Q&A from the webinar attendees

"Insects for animals: Safely feeding their health"

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1. How about amino acids and a digestibility for poultry?

Answer: It varies from 42 to 91%, depend on the amino acid. Here you can see the scientific reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5465574/

2. How we can design a small commercial insect meal manufacturing plant?

Answer: Many production models exist. You may find some good ideas on google scholar looking for crickets and black soldier fly, the species with most references currently.

3. How large is the risk of ammonia production during rearing BSFL?

Answer: BSFL production leads to ammonia emissions. The quantity of ammonia produced is substrate-dependant. Substrate with high protein contents will induce higher ammonia emissions. Good ventilation is highly recommended in mass-rearing BSF system

4. Can you maybe suggest air-exchange intensity (like 2-3 or more times per hour) for average rearing conditions?

Answer: It may have to be adapted / designed according to your production scale

5. What is the economics of feeding live larvae in broiler diets?

Answer: It will highly depend on how much you can buy the fresh live larvae. If you are close to a reliable producer, will be more feasible.

6. Thank you for this interesting webinar, we can use BSF larvae meal in rabbit nutrition?

Answer: Yes, sure. There is also very interesting publications with the use of BSF oil in rabbit nutrition: https://www.sciencedirect.com/science/article/pii/S0309174017315905

7. How do you process the live BSF larvae into dry powder form?

Answer: The BSFL is washed and dried using industrial equipment. After that they were crushed using a mechanical press, which also can separate the oil from the dry powder meal.

8. Could you recommend any industrial equipment to dry and crush the maggot? Thanks

Answer: There is a large choice of drier available for insects processing such as microwave, static ovens, spray driers (will include crushing prior drying), fluid-bed driers, belt drier, disc drier, etc... For crushing, any hammer mill or grinder will do the job once dry.

9. Would love to know the substitute potential of BSF in the poultry and aquaculture industry to complement existing meals. A few different numbers were presented in the webinar and would like to know if there was a general substitution ratio. Thank you!

Answer: There is no general substitution ratio. Many reviews are summarizing different applications at different ratios such as in the following paper: https://www.researchgate.net/publication/343670285_Rethinking_organic_wastes_bioconversion_Evaluating_the_potential_of_the_black_soldier_fly_Hermetia_illucens_L_Diptera_Stratiomyidae_BSF

10. Are there certain types of genotypes of BSF more nutritious than others? Which genes or markers are used for trait analysis?

Answer: We are looking forward to publications on that regard as we understand this is a work in progress. Current genotypes identified are matched with other phenotypic traits such as hatching rate or pupae weight as recently highlighted in the following paper with specific market used: https://onlinelibrary.wiley.com/doi/abs/10.1111/age.12961

11. What is the effect of chitin in fish feed?

Answer: It is mostly related to its dietary level of inclusion; when included at low levels, chitin might act as prebiotic, immuno-stimulant and anti-inflammatory molecule in fish, while if included at high doses it might reduce fish growth.

12. Can you use the live BSF larvae in aquaculture?

Answer: Yes. But it should be used only as a complement feed as it does not cover all the nutritional requirements of the fish.

13. What about as feed for crawfish? does it require other supplements?

Answer: Yes, any farmed animal required a balance diet to support the best performance. Thus, it's not advised to feed only BSF larvae or meal

14. Looks like BSFL is a very promising alternate for traditional feed supplements in animal feed. Can we expect some support, both technical and financial, from AFFIA in setting up manufacturing and processing units in India?

Answer: AFFIA is a non-commercial association, which is a collaborative plattform gathering the research and the industry. AFFIA doesn’t provide direct financial or technical support but join forces in order to represent the interests of the insect sector, and aim at addressing common issues such as standards, regulatory framework etc.

15. Can you please suggest a reliable source for the procurement of BSF mating pairs for rearing pathogen-free and nutrient-rich strains?

Answer: It is advisable to work with locally established colonies in regions where the insects are endemic.

16. Are there any general rules on how much chitin inclusion suitable for feed?

Answer: No general rule: depends on chitin quality parameters and species consuming it.

17. What are the general genera of entomopathogen (bacteria/fungus/virus, if there is any) that is normally found to be infesting BSF colonies in an industry facility?

Answer: No disease was yet reported in any BSF commercial facility. Some recent studies have started to challenge BSF larvae and adults with pathogens (see Lecocq publications). It seems that adults are susceptible to infection by fungi.

18. Is there any quality control step (or diagnostic tool) that is used to closely monitor the overall health of insect colony, in term of pathogen burden?

Answer: Some researchers and veterinarians are trying to build up a "service center" for diagnosis of insect pathogens, other microorganisms and non-infectious diseases in production facilities of insects for food and feed (project "INSECTPATH"). You may contact them for further information.

- University of Copenhagen, Denmark. Contact Professor Jørgen Eilenberg; jei@plen.ku.dk.
- Wageningen University and Research, Laboratory of Virology, the Netherlands. Contact Professor Monique van Oers; monique.vanoers@wur.nl.

19. If the BSFL eats canteen/cafe/restaurant waste, will it still be suitable to feed to animals? poultry/swine/aqua etc.

Answer 1: Follow up from the question, for sure the bacteria/virus will stick to the worm's body (I assume), but will the bacteria survive when the worm is dried/processed using microwave?

Answer 2: BSF industry that produces feedstuffs is considered animal farming. So, it is not allowed to use human post-consumption food waste. We still don't know the likely role on spread zoonosis. This industry uses high temperature (oven or microwave), but we cannot use the post consumption waste to feed the larvae.

20. Will the titles of the papers cited be shared?

Answer: If you make a research on Google scholar, with the name and the year of publication, you will find what you are looking for.

21. Does insect consumption change status of health (both animals and humans)?

Answer: Several publications with animal trials report immunostimulant effects from the consumption of insect-based products: one may consider as such the protection of the animal from diseases it could have been susceptible to without insect product consumption

22. The regulation in Thailand allow or not to use insect meal as ingredient in animal feed mill or pet food?

Answer: The use as ingredient shall be possible but the placement on the market as finished feed is subject to authorization i.e., product registration and approval

23. thanks for nice presentation, I want to ask about insect for feed ruminant. can you explain about prior in ruminant, please? would this insect supplementation cause prior (bovine spongiform encephalopathy)?

Answer: This is not well studied yet.

24. What are the substrates/feed allow in Asia? I'm from Europe.

Answer 1: The same as in Europe. We follow European Regulations, since we export for that market.

Answer 2: There is no regulation in Asia about the substrates that may be used for BSF.

25. What is name of company can make the machine and equipment for rearing and processing?

Answer: You can find online few companies that are willing to sell you a technology for rearing insects.