Department of Agriculture, Crop Production & Rural Environment

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Progress towards utilizing the yellow mealworm as food, feed and beyond

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PRIMA
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CIPROMED
CIRCULAR AND INCLUSIVE UTILISATION OF ALTERNATIVE PROTEINS IN THE MEDITERRANEAN VALUE CHAINS

Background information…

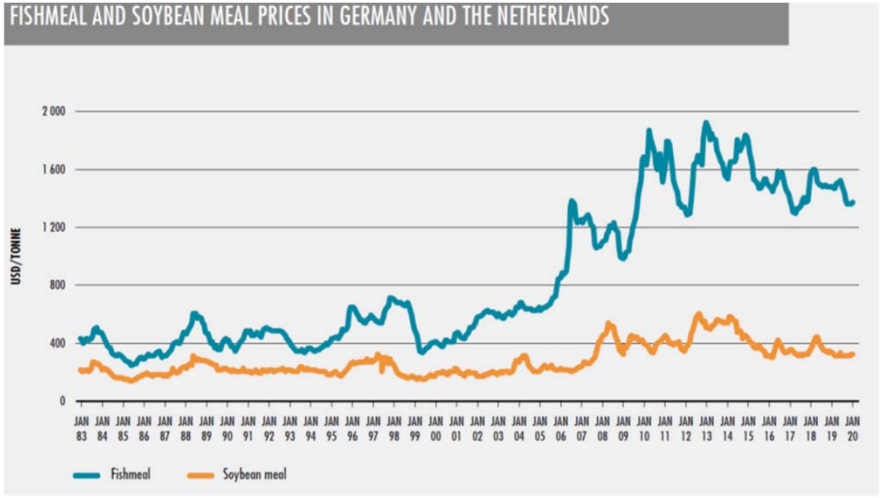
- Estimation of annual animal production: 2010-2050

- Animal production increase 2010-2050

Meat Type	2010 (Million Metric Tons)	2050 (Million Metric Tons)
Bovine	66.7	107.5
Poultry	98.9	201.9
Pigs	109.3	150.3
Aqua	59.9	113.7

Source: FAO

- Fishmeal and soya meal price increase!



Three milestone dates (1)

➢ July 2017: permission for the use of insect proteins as fish feed (EU Regulation 2017/893)

- *Hermetia illucens* (Black soldier fly)
- *Musca domestica* (Housefly)
- *Tenebrio molitor* (Yellow mealworm)
- *Alphitobius diaperinus* (Lesser mealworm)
- *Acheta domesticus* (House cricket)
- *Gryllodes sigillatus* (Banded cricket)
- *Gryllus assimilis* (Field Cricket)
- *Bumyx mori* (wax moth, 2022)

Three milestone dates (2)

➢ August 2021: Approval of insects in poultry and pig feeds in EU (EU regulation 1372/2021)

- *Hermetia illucens* (Black soldier fly)
- *Musca domestica* (Housefly)
- *Tenebrio molitor* (Yellow mealworm)
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Three milestone dates (3)

- May 2021: Approval of insects as food in EU (annexes of 2015/2283)

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Food safety
This article is more than 8 months old
Yellow mealworm safe for humans to eat, says EU food safety agency
Move paves way for high-protein maggot-like insect to be approved for consumption across Europe
Daniel Boffey in Brussels
Wed 13 Jan 2021 11.26 GMT
Yellow mealworm when dried is said to taste like peanuts. Photograph: François Lenoir/Reuters
Yellow mealworm finger foods, smoothies, biscuits, pasta and burgers could soon be mass produced across Europe after the insect became the first to be
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- *Tenebrio molitor* (Yellow mealworm)
- *Acheta domesticus* (House cricket)
- *Alphitobius diaperinus* (Lesser mealworm)
- *Locusta morgatoria* (Migratory locust)

Insect frass as biofertiliser (more than protein)

- November 2021: EU-wide insect frass standards adopted

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BACK

EU authorities' move to set up standards for insect frass hailed as a major step forward for the European insect sector

PUBLISHED ON 27/05/2021

SHARE ON :

Paris, May 26th, 2021 – On May 25th, Member States' delegates in the EU Standing Committee on Plants, Animals, Food and Feed have backed a draft Commission Implementing Regulation, aiming at setting EU baseline standards for the valorization of insect frass as fertilizer, as part of the EU legislation on animal byproducts.

Similar to compost or other types of animal manure, frass contains relevant nutrients and micronutrients, as well as chitin, which could stimulate the growth of beneficial bacteria in soil. These properties make frass a valuable solution for farmers active in crop production

