



RESEARCH

Assessment of hygienic properties of single-use wood packaging for fish.

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Introduction and background.

In the supply chain of fresh fish in Europe – right from the boat to the shop – the most common and representative packaging systems for handling and transporting the product are made of wood, plastic or expanded polystyrene.

Wooden and expanded polystyrene boxes are single-use for reasons of hygiene, whereas plastic boxes are considered reusable as they can be washed after each use.

Mission and aims of study.

In November 2014, the research team of Dr. José Juan Rodríguez Jerez, expert in microbiological analysis of surfaces and evaluation of biofilms and professor at the Faculty of Veterinary Medicine at the Autonomous University of Barcelona, conducted a comparative assessment of microbiological behavior of boxes for fresh fish in the market.

This team studied three different aspects about the packaging for fish, according to scientific and technical specifications of standardized tests.

Firstly, a microbial analysis of the surfaces of empty boxes was performed.

Secondly, its anti-microbial efficacy was assessed, and therefore if the package can cope with the growth of foreign microorganisms due to characteristics or substances that can act as inhibitors.

And finally, microbial analysis in real conditions of use with fresh fish and how the microorganisms present in the product evolve over time in each box.

This study provides a knowledge base for fresh fish marketing chain to put in value hygienic behavior of each material.

Conclusions.

In the following pages a summary of the main conclusions, favorable to the use of wood in contact with fish, from various tests done, whose results are shown by graphics.

Conclusions

✓ Wood does have antimicrobial properties, with pine being more effective than poplar. In fact, the reduction levels detected indicate that the load reduction caused by pine is highly significant, whereas that caused by poplar is minor.

✓ The plastic materials tested HDPE y EPS have no antimicrobial properties.

✓ The standard chosen to assess the antimicrobial properties must be ISO 20743:2013, since this allows the assessment of porous and non-porous materials.

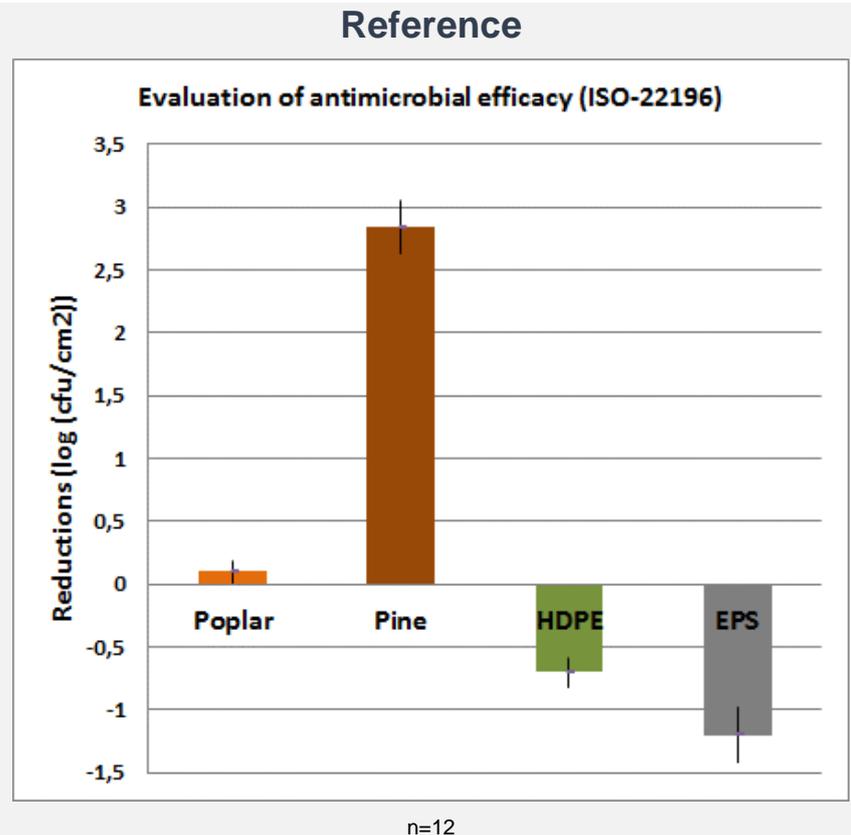


Figure 1.- Assessment of the anti-microbial effects of the various studied materials, according to standard ISO-22196.

