



The Research Group of
Industrial Microbiology and Food Biotechnology (IMDO)
has the honour to invite you to the public PhD defense of
MSc. Evelyne DUTHOO
to obtain the degree of Doctor of Bioengineering Sciences

Characterization of the microbiota associated with institutional kitchens and commercial packaged foods during food storage

Promotors:

Prof. Dr. ir. Frédéric Leroy (VUB)
Dr. ir. Koen De Reu (ILVO)
Prof. Dr. Marc Heyndrickx (ILVO)

The defense will take place on
Wednesday, December 8, 2021 at 17.00 h

Due to COVID-19 measures, the capacity to physically assist the event in the Promotion Room D2.01 at the Campus of Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2, 1050 Elsene, will be limited. Contact Frederic.Leroy@vub.be for more information and inscription.

Members of the jury

Prof. Dr. ir. Wim Versées (VUB, chair)
Prof. Dr. ir. Wim De Malsche (VUB, secretary)
Prof. Dr. ir. Eveline Peeters (VUB)
Prof. Dr. Bruno Pot (VUB and Yakult)
Prof. Dr. ir. Frank Devlieghere (UGent)
Prof. Dr. Martin Wagner (University of Veterinary Sciences, Vienna, Austria)

Curriculum vitae

Evelyne Duthoo was born on January 22, 1992, in Ostend. After obtaining her Bachelor degree in Chemistry, specialization Biochemistry, at HoGent, she graduated as a MSc. in Biochemical Engineering Technology at the University of Ghent in 2016. She started her doctoral research in 2017 at the Flanders Research Institute for Agriculture, Fisheries and Food (ILVO) in collaboration with the Vrije Universiteit Brussel. This study was financed by the FPS Health, Safety of the Food Chain and the Environment, and ILVO. Evelyne is the (co)author of several scientific publications in international journals and she actively participated in national and international conferences with poster and oral presentations.

Abstract of the PhD research

At different stages during their production, storage and catering, food products can become contaminated with spoilage microorganisms and/or pathogenic ones. It remains important to precisely locate the vulnerabilities of the existing hygiene procedures. Also, more data on the microbial status of ready-to-eat food products at different points during their shelf-life period is still needed, so that food business operators can have a better understanding of the spoilage dynamics and the potential solutions to improve control. Use of culture-independent methods, such as 16S rRNA gene metabarcoding, are able to provide a broader view on the microorganisms present.

In the first part of this PhD research, hygiene practices were evaluated in four sectors of institutional kitchens (hospitals, retirement homes, schools and childcare centers), with an additional analysis of the contamination level at several critical food contact points in these kitchens. To do so, a questionnaire on hygiene practices was used, together with microbiological analysis. The findings exposed that hand washing resulted in only a slight reduction in total aerobic counts and that cleaning of the work surfaces only resulted in slight improvements in bacterial enumerations. The hygiene questionnaire uncovered that childcare centers accumulated the lowest hygiene scores of all sectors. This lower score was verified when comparing the results of the cleaned surfaces between the different sectors.

In the second part, the microbiota of sliced and modified-atmosphere-packaged cooked ham, cooked chicken, and a vegetarian meat alternative were investigated using culture-dependent and -independent methods during the shelf-life period. Bacterial isolates were identified using culture-dependent methods, uncovering that lactic acid bacteria (LAB) were the most abundant microbial group in all products, with *Leuconostoc carnosum* as the most abundant species in cooked ham, at the end of the shelf-life period, and *Latilactobacillus sakei* in cooked chicken and the vegetarian product, throughout the shelf-life period. Additional metabarcoding analysis uncovered results that were generally in accordance with the culture-dependent method, but also led to some additional information. This analysis showed a strong presence of the genus *Photobacterium* for both cooked ham and cooked chicken and a presence of *Vibrio* in cooked ham samples. The latter was not found with the culture-dependent method. In the vegetarian product, *Xanthomonas* was found to be the most abundant genus in general and *Streptococcus* and *Weissella* were found to be the most prominent LAB.

In conclusion, this research revealed some points of attention for hygiene improvement in institutional kitchens, as well as differences between sectors and similarities in hygiene conclusions between the questionnaire and microbiological analyses. Also, this research indicated that combining culture-dependent methods with culture-independent analysis can give complementary insights into the evolution of microorganisms in perishable foods.