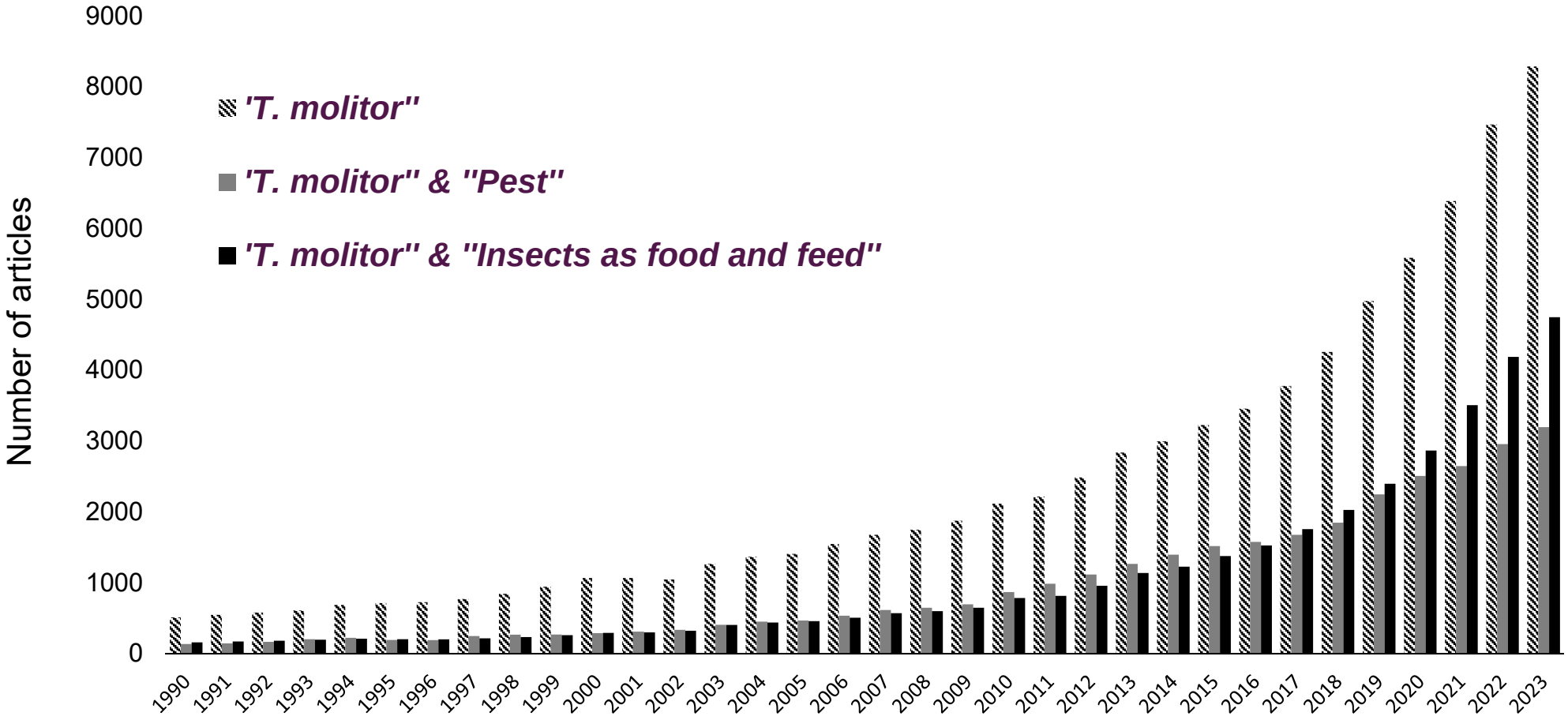
Heat treatment for

1 h at 70°C

Tenebrio molitor (yellow mealworm)

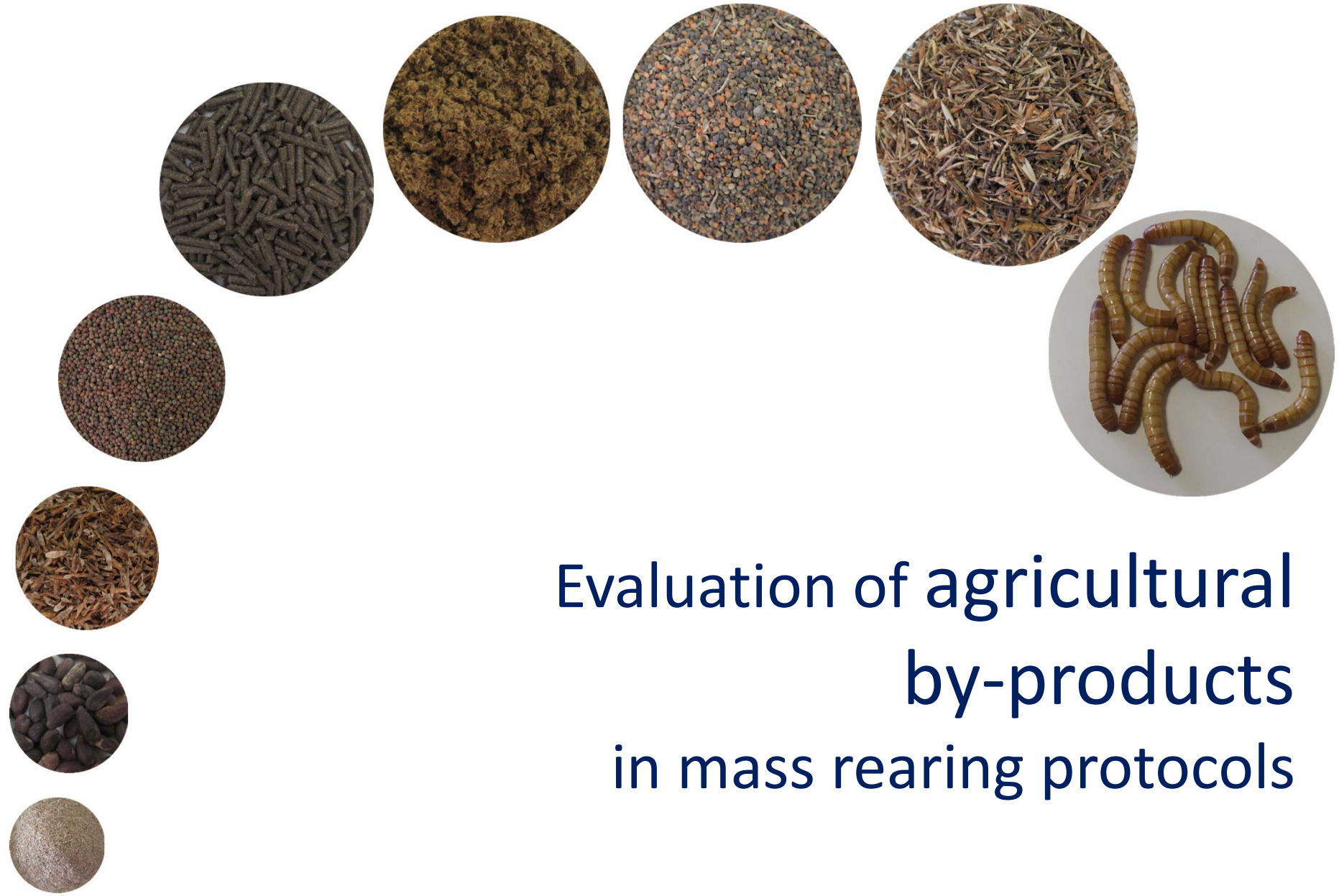
Number of published articles over the years matching the search for the following key words: "T. molitor", "T. molitor and Pests", "T. molitor and Insects as food and feed"

