

# 2023

## TUNIVAC® TUNA COOKER



 **Hermasa**  
Canning technology

**TEINCO**   
Tecnología alimentaria

## TUNIVAC® COOKER.

### ➤ Introduction.

The type of cooking and equipment used for precooking tuna has a direct impact on the quality and cost of the product. Minimize yield losses in cleaning through processes that reduce oxidation, and control moisture during cooking will allow for a significant economic differentiation in the production costs linked to the process and in the quality of the final product.

Both the nutritional value and the sensory characteristics of the final product are related to the methods and equipment used for the precooking of tuna.

In this way, an inadequate or uncontrolled process will produce a decrease in the physicochemical as well as the organoleptic characteristics, negatively affecting the final valuation of the product by the end consumer.

The **TUNIVAC®** Cooker makes the difference. Its advanced design and control system of variables and critical points allows flexibility and optimization of treatment for different species or sizes of fish. **TUNIVAC®** allows to obtain the best result for a process as variable and complex as tuna pre-cooking.



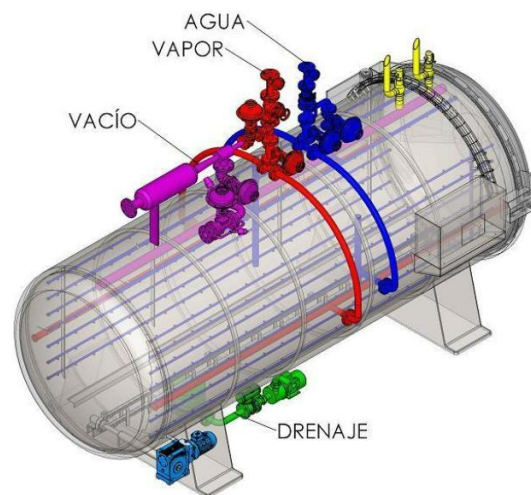
➤ **Flexible cooking system.**

- ✓ By means of simple operation, the selectable operating modes allow a suitable combination of vacuum parameters, chamber temperature, spinneret temperature and humidity.
- ✓ In its vacuum mode, the cooker eliminates the oxygen in the chamber, significantly reducing the oxidation of the fish. A vacuum pump based on the Venturi effect will create an effective vacuum in the treatment chamber.  
For raw material that cannot withstand vacuum conditions, the cooker also has the option of removing most of the oxygen by means of entrainment systems without applying vacuum.
- ✓ During the entire baking process, the humidity in the chamber can be efficiently controlled automatically by means of sprayers installed and suitably distributed throughout the chamber.
- ✓ Easy management of preset thermal processes through the creation of recipes and almost unlimited storage possibilities.
- ✓ Possibility of cooking by time with temperature ramps, pressure and humidity programmed for more homogeneous pieces of raw material
- ✓ Delta T firing makes it possible for larger pieces, a homogeneous treatment, controlling at all times, the temperature in the thorn.  
A total of 12 control probes are installed in the cooker.
- ✓ By means of the control algorithm developed by Teinco, an optimum firing performance is achieved.
- ✓ All process parameters are monitored and stored in an inviolable format.