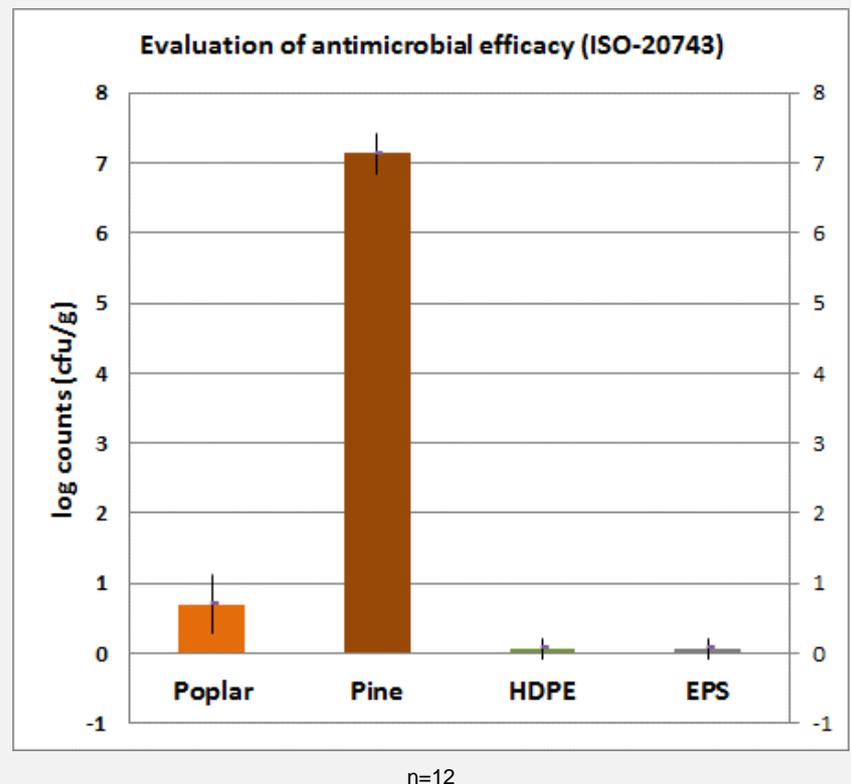
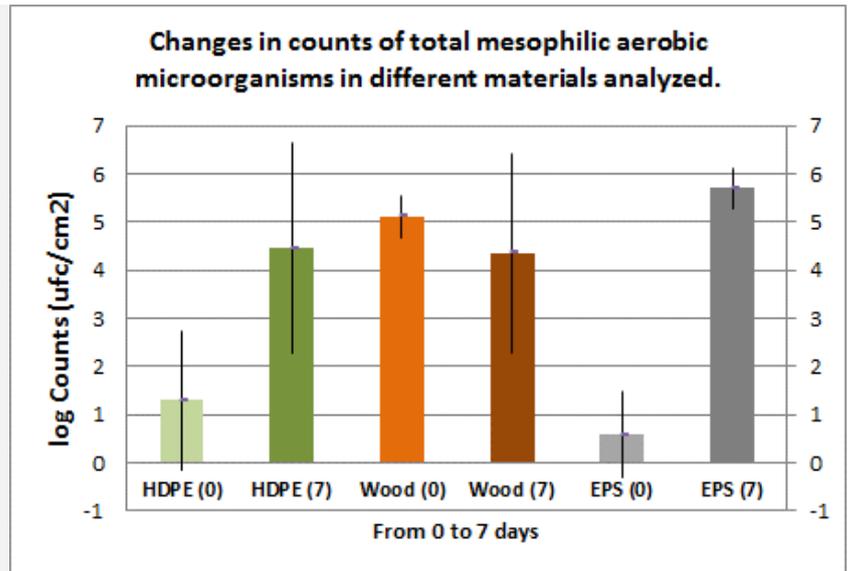


Figure 2.- Assessment of the anti-microbial effects of different studied materials, according to ISO-20743.

✓ **Wood packaging shows lower contamination levels after contact with fish products**, reducing surface contamination in a statistically significant manner compared with the other materials tested (HDPE and EPS). It can be seen, therefore, that wood has no negative hygiene consequences.

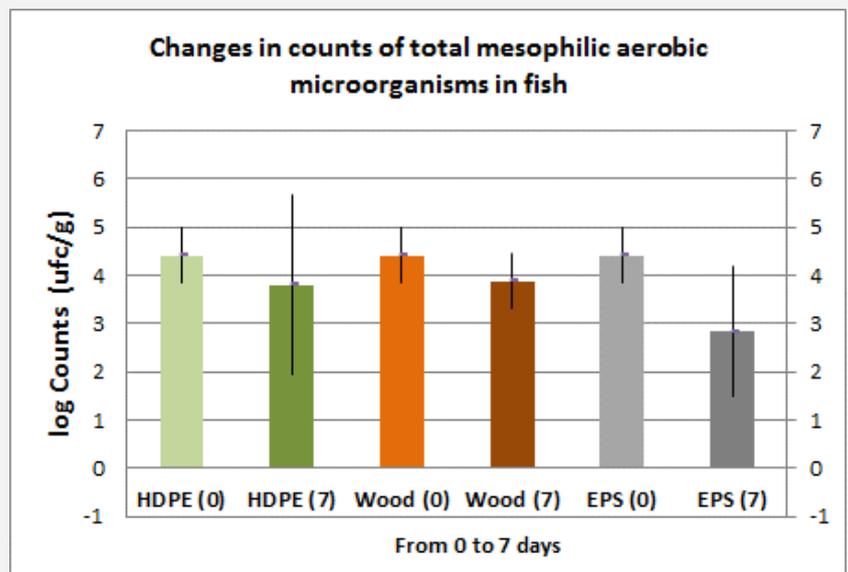
✓ Since EPS is the most contaminated material, the practice of draining water from this this kind of packaging after use could pose a microbiological contamination risk for fish products coming into direct contact with this more contaminated surface.