(Source: Google Scholar, 14 March 2024)



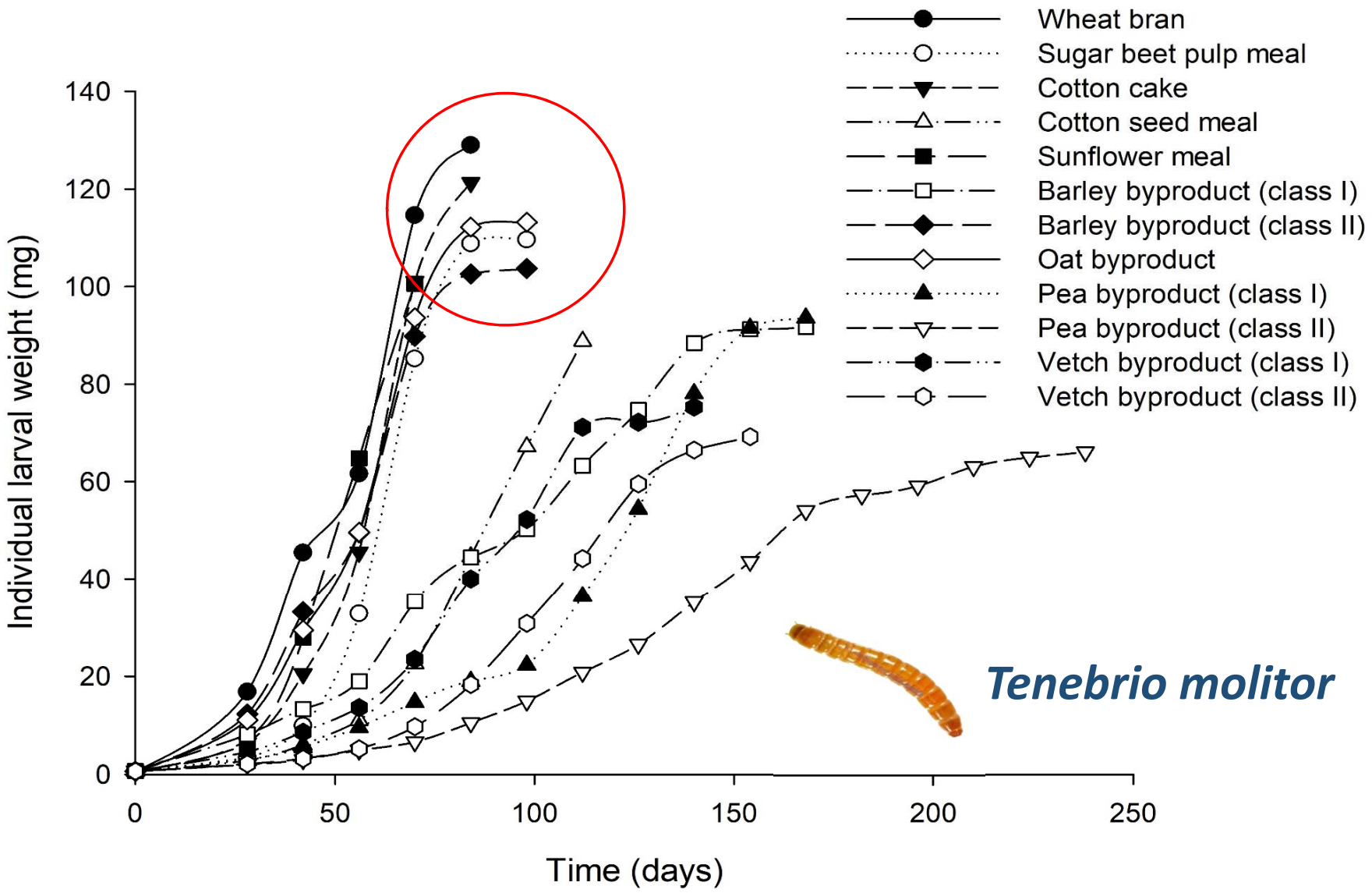
Mealworm facilities in UTH

Research priorities



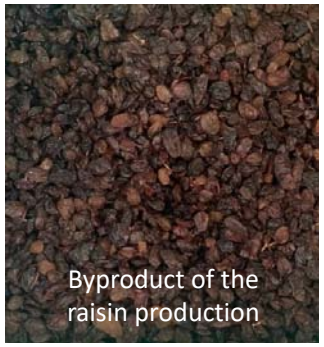
Evaluation of agricultural by-products in mass rearing protocols