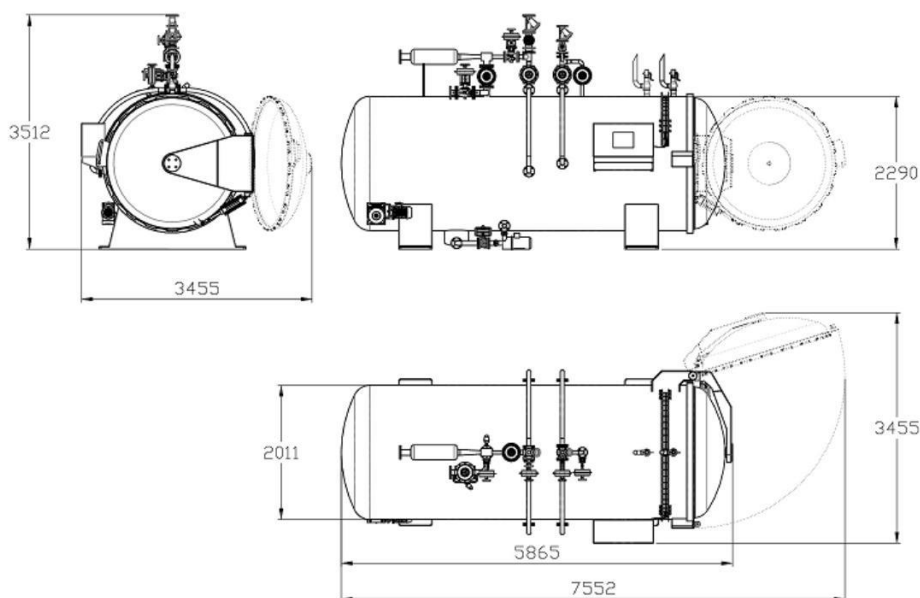
➤ **Vacuum and dual cooling system**

- ✓ Cooling of the cooker is achieved by heat absorption through the vacuum system. The PLC, through the control algorithm, allows to adjust and control the humidity of the fish during this phase, optimizing the result to the product needs. TUNIVAC offers an optimal result on the desired parameters of the fish. Reducing subsequent times of the raw material in the chamber and undesirable results in the final product, such as water decantation in canning glass jars.
- ✓ An ejector installed at the top of the machine acts as a vacuum pump using steam as the motive fluid. As it has no moving parts, it significantly reduces the wear that can occur on the equipment.
- ✓ A perfect vacuum/spray combination in the treatment chamber through the control mechanisms installed on the TUNIVAC will allow you to achieve a perfect result.



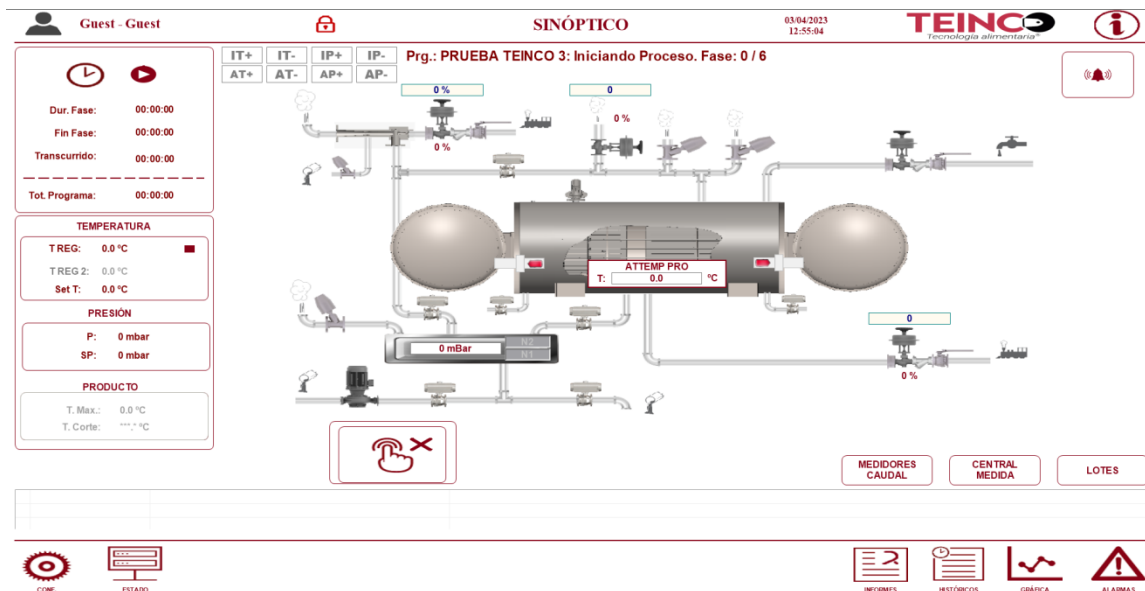
➤ **TUNIVAC® Technical Specifications**

- ✓ Number of doors: 1 or 2
- ✓ Door opening security system.
- ✓ Built in AISI 304
- ✓ Capacity from 2 to 8 carts (approx. from 1,700 kg/process to 7,100 kg/process)
- ✓ Door closing by pneumatic cylinder.
- ✓ Mechanical traction for loading and unloading of trolleys.
- ✓ Recovery of by-products.



## ➤ PLC and Control Algorithm.

- ✓ Automatic control of all process steps. Through a simple and intuitive interface to control all firing variables. Up to 12 temperature channels can be displayed simultaneously on the touch screen. The chamber temperature, pressure, humidity and 5 critical parameters of the baking process are also recorded and can be selected and stored. Fish type, fishing zone, size or other parameters.
- ✓ An elaborate control algorithm maintains the working conditions under the desired parameters. In any phase of the cycle, the operator can modify the operating parameters if necessary to adapt them to specific process conditions. Different temperature ramps can be programmed and memorized to favor a homogeneous heat penetration in the tuna loin.
- ✓ PC-based monitoring and control system with remote access.



➤ **Charging system.**

- ✓ The carriage enters the cooker by means of a mechanical drive system.

