

# Safety conditions and native microbial flora of three processing units in Alentejo, Portugal



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## INTRODUCTION

Portugal as other Mediterranean countries has a great diversity of dry fermented sausages. This traditional sausage production is highly diverse and products possess very particular organoleptic characteristics, which please consumers. These sensory characteristics are related not only to the manufacturing process, but also to the house microbial flora. On the other hand, the safety of fermented products is always difficult to achieve due to their processing technology and final characteristics, as the process does not have any step able to undoubtedly eliminate pathogens, according to HACCP approach. In this kind of products, coagulase negative staphylococci (CNS) and lactic acid bacteria (LAB) are present in high levels. These bacteria are responsible for the particular taste and flavour and also for extending the shelf life of sausages. LAB are useful particularly for the ability to produce bacteriocins that are generally active towards several foodborne pathogens, such as *Escherichia coli*, *Listeria monocytogenes* and *Salmonella* sp., while CNS are mainly nitrate reducers, thus contributing to colour development.

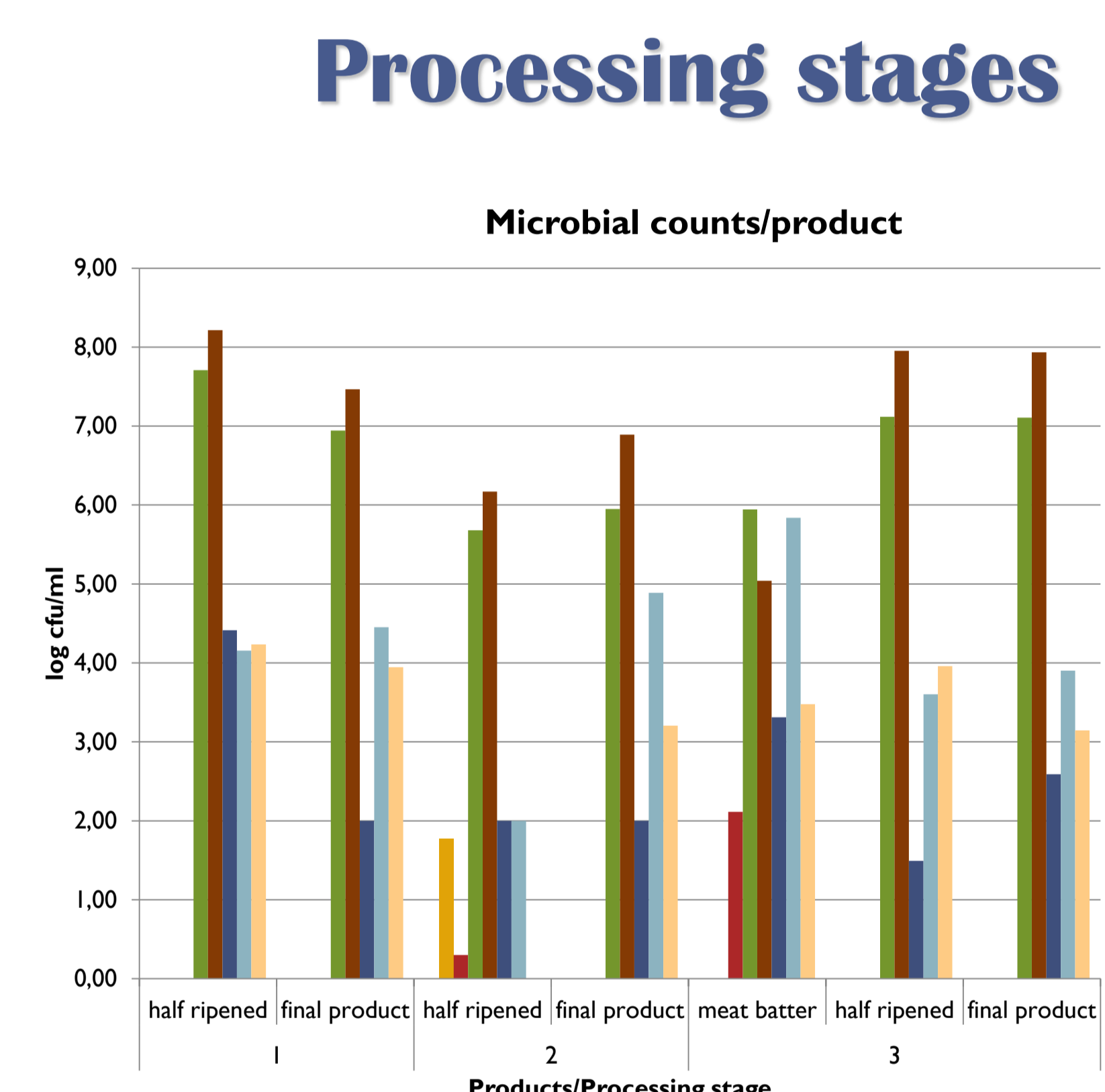
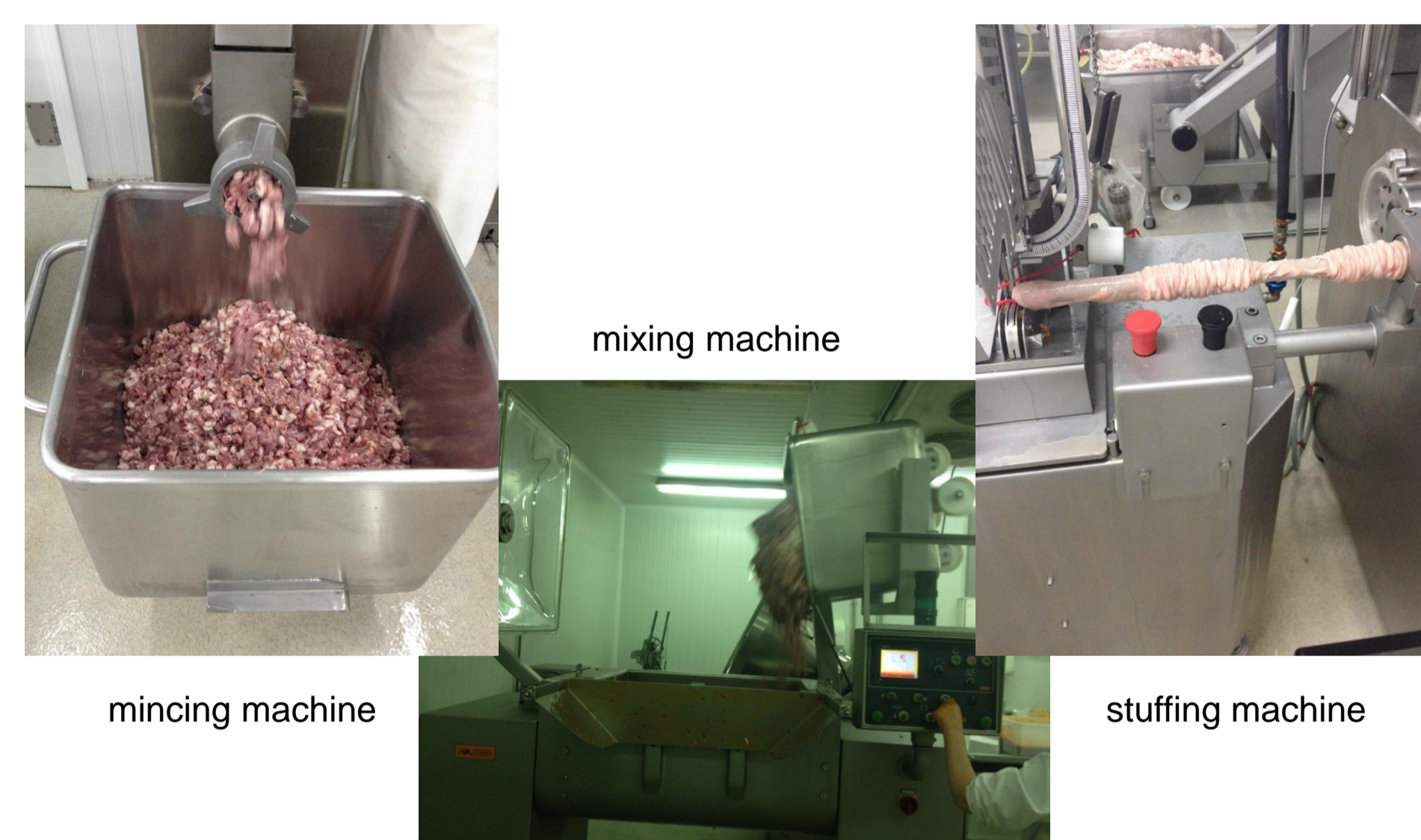
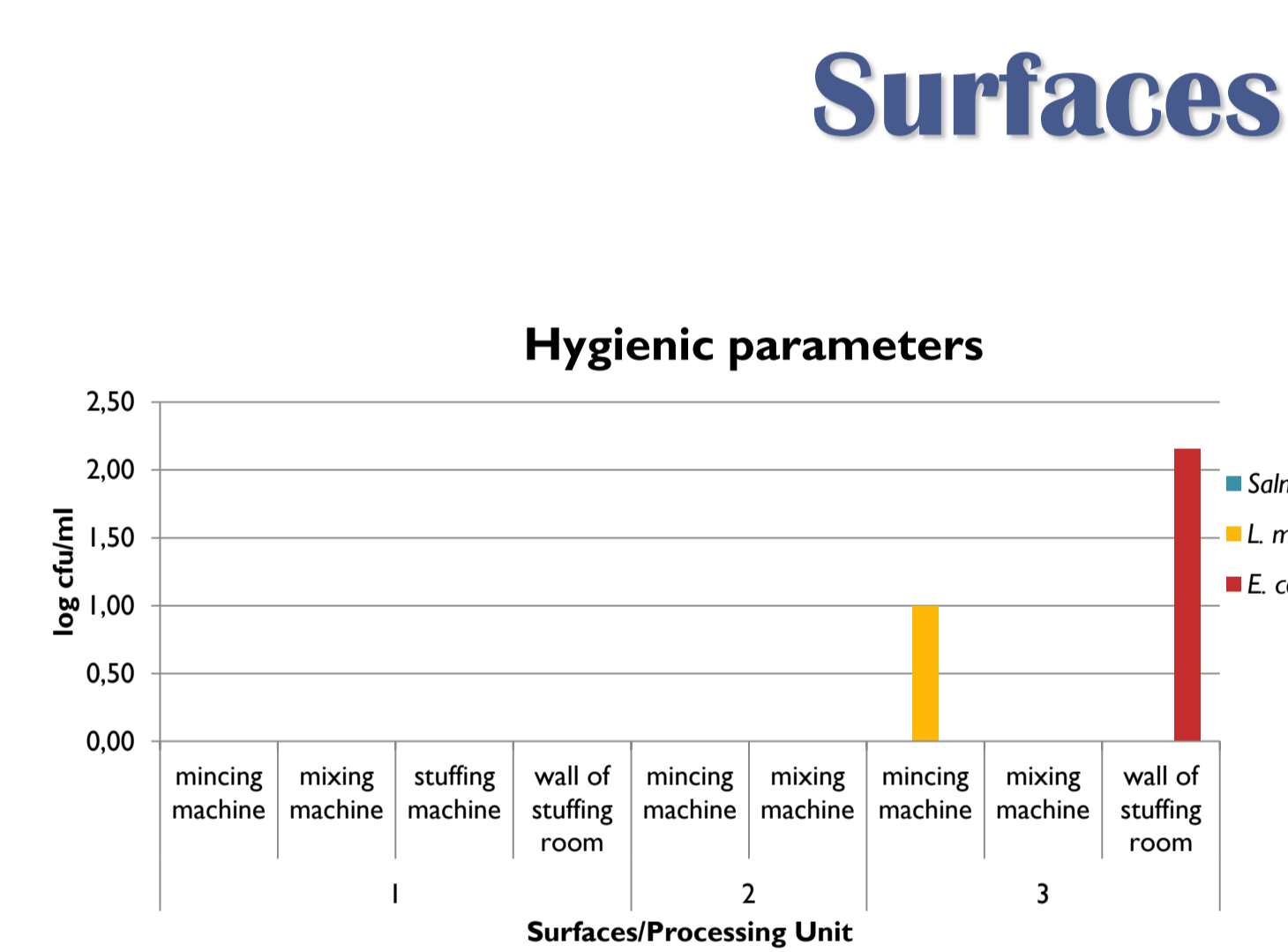
## AIMS

