Life Sciences und Facility Management

Preliminary results of survey on food safety aspects of drone brood from *Apis mellifera* L.

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Aim

Drone brood removal is a common practice for the control of the honeybee parasite *Varroa destructor* in beehives of *Apis mellifera* L. in Switzerland and other European countries. At present, the removed drone brood is not used. Drone brood has potential to become a new food product and a new income for beekeepers (Lecocq et al. 2018).

In contrast to insects currently produced for food, honeybees feed in an open system in the environment, which is difficult to control. Therefore, food borne pathogens from the environment on drone brood need to be assessed carefully. We analysed samples of drone brood from four Swiss apiaries regarding important food borne pathogens.

Materials and methods

Samples were taken from four apiaries in Switzerland in May and June 2019. A total of six drone brood combs per apiary were collected (fig.1, left). Three combs were collected from three different bee colonies by the beekeepers with their personal equipment and frozen at -20 °C maximum 4.5 h after collection (BK). Three combs were collected from three other bee colonies with sterile equipment (knife, gloves and plastic bags) (Z). Each comb (Z) was individually vacuum-packed, sealed and immediately frozen at -20 °C after collection.

Fig. 1. Drone brood comb before harvest inside the frame (left) and frozen drone pupae before separation from the wax (right).

The brood of BK and Z was separated from the wax by breaking the frozen combs (fig. 1, right) and collecting the larvae and pupae (100 g per sample) with tweezers under sterile conditions (Jensen et al. 2016).

Samples (n=24) were analysed two months after collection using standard ISO methods.

Results

All samples were free of salmonellae (analytical method: ISO 6579). Table 1 shows that *Escherichia coli*, Enterobacteriaceae, *Listeria monocytogenes*, coagulase positive *Staphylococcus* and *Bacillus cereus* counts were all below Swiss thresholds (EDI 2016).

Table 1. Bacterial counts (lg cfu/g) of *E. coli*, Enterobacteriaceae, *L. monocytogenes*, coagulase positive *Staphylococcus* and *Bacillus cereus* of drone brood samples (n=24) with thresholds for different food items (EDI 2016).

Pathogen	Method	lg cfu/g	Threshold (lg cfu/g)
E. coli	ISO 16649-2	<1	<1 or <2.7
Enterobacteriaceae	ISO 21528-2	<1	<1 or <2
Coag. positive *Staphylococcus*	ISO 6888-2	<2	<2; <3 or <5
L. monocytogenes	ISO 11290-2	<1	<2
B. cereus	ISO 7932	<2	<2 or <3

The process hygiene criteria for minced meat set by the Swiss government (EDI 2016) for total aerobial mesophilic bacterial count (<6.7 lg cfu/g, ISO 4833-1) was met in all analysed samples (fig. 2).

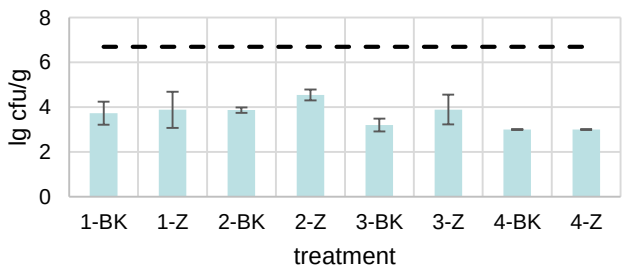

Fig. 2. Total aerobial mesophilic bacterial count (mean lg cfu/g ± standard deviation, n=3) from drone brood from four different locations (numbers 1-4) either harvested by beekeepers (BK) or staff with sterile equipment (Z). Dashed line shows process hygiene criteria for minced meat (EDI 2016).

References

EDI (2016) Verordnung des EDI über die Hygiene beim Umgang mit Lebensmitteln. 817.024.1:66

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Acknowledgements

We would like to thank Karl Lenzin, Werner Habermacher, Charly and Brigitta Burch who provided us with drone brood combs. Furthermore, we would like to thank AgrIQnet for the funding.

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