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# FERMENTED HYBRID MEAT PRODUCTS

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## I. INTRODUCTION

Hybrid meat products consist of mixtures of meat and non-meat raw materials, such as vegetables, grains, mushrooms, insect proteins, and biomass. To date, there is no valid definition for hybrid products that specifies both the ingredients and the percentage of non-meat ingredients. It is understood that meat must be the component present in the largest proportion.

Historically, the meat industry has used plant-based materials such as textured proteins and plant fibers. But the purpose of hybrid meat products is to obtain products with the benefits that each ingredient offers separately (Grasso et al) (1). Although these products offer interesting nutritional advantages, a taste close to the original, and a similar or even lower cost than 100% meat products, there are currently few references on the shelves (Boukid et al.) (2). The authors have not found any fermented hybrid products on the Spanish market.

On the other hand, fermentation (acidification) combined with dehydration is the basis for preserving a large number of meat products around the world. In this study, fermentations were carried out on hybrid meat products using strains commonly used in 100% meat products and the characteristics of the resulting products were evaluated.

## II. MATERIALS AND METHODS

A recipe for *salchichón* was used for the study. *Salchichon* is a fermented and dehydrated sausage typical of Spanish charcuterie, whose characteristic spice is pepper. A typical sausage recipe consists of 90% pork meat (70/30 lean meat/fat), 2,1% salt, pepper (black and/or white pepper), preservatives and antioxidants,

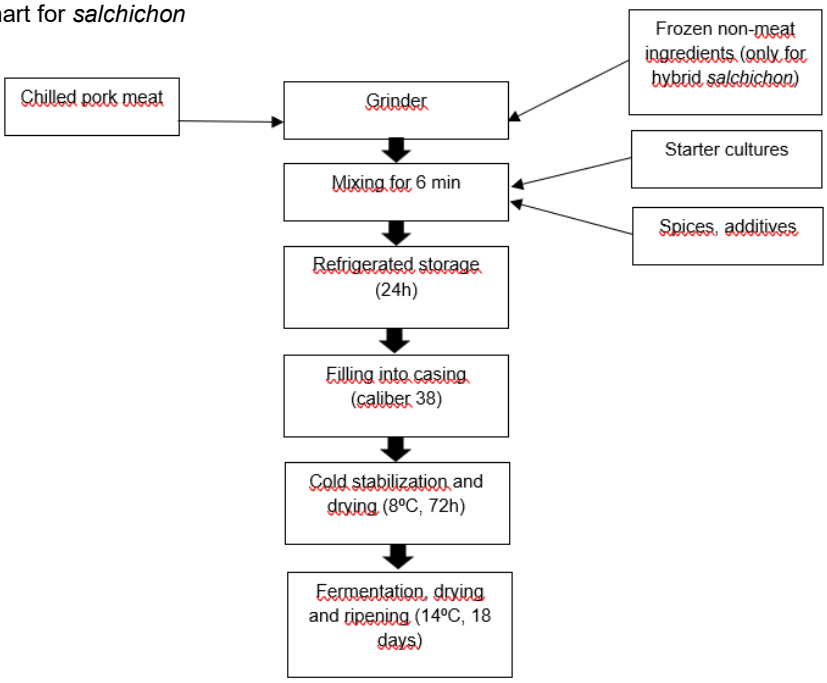
In the hybrid sausage recipe, 40% of the pork meat has been replaced with a vegetable mix consisting of boiled potatoes, roasted zucchini, and cooked brown rice.

Four different starters cultures were used to ferment the 100% meat and hybrid sausages (Table 1).

Table 1 – Composition of starter cultures

| Starter culture | Composition | Colony Forming Units per kilogram (CFU/kg) |
|---|---|---|
| CONTROL | Native flora present in the meat and in the other ingredients | - |
| ST1 | *Staphylococcus carnosus*<br>*Staphylococcus xylosus*<br>*Pediococcus pentosaceus*<br>*Lactobacillus plantarum*<br>*Lactobacillus sakei* | $6.10^9$ |
| ST2 | *Staphylococcus xylosus*<br>*Pediococcus acidilactici*<br>*Lactobacillus plantarum*<br>*Lactobacillus curvatus*<br>*Lactobacillus brevis* | $5.10^9$ |
| ST3 | *Staphylococcus xylosus*<br>*Pediococcus acidilactici*<br>*Lactobacillus plantarum*<br>*Lactobacillus curvatus*<br>*Lactobacillus brevis* | $5.10^6$ |

Figure 1 – Production flow chart for *salchichon*




## III. RESULTS AND DISCUSSION

A comparative study was conducted between 100% meat and hybrid sausages fermented with each strain.

Specifically, the following characteristics were compared: acidification curve, acetic acid production, weight loss, water activity and organoleptic characteristics evaluated by an expert panel, paying special attention to the appearance of off-odors and flavors. Regarding microbiological properties, lactic acid bacteria y mesophilic aerobic microorganisms were monitored. Results and conclusions of the study are not included in this abstract because the complete results of the study are not available to date.

## IV. CONCLUSION

This study provides information on whether the strains used in 100% meat products are suitable for hybrid meat products or whether new cocktails are needed to optimize them. Microbiological determinations will determine whether the products provide beneficial lactic acid flora.

## ACKNOWLEDGEMENTS

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