# Development of a risk assessment method for biological hazards in the insect production process in Europe

## Application to two farmed species and three consuming targets

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## Background

- Recent publication of a guide on good hygiene practices (IPIFF, 2019) where the applicable EU regulations for larvae production as food and feed are mentionned.
- Is the list of microbiological hazards to be controlled in feed and food in accordance with the current scientific knowledge on insects production?


## Aims

1. Development of a risk assessment method for biological hazards in the insect production process in Europe
2. Application to ***Hermetia illucens*** and ***Tenebrio molitor*** **larvae** as feed (for poultry of fish) or food (humans)

## 1. Risk assessment method

- Based on the *Codex alimentarius* method

Biological hazard identification → List of hazards to assess

Exposure assessment during the process

Hazard characterisation towards consummer health


- **Equation for criteria aggregation:** $((1 + 2 + (3 \times 4)) \times (5 + 6)) \times (7 \times 8)$ → Estimated risk / hazard

## 2. Applications

- Few quantitative data available => qualitative approach : qualitative 4-levels scoring scales for the 8 criteria, qualitative aggregating matrices
- Data from literature, experts opinion and farm visits (Pays de la Loire Région, Western France)

### Feed


| Estimated Risk | *Hermetia illucens* | *Tenebrio molitor* |
|---|---|---|
| ***Hazard with the highest risk*** | *Clostridium botulinum* | |
| ***Hazards with a moderate risk*** | *Clostridium perfringens*<br>Duck herpesvirus 1<br>Infectious bursal disease virus<br>Newcastle virus<br>*Salmonella enteritica* | |

No biological hazards

### Food


| Estimated Risk | *Hermetia illucens* | *Tenebrio molitor* |
|---|---|---|
| ***Hazards with the highest risk*** | *Bacillus cereus*<br>*Campylobacter spp.*<br>*Clostridium botulinum*<br>*Listeria monocytogenes*<br>*Toxoplasma gondii* | |
| ***Hazards with a moderate risk*** | *Clostridium perfringens*<br>*Cryptosporidium spp.*<br>*Giardia spp.*<br>*Leptospira interrogans*<br>*Salmonella spp.*<br>*Verotoxigenic E. coli*<br>*Yersinia enterocolitica* | |

## Discussion and conclusion

- **Comprehensive risk analysis approach** ... but **lack of scientific knowledge** concerning the exposure assessment of the larvae during the production process for a few hazards for poultry (infectious bursal disease virus & duck herpesvirus 1) and for humans (*Cryptosporidium spp, & Leptospira interrogans*)
- Identification of **longer lists of biological hazards than the one covered by the regulations** EU 142/2011 for feed / EU 2073/2005 & 1441/2007 for food (biological hazards under regulation written in purple in the tables above) and the additional ones recommended in the guide on good hygiene practices (IPIFF, 2019 biological hazards written in blue in the tables above)
- **A strict application of biosecurity** in the insect production process with regards to the risks of pathogen introduction by insects, wild and domestic pest animals and substrate must make possible reducing the biological hazards
- Risk assessment done at the step of live larvae ... **slaughtering process can be used as a control action** towards these hazards

**Bibliography**

(1) IPIFF, 2019. Guide on good hygiene practices for European Union producers of insects as food and feed. IPIFF Ed., 99p.

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