➤ **Functional characteristics.**

- ✓ Optimum product quality and yields.
- ✓ Flexibility in operation for final thawing of tuna, precooking and cooling by vacuum or spraying in the processing chamber.
- ✓ Flexible loading system for different sizes of raw material. Whole fish or tuna fillets.
- ✓ Oxygen-free cooking with oxidation reduction in the product. Oxygen elimination system with vacuum or by sweeping, selectable according to raw material requirements..
- ✓ Multizone humidity control in the treatment chamber with automatic or timed regulation of water spray. Optimization of the final result in leather and humidity of the product.
- ✓ Control of critical process variables. Treatment chamber temperature, control of temperature in thorn.
- ✓  
Elimination of cold spots. Homogenization and temperature stability in the chamber for uniformity in the treatment applied on the product.
- ✓ Specific design to prevent the entry of oxygen into the chamber due to lack of sealing or wear on doors.
- ✓ Optimized system of steam energy consumption and water. Optional energy economizer with heat recovery and reduction of boiler steam consumption during heating by up to 25%. Patent pending.
- ✓ Recovery of by-products from cooking such as fats and other products.



➤ **HERMASA-TEINCO. R+D-i applied to the optimization of the tuna cooking process.**

The development of the **TUNIVAC**® tuna cooker is the result of the intense research and development work carried out by HERMASA and TEINCO in the food and beverage in the field of the food industry and more specifically in the tuna transformation process. Thanks to this, it has been possible to develop equipment capable of providing solutions to the needs posed by the tuna processing industry.



- ✓ With the technology developed in the **TUNIVAC**® tuna cooker it is possible to minimize cleaning yield losses, reduce oxidation, dry skin and control moisture during cooking, which allows a significant economic differentiation in the production costs linked to the process and in the final quality of the product.



- ✓ In the tests carried out, the tuna processed in the TUNIVAC® cooker maintained its structure intact, allowing a proper peeling after leaving the cooker, as well as an easy and complete separation between the spine and the muscular myotomes. Thus, the applied process allowed a maximized utilization of the fish. In addition, the adequate control of the conditions of the tuna thawing and cooking process, allowed obtaining a high organoleptic quality of the tuna once cooked.



- ✓ Thawing and vacuum cooking times.

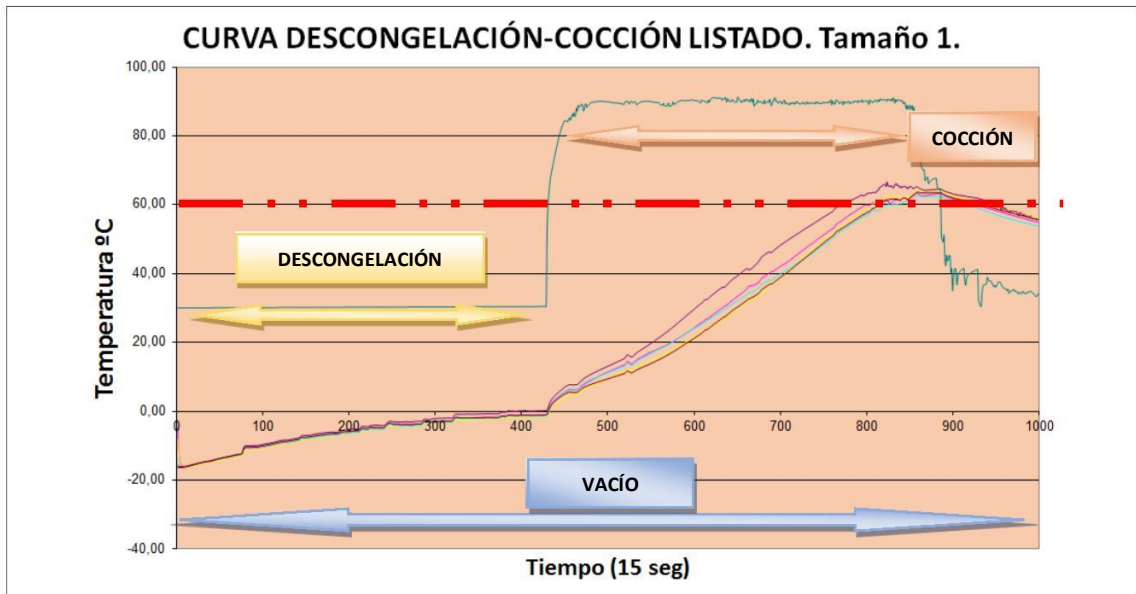
The results obtained from the times applied in the thawing and vacuum cooking tests, in this case, of skipjack tuna (*Katsuwonus pelamis*) weighing between 1,850 grams and 3,795 grams. *pelamis*) are presented below. They were grouped into two sizes of fish to avoid overcooking the smaller specimens, as shown in the table below.

