Salmonella Typhimurium level in mealworm larvae after exposure to contaminated substrate

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Salmonella Typhimurium level in mealworm larvae after exposure to contaminated substrate

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Mealworms (Tenebrio molitor) for feed and food must be reared on feed-grade materials and findings of Salmonella spp. bacteria, which are important foodborne pathogens, have not yet been reported. However, Salmonella spp. belongs to the family of Enterobacteriaceae, which is found in levels up to 7.5 Log CFU/g in mealworms. This indicates that Salmonella spp. may be able to thrive in the mealworms if introduced into the production. This study aimed to assess the level of salmonella to be found in mealworms after exposure to different salmonella contamination levels in the substrate. The initial contamination level was 2, 4 or 6 Log CFU/g of a Salmonella enterica serotype Typhimurium strain resistant to rifampicin (in-house strain). Samples of mealworm and substrate were collected at start and additional four times until termination at day 7. For each sample, ten-fold dilutions series were prepared from 1 g of homogenized sample in 9 ml saline (0.9% NaCl). Each dilution was plated (0.1) on Nutrient Agar (NA) with rifampicin 50 mg/L to suppress competing bacteria, and incubated overnight at 37°C before counting of colonies. Presumptive S. Typhimurium® colonies were verified by slide-agglutination. Preliminary results indicated that the S. Typhimurium® level found in mealworm and substrate depended on the initial contamination level while there was no clear effect over time (7 days). In future studies it would be of interest to see for how long salmonella will persist in the mealworms and the substrate after introduction. Also, the quantitative method is limited by a detection level of minimum 1 Log CFU/g and a qualitative approach with enrichment of the samples would be necessary to exclude the presence of salmonella in low numbers. Finally, the entire mealworm was homogenized and analyzed, not allowing concluding whether the salmonella had been ingested or only present on the surface. Adequate surface decontamination methods must be established to elucidate if salmonella is ingested or not. However, as the entire mealworm is normally used, this may from a food safety perspective be less important.