Effect on larval growth - Greek Agricultural By-products



Source: Rumbos et al. (2022) *Journal of Insects as Food and Feed* 8: 9-22

Valorization of agricultural by-products as dry insect feed



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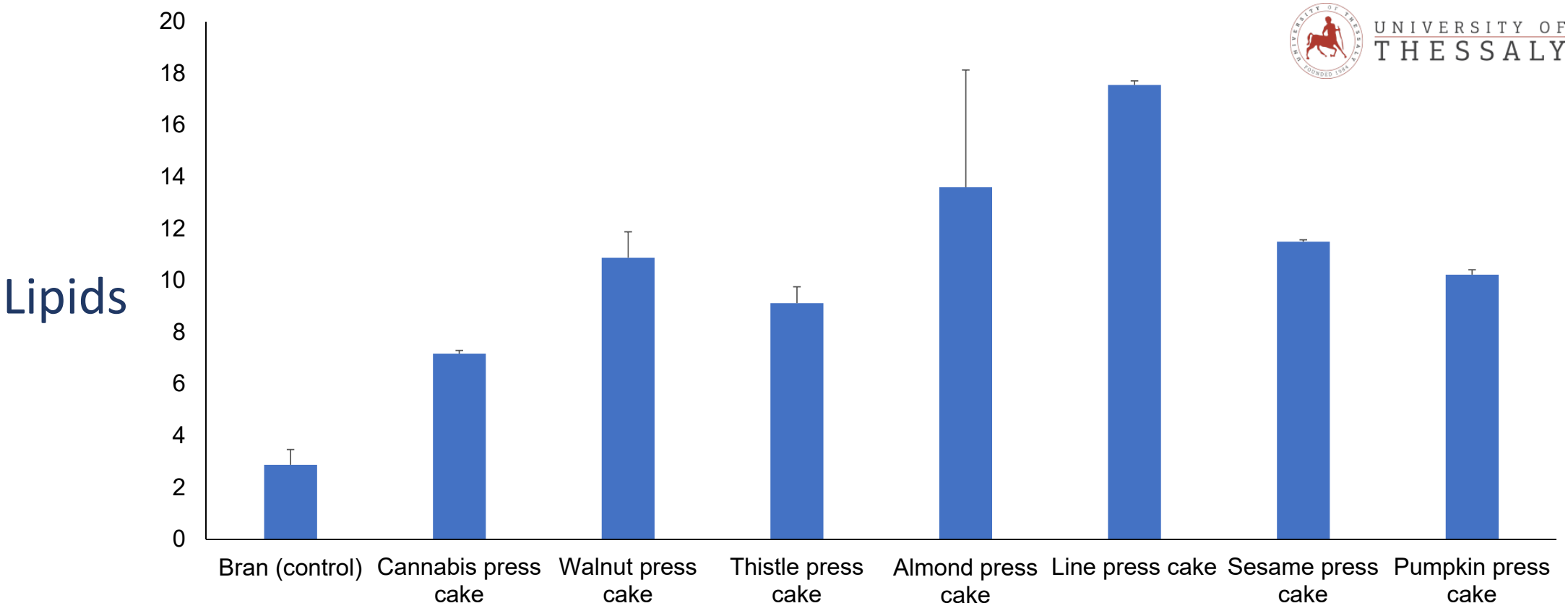
Valorization of agricultural by-products as dry insect feed



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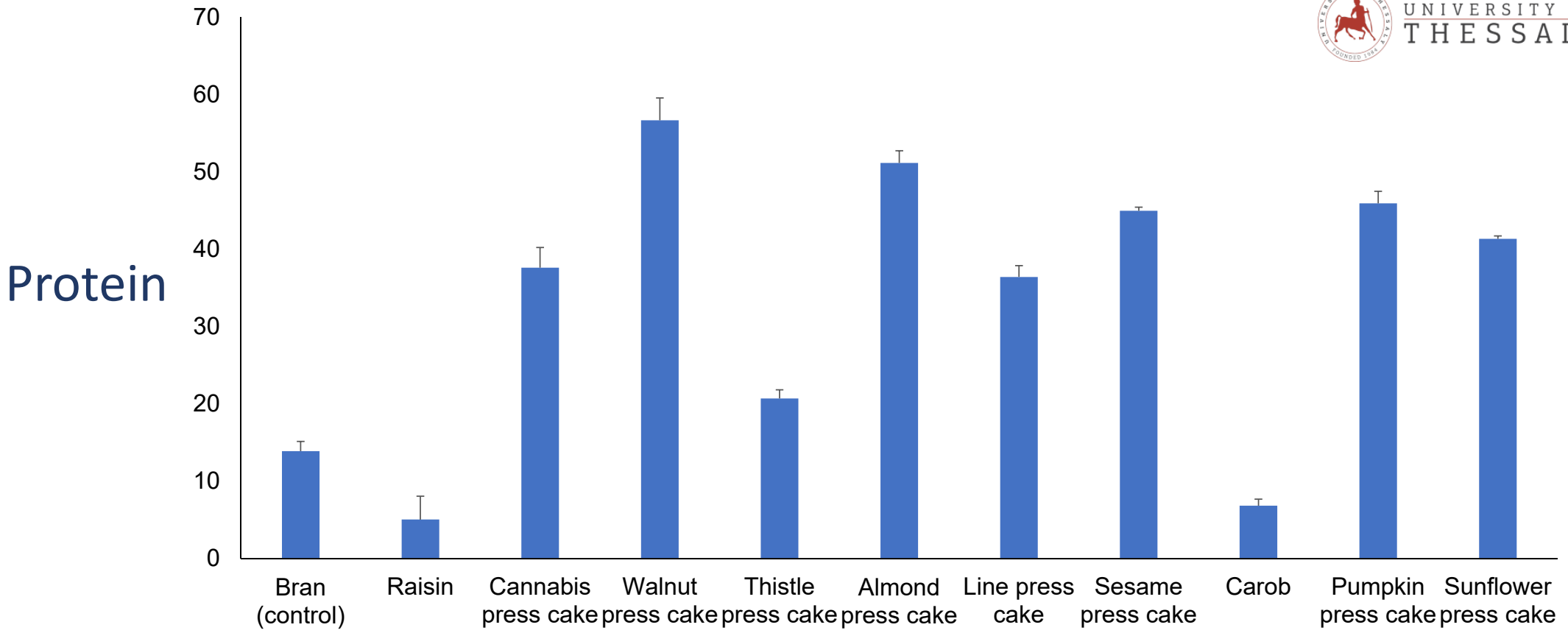