The aim of this study was to determine the occurrence of *Salmonella* sp., *L. monocytogenes* and *E. coli* in different surfaces of the three visited processing units, as well as in Portuguese traditional sausages. Furthermore, we also evaluated the total number of mesophiles and Enterobacteriaceae in each surface and product, as well as the number of CNS, LAB and yeasts.

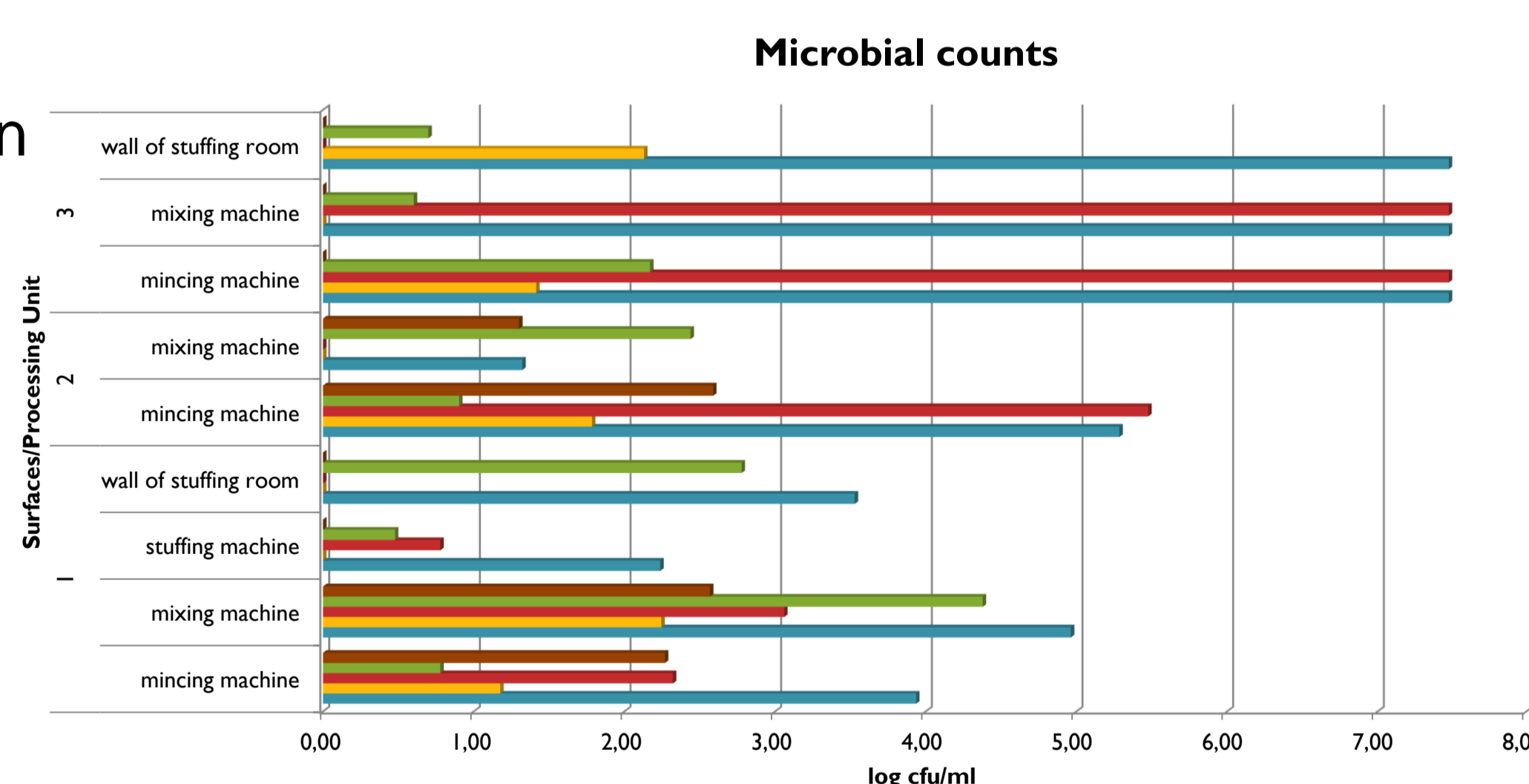
## MATERIALS & METHODS

Three processing units were visited. Four different surfaces, namely mincing, mixing and stuffing machines along with the wall of the stuffing room, as well as Portuguese traditional sausages in three different processing stages: meat batter, half ripened product and final product. All microbiological analyses were performed according to the ISO standards.

## RESULTS



- No contamination with *Salmonella* spp. was found in the analysed surfaces.
- Microbial counts were generally higher in unit 3.
- LAB counts are generally higher than CNS counts.
- Yeasts are only present in moderate amounts (< 3 log cfu/ml).
- Contamination with Enterobacteriaceae occurs in low to moderate numbers (~0-3 log cfu/ml).



- The same type of sausage ("chouriço") was compared in the three units throughout the three processing stages.
- No contamination with *Salmonella* spp. was found in the analysed products, however the number of Enterobacteriaceae in general is high (~7-8 log cfu/ml in the final product).
- A few products were contaminated with *L. monocytogenes* and/or *E. coli*, but contaminations were absent in the final products.
- CNS are generally in higher number than LAB.

## CONCLUSIONS

- Surfaces were generally well hygienised, only a few presenting with low contamination levels by *L. monocytogenes* and *E. coli*.
- No contamination with *Salmonella* sp. was detected in the diverse analysed products independently of their processing stage. However, different contamination levels with *L. monocytogenes* and *E. coli* were found in the first processing stages.
- The number of LAB is generally higher than that of CNS in the surfaces, whereas it is the opposite in the products.

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