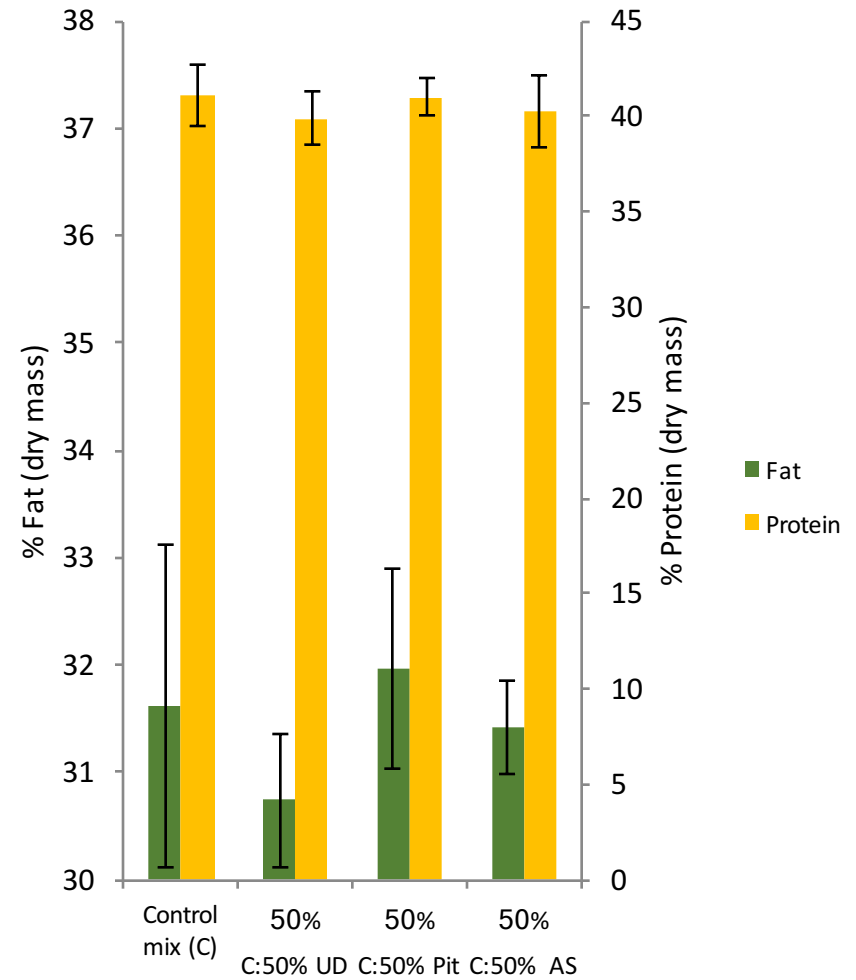
Experiment 4



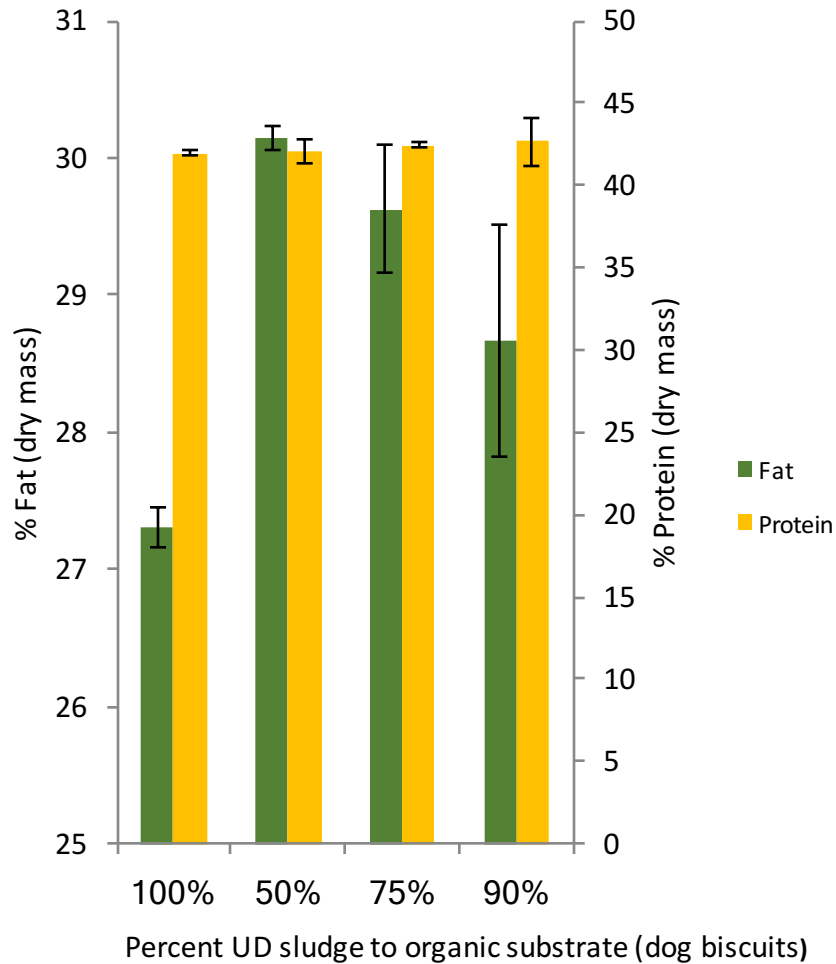
Experiment 1



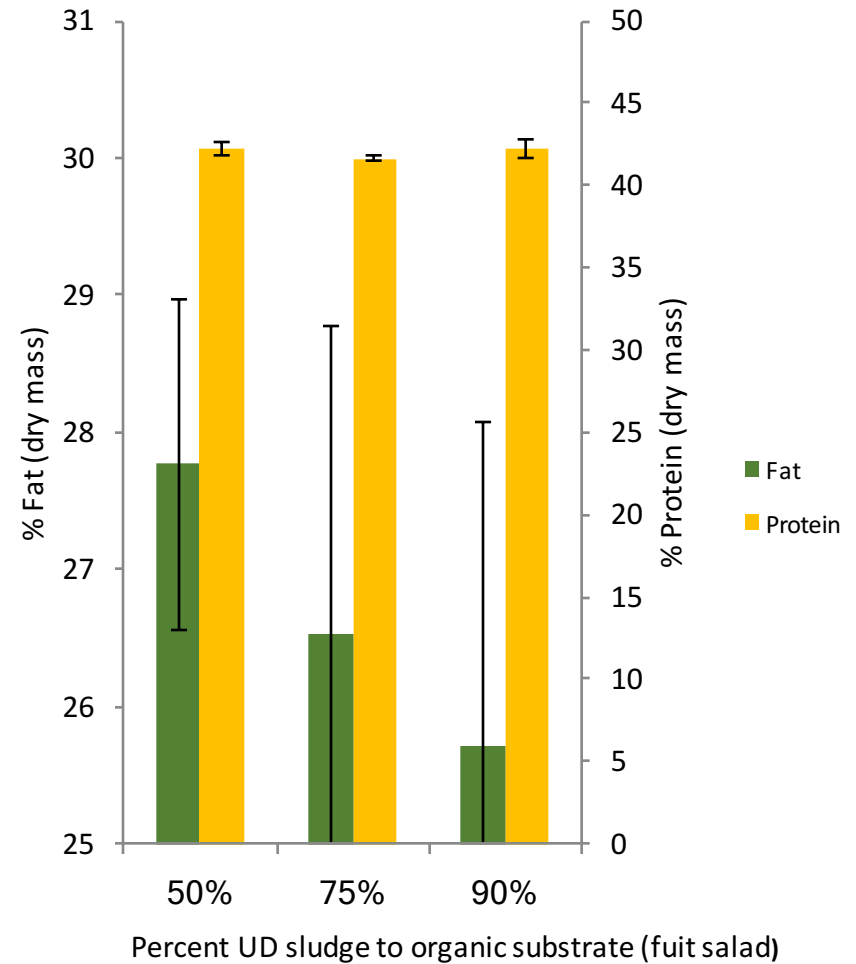
Experiment 2



Experiment 3



Experiment 4



Findings and conclusion

- Larvae are resilient to high proportion of faecal sludge in feed.
- Flies fed best on readily biodegradable organic substrates (fruit salad and dog biscuit).
- Flies can biodegrade different types of faecal sludge (potential for treating sludge).
- Flies are an efficient way to dispose organic wastes, by converting them into a protein-rich and fat-rich biomass.

Thank you for listening

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Peter Barnard (Westville), BSFL breeder

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