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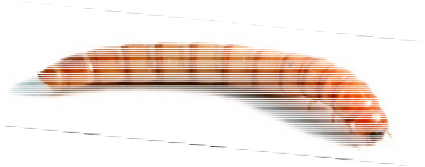


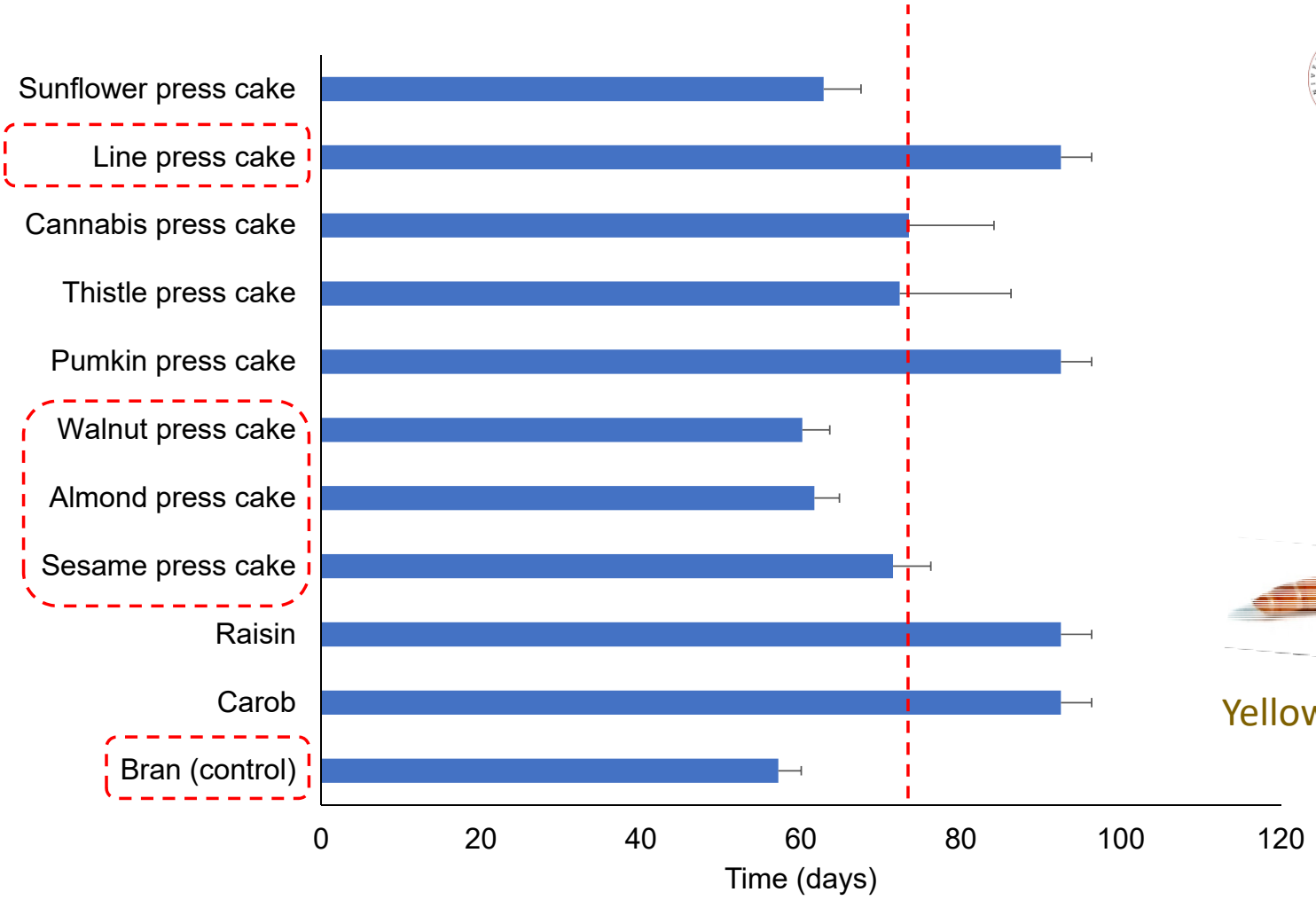
Yellow mealworm (YM)

Valorization of agricultural by-products as dry insect feed

Yellow mealworm (YM)

Valorization of agricultural by-products as dry insect feed

Development time



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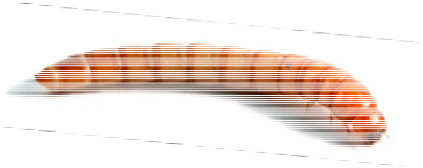

Yellow mealworm (YM)

