A novel protein source: Maggot meal from *Hermetia illucens*

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I Introduction

Protein quality plays crucial role in animal nutrition

Fishmeal: expensive and ecologically questionable

EC regulation 1069/2009 will replace (EC) 1774/2002 in March 2011

- Art. 10 l) classifies terrestrial and aquatic invertebrae as material of Category 3
- Art. 14 d) i) allows the use of Category 3 material suitable for livestock feed production

II Objective

Maggots of the Black Soldier Fly (*Hermetia illucens*) were reported to have a favourable amino acid pattern

Maggot meal should be tested for its use as a protein source in broilers

3 different degrees of mechanical de-fattening were applied

III Materials & Methods

Birds & Housing

810 male Ross broiler chickens

pen size ~1 m²

Pelleted feed, nipple drinkers

Hermetia meal production

Maggots grown on vegetable residues, by-products …

Maggot harvest

Freezing and re-thawing

Mechanical press to remove moisture and fat

Drying at 60°C

Hermetia meal characteristics

g/kg DM

340-410 Crude Fat

(11% Linoleic acid)

380-410 Crude Protein

21 Lysine

7 Methionine

10 Met+Cys

14 Thr

Starter

Calculated to meet recommendations; 15 birds per pen

Negative Control: all-vegetable diet (Veggie)

Positive Control: 30 g/kg fishmeal (FM)

Test diets: Hermetia meal containing 37, 22 or 15% crude fat supplemented to contribute the same amount of protein as the fishmeal

Hermetia diets accounted for lower Lys+Met levels by supplementation of free amino acids

Grower

Calculated to meet recommendations; 10 birds per pen

Negative Control: all-vegetable diet (Veggie)

Test diet: Hermetia meal 22% crude fat at 50g/kg

IV Results & Discussion

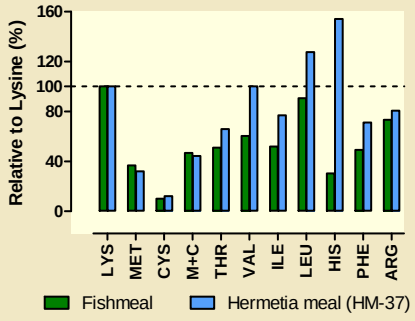

Figure 1: Amino acid pattern of fishmeal and unprocessed Hermetia meal

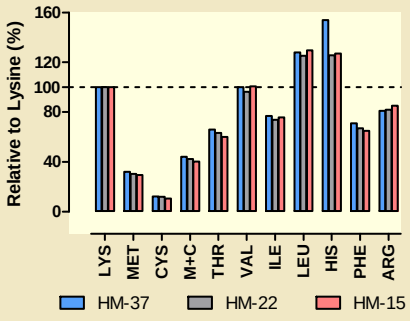

Figure 2: Amino acid pattern Hermetia meal de-fatted to varying levels of residual fat

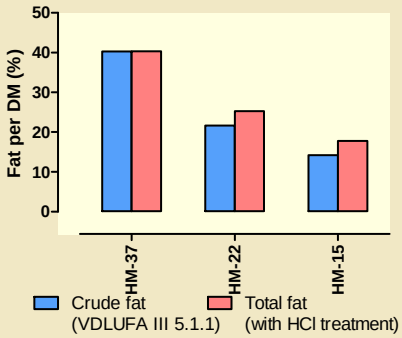

Figure 3: Crude fat and total fat content of Hermetia meal de-fatted to varying degrees

Table 1: Results of broiler performance in Starter and Grower periods

Diet	BW day 10 g	FC g/d	FCR feed/gain	Losses %	EEF days 1-10
Starter					
All vegetable	281$^{(a)b}$	25.9^{b}	1.080	1.1	220^{ab}
Fishmeal	285^{b}	26.4^{b}	1.079	0.7	227$^{(a)b}$
Hermetia meal 37	286^{b}	26.4^{b}	1.073	1.3	227$^{(a)b}$
Hermetia meal 22	274^{ab}	25.3^{ab}	1.082	1.7	213^{ab}
Hermetia meal 15	267^{a}	24.5^{a}	1.080	2.0	207^{a}
	BW day 24 g	**FC g/d**	**FCR feed/gain**	**Losses %**	**EEF days 11-24**
Grower					
All vegetable	1267	103.7	1.475$^{(a)}$	5.6$^{(b)}$	450
Hermetia meal 22	1257	104.0	1.493$^{(b)}$	3.0$^{(a)}$	454

Starter period

Fulfat Hermetia meal yielded similar performance as Fishmeal

De-fattening of Hermetia meal caused decrease of performance

Grower period

All-vegetable diet had better FCR than partly de-fatted Hermetia meal diet

Overall performance (based upon EEF) was similar due to reduced losses in 'Hermetia meal 22' diet

Reasons for degrading performance with increasing level of de-fattening of Hermetia meal?

- Nutrient encapsulation by chitin structure (Figure 3) ?

In Grower period, partly de-fatted Hermetia meal was used. Fulfat Hermetia meal might have improved performance similarly to the Starter period.

V Conclusions

Hermetia meal is a source of protein for broilers. It shows potential to yield similar performances as fishmeal.

Further studies are necessary to determine nutritional value (also for other species), restrictions of use and reasons for decreased performance after mechanical de-fattening.

This poster was first presented at the 11th Symposium on Pig and Poultry Nutrition in Wittenberg, Germany, in November 2010.