Size	Weight	Defrosting time (minutes)	Cooking times. (minutes)
1	1.850 - 2.750 g	105	105
2	3.025 - 3.795 g	130	180

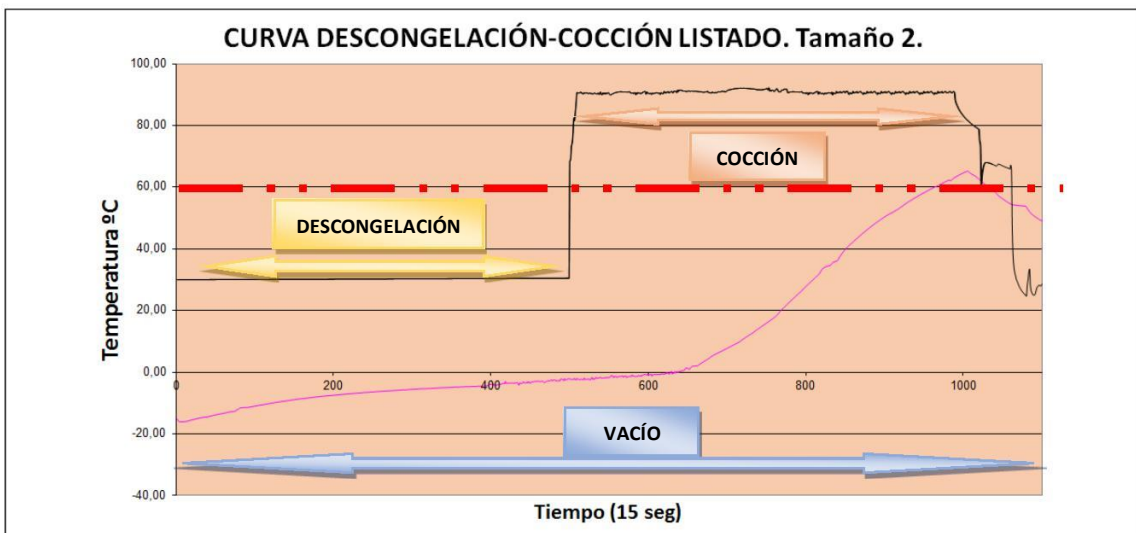


The following graphs show the applied thawing and cooking process under vacuum conditions for each of the sizes studied.

- Size 1.

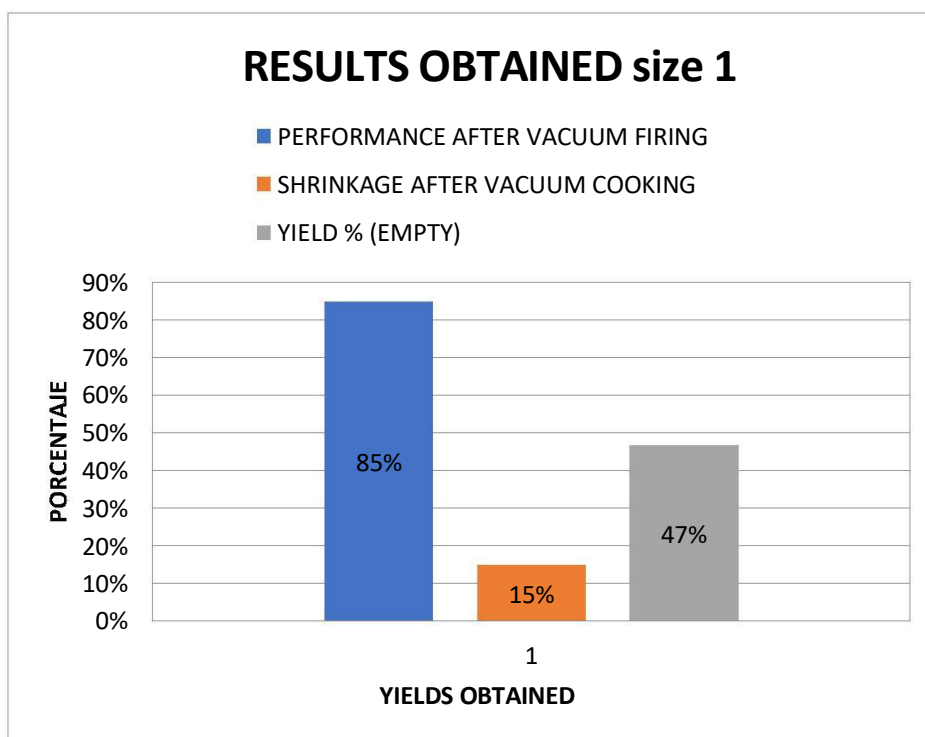