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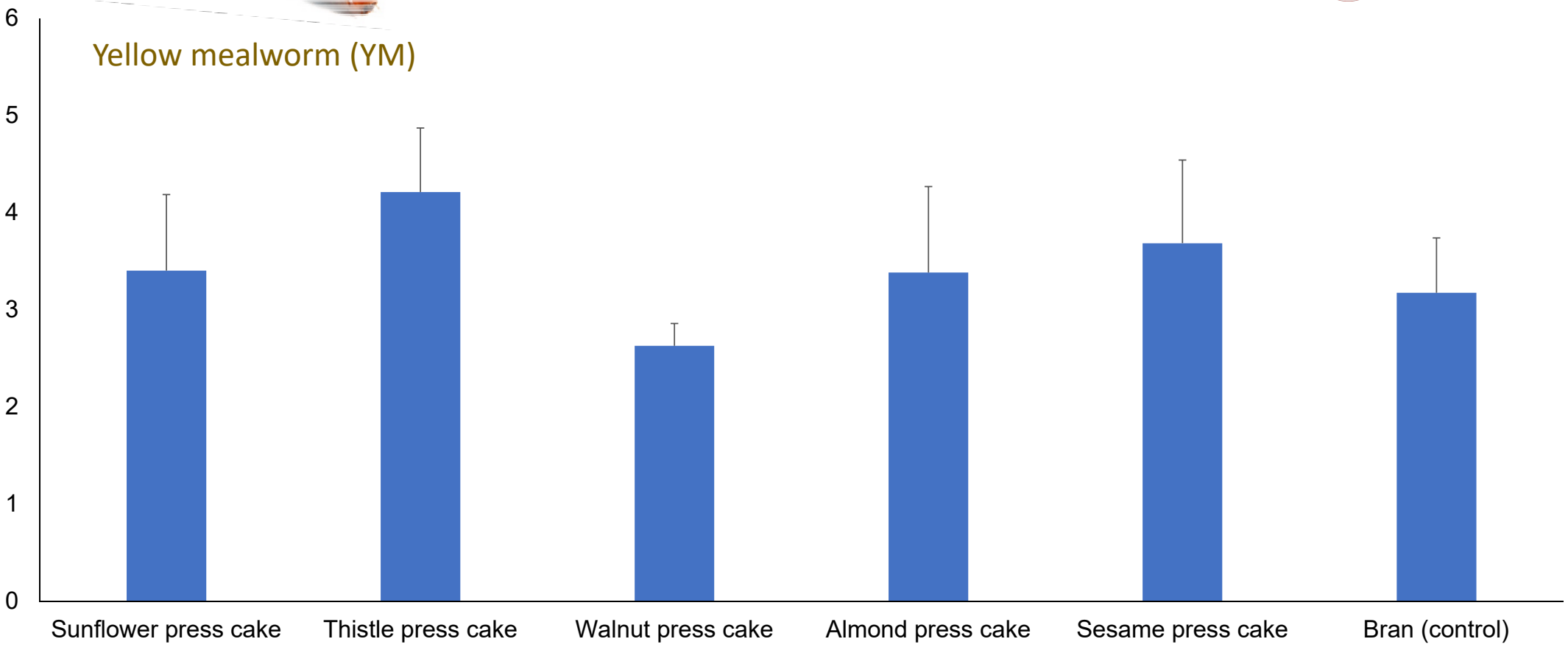
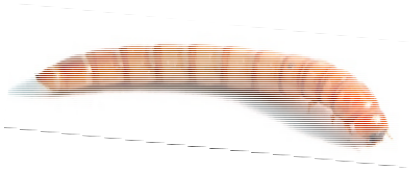


Valorization of agricultural by-products as wet insect feed

Whey valorization as wet feed

Treatments:

1. Water agar (control)
2. Acid whey agar
3. Sweet whey agar



Yellow mealworm (YM)

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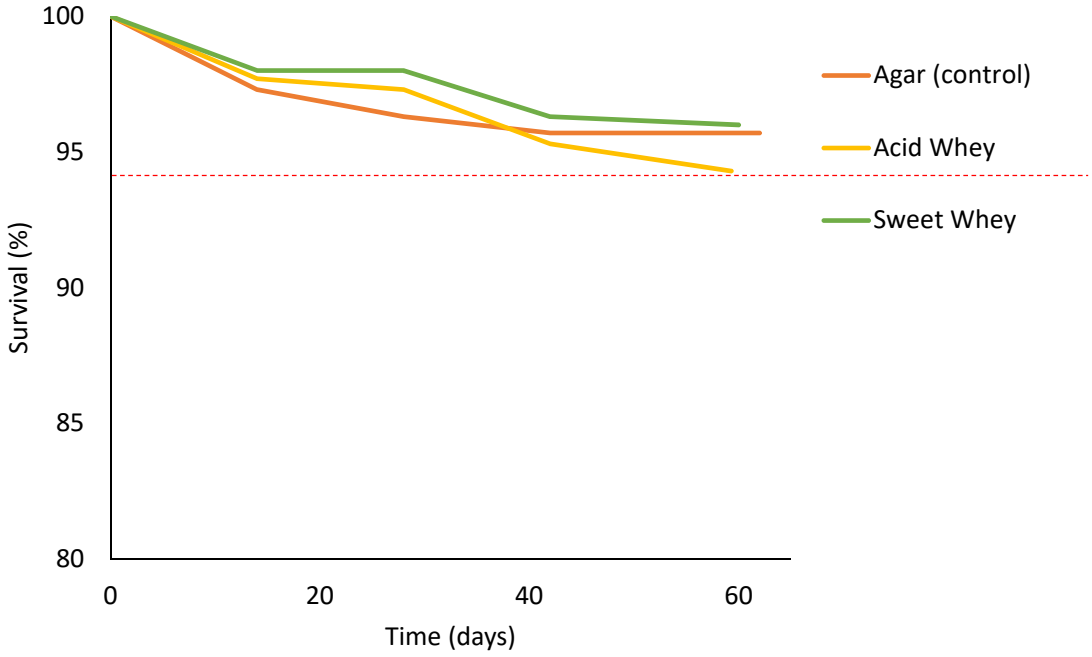
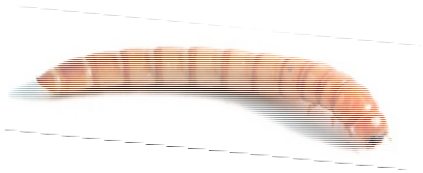
Valorization of agricultural by-products as wet insect feed





