



A validation approach for the qualitative screening of veterinary drugs in edible insects with LC-HRMS

G.R. Boerrigter-Eenling, S. Rasker, L.J.M. Jansen, M.H. Blokland, I.J.W. Elbers, M. Broeren, S. Vonsovic, S. Sasse

Background

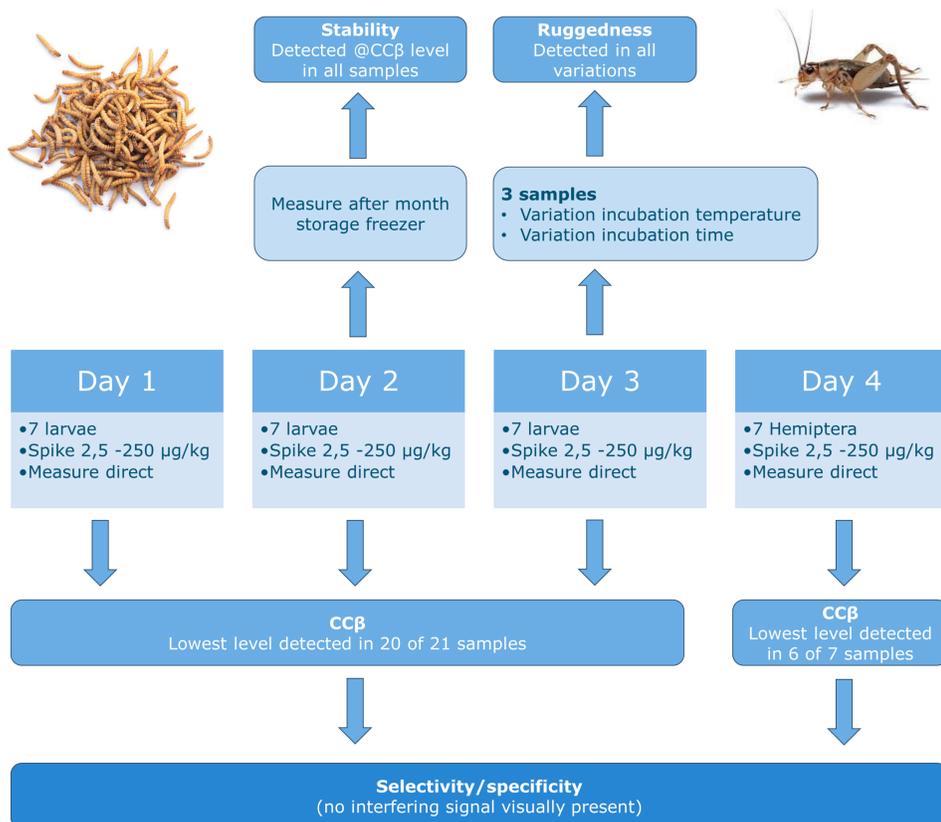
Edible insects are an upcoming food source and therefore need to be monitored according to Commission Regulation (EU) 2022/1644. Considering this new matrix needs to be monitored for a varying number of substances, the use of HRMS-based techniques could be time and cost saving. HRMS-based methods can replace multiple conventional targeted techniques, but to be accepted they must meet strict validation criteria. Currently, there are a few validated HRMS-based methods in the field of veterinary drug detection.

Objective

Develop a validation approach to qualitatively screen for veterinary drugs in edible insects using LC-HRMS, in line with Commission Regulation (EU) 2021/808. The following performance characteristics are examined: CC β , selectivity/specificity, ruggedness and stability. Compounds were selected based on Commission Regulation (EU) 2022/1644. For insects there is no MRL or MMRP available, therefore the cascade rule EU/2018/47 was applied and the lowest MRL value or MMRP for muscle was taken as target level.

Methodology

- 123 compounds were selected



- The data were visually processed
- A peak was detected if
 - Signal in full scan or in DIA mode

Results

- Insect matrix was a challenging and highly variable matrix
- For 53 of 123 compounds the target level of the cascade MRL or MMRP of muscle was met

Table 1. Validation results of veterinary drugs in insects using LC-HRMS

Veterinary Drug Class	Selectivity/ specificity Ruggedness Stability				Conclusion
	CC β				
β -lactams (B1a) (13)	√/X	√	√	√	Partially suitable
Phenicolis (B1a) (2)	√	√	√	√	Suitable
Lincosamides (B1a) (2)	√	√	√	√	Suitable
Macrolides (B1a) (10)	√/X	√	√	√	Partially suitable
Quinolones (B1a) (7)	√	√	√	√	Suitable
Sulfanomides (B1a) (17)	√	√	√	X	Suitable, measure direct
Tetracyclines (B1a) (4)	X	X	X	X	Develop targeted method
Other antimicrobial agents (B1a) (3)	√/X	√	√	√	Partially suitable
Corticosteroids (B1d) (4)	X	√	√	√	Develop targeted method
NSAIDs (A3f en B1d) (14)	√/XX	√	√	√	Partially suitable
Avermectins (B1b) (6)	X	X	X	X	Develop targeted method
Anthelmintics (19)	√/X	√	√	X	Partially suitable, measure direct
Other parasitic agents (B1b) (20)	√/X	√	√	X	Partially suitable, measure direct
Tranquilizers (B1c) (3)	√/X	√	√	X	Partially suitable, measure direct

- √ all criteria were met
- √/X criteria were partially met
- X results did not meet the criteria

- This validation approach is suitable for LC-HRMS methods and gives a clear insight into whether certain groups of veterinary drugs can be measured according to the regulations
- Due to high molecular variation in compounds not all compounds could be measured successful at demanded levels, indicating targeted methods need to be developed for those compounds.

Conclusions

- The LC-HRMS method was validated for the insects and is a promising validation approach for other LC-HRMS methods
- The acquired data quality is sufficient for additional (retrospective) data analysis strategies
- The proposed approach covers official guidelines and gives more flexibility and future proof methodology

Follow up

- Automation of data processing and interpretation
- Develop targeted methods or more selective sample preparation methods for compounds that were not successful validated

Acknowledgements

This project was financially supported by the Dutch Ministry of Agriculture, Fisheries, Food Security and Nature