✓ If reused, plastic materials could pose a high risk of bacteria transfer from surface biofilms onto the product. In this case, there is a real need for efficient cleaning of the boxes, showing the importance of an effective washing process.



n=12.

Figure 3.- Changes in counts of total mesophilic aerobic microorganisms in different materials analysed.

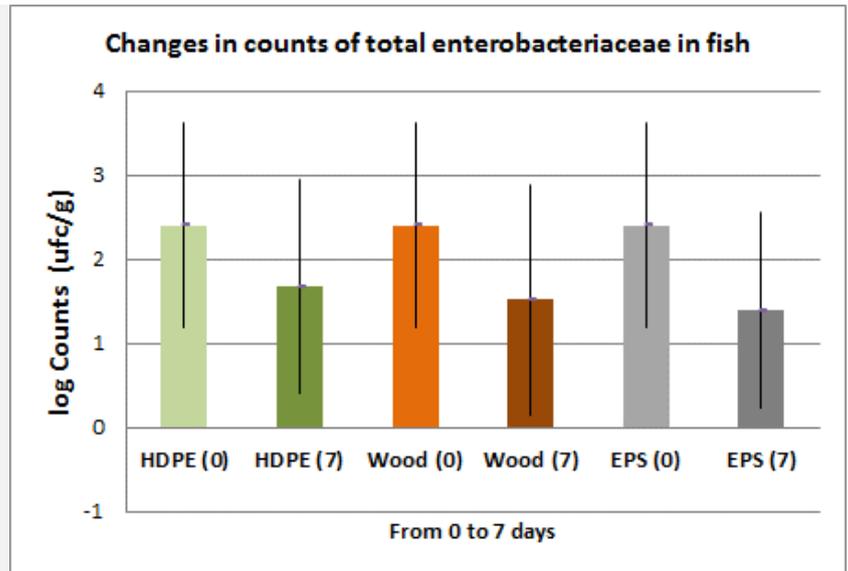


n=12.

Figure 4.- Changes in counts of total mesophilic aerobic microorganisms in fish products at day 0 and after 7 days of contact with different materials (log ufc/g).

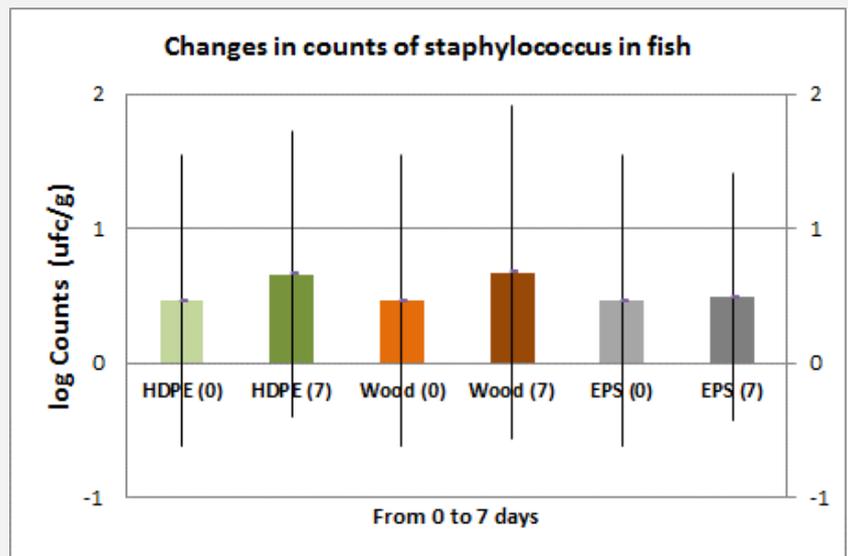
✓ The materials tested do not affect the quality or safety of the fish products, provided that they are for single-use only.

✓ **Wood has no anti-hygienic consequences in comparison with the plastic materials tested.**



n=12.

Figure 5.- Changes in counts of total Enterobacteriaceae in fish products at day 0 and after 7 days of contact with different materials (log ufc/g).



n=12.

Figure 6.- Changes in Staphylococcus counts in fish products at day 0 and after 7 days of contact with different materials (log ufc/g).