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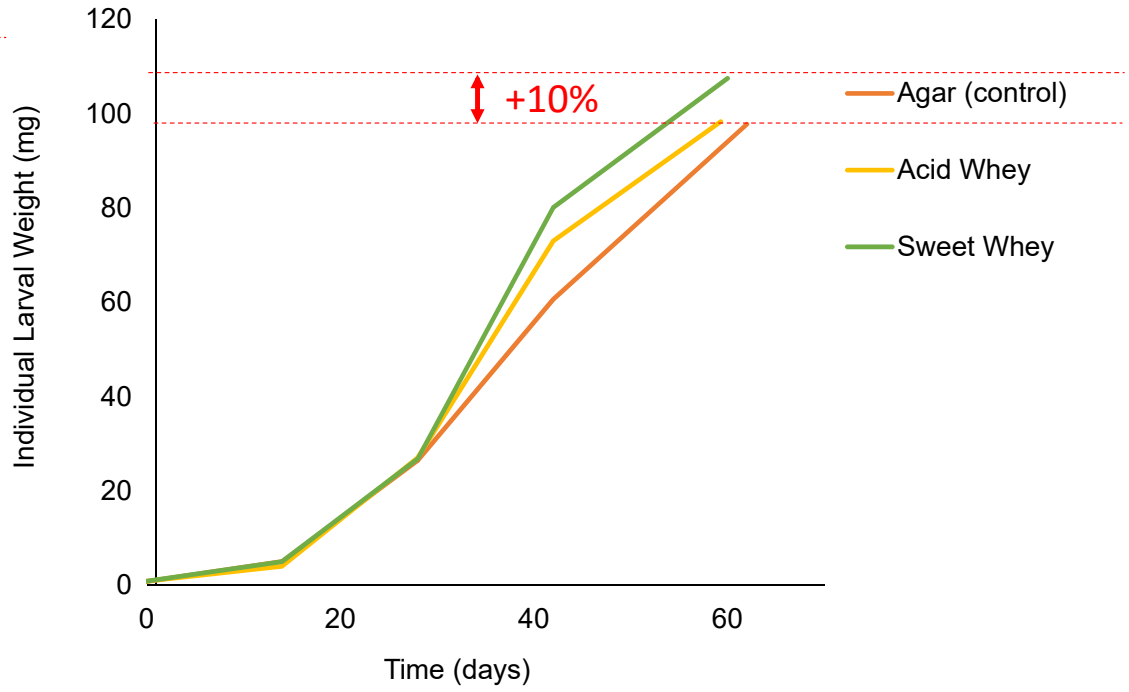

