

## Additive-free hams

### Summary

The project carried out by Pernils Llémena, S.A. consists of obtaining an additive-free cured ham, which maintains the same level of food safety as conventional hams.

The safety of cured ham has historically been based on the slightly acidic pH of the meat combined with the use of sodium chloride and nitrifiers. This combination prevents the development of bacterial flora, and in particular the bacteria *Clostridium botulinum* and the formation of its toxin, which is responsible for botulism, a serious illness that can be fatal.

In order to eliminate nitrifiers and ensure the safety of the product, the company carried out a study on the evolution of the *Clostridium botulinum* bacterium while the ham is processed under various conditions, in order to determine the appropriate processing methodology.

### Objectives

- Develop a cured ham without additives which is safe for human consumption.
- Study how the production process of cured ham affects the evolution of the bacterium *C. botulinum* under various conditions.
- Determine the working conditions that prevent the development of the bacterium *C. botulinum* and the generation of its toxin.
- Improve the company's competitiveness with the new product line.
- Provide a response to the market with a commitment to natural products.
- Expand the range of clients and enter new domestic and international markets with the new product range.

### Description of the actions carried out in the project

- a. Coordinate the project. This includes a definition of the process validation method and a literature search.
- b. Simulate the process in predictive microbiology
- c. Develop an isolated drying pilot plant
- d. Define and select the batch of samples that have participated in the study
- e. Select and acquire various strains of *C. botulinum*
- f. Perform the challenge test in 4 stages.
- g. Define the new packaging design.
- h. Promote the new product at markets and events of interest and disseminate the results achieved through the EAI.

### Final results and practical recommendations

The main results have been the identification of the lack of growth of *C. botulinum* in the various stages of the ham curing process.

The study covered the first 6 stages of the process (reception, salting, post salting I, post salting II, drying I and drying II). It is not relevant in the storage room stage, as the conditions that could be optimal for the growth of the bacterium under study no longer apply.

The following parameters were monitored in each stage studied:

- Initial contamination level.
- Temperature.
- Water activity (aw).
- pH levels of the meat.

The process was also simulated as predictive microbiology, and finally the challenge test was performed in 4 stages, and *C. botulinum* counted in each one.

## Conclusions

The monitoring carried out for over a year shows that the presence of *Clostridium botulinum* in fresh hams is very unlikely. In addition, the toxin is produced in the microorganism's developmental stage. If the development of the microorganism is prevented, then the creation of the toxin is prevented.

The Challenge test on *Clostridium botulinum* ensures that the current manufacturing process, complying with Control Points, ensures that this microorganism does NOT develop in the product.

The study carried out throughout the shelf life of the end product packaged in a protective atmosphere demonstrates the lack of clostridia incidents in the end product. Tests 1213 and 1216, which were performed on hams with the same characteristics (the same pig of origin), but which used different salting methods, show hardly any differences in the end product. All the microbiological controls showed complete safety, and the physical and chemical parameters were as expected. There are no differences in the very important factor of aw.

Additive-free ham has been produced in regions of Europe such as Italy and southern Spain for decades, with no documented cases of infection or food poisoning in products made by the industry in all these years. Our preparation process takes place under conditions very similar to those used in these industries, while taking advantage of the latest technological breakthroughs.

**After reviewing the results, we have evidence that as long as the current production process is maintained, there is no microbiological risk in the production of cured ham without additives.**

## Leader of the Operational Group

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**Subject area(s) of application**☒ Food quality/processing and nutrition**Geographical area(s) of application**

PROVINCE(S): GIRONA

REGION(S): LA GARROTXA

**More information on the project**

| PROJECT DATES            | TOTAL BUDGET             |
|--------------------------|--------------------------|
| Starting date: July 2019 | Total budget: €28,449.08 |
| End date: September 2021 | DARP funding: €11,626.55 |
| Current status: Executed | EU funding: €8,770.91    |
|                          | Own funding: €8,051.62   |

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