Valorization of agricultural by-products as wet insect feed

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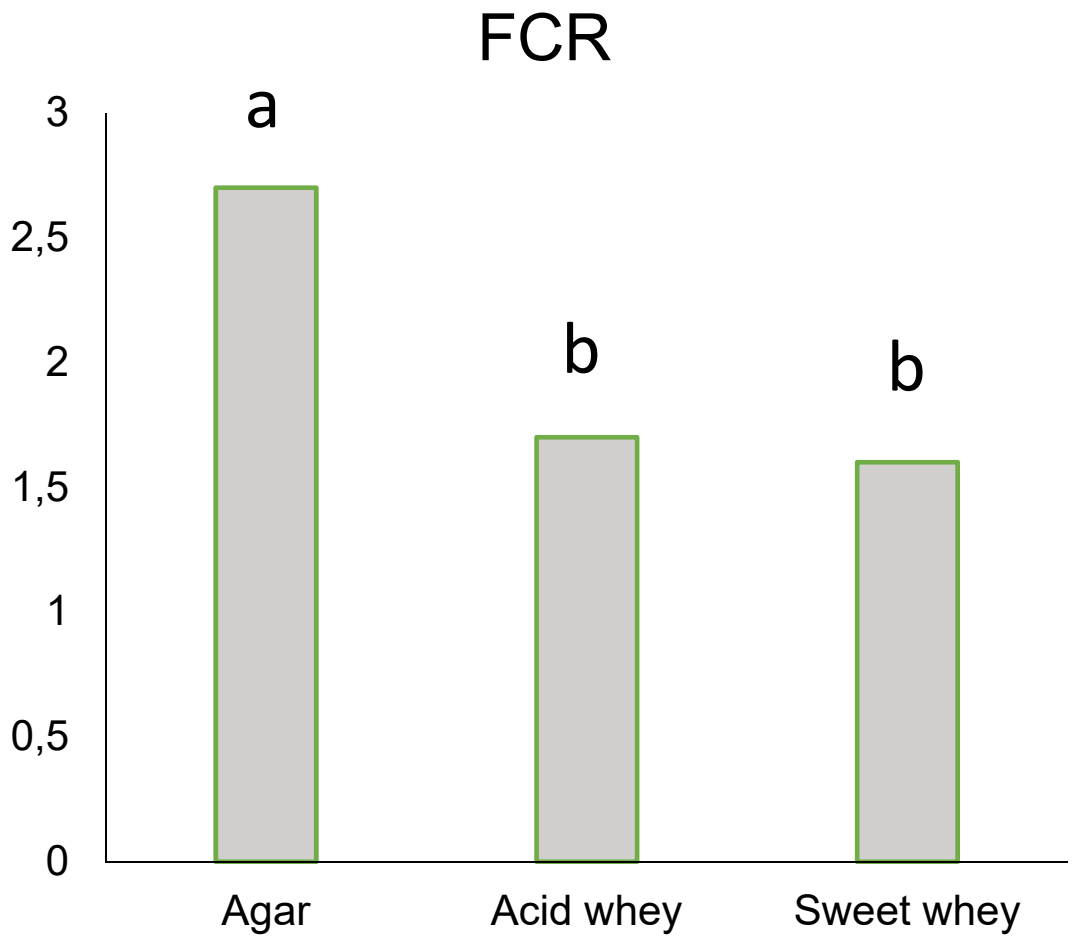
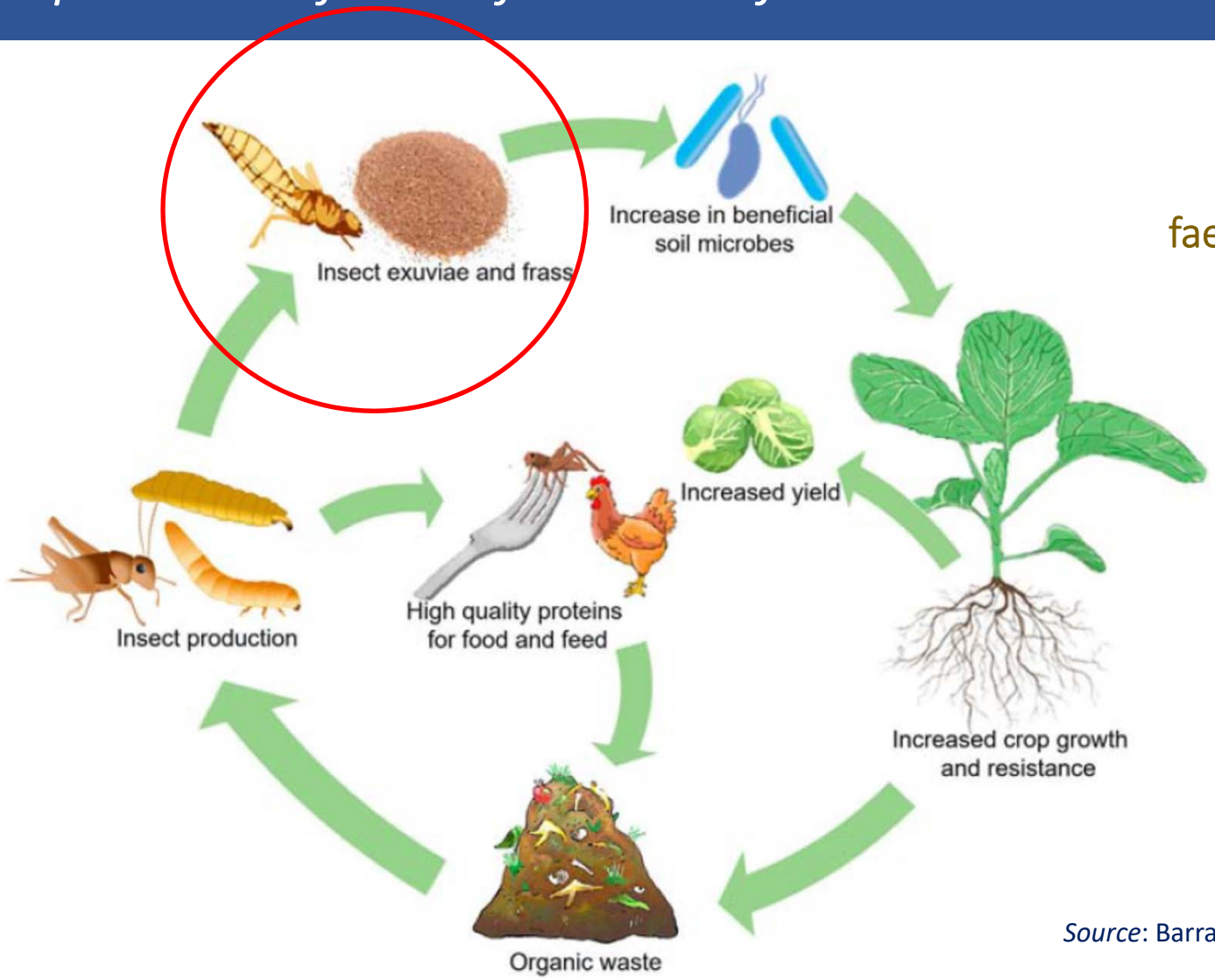


Research priorities

Insect frass… more than protein

Exploitation of insect frass as biofertiliser



the leftover of the insect rearing process that consists of **larvae faeces**, **exoskeletons** and **residues of the rearing substrate**

Source: Barragán-Fonseca et al. (2022) Trends in Plant Science 27: 7

YM frass as a soil amendment

***Tenebrio molitor* frass (FR)**: N=5%, P=2%, K=1,7%

Chicken manure (CM)

Pepper

- Two local Greek varieties: *Florinis*, *Bahovitiki*
- Typical requirements: N = up to 15 kg/ha; P = up to 10 kg/ha (as P_2O_5); K = up to 15-20 kg/kg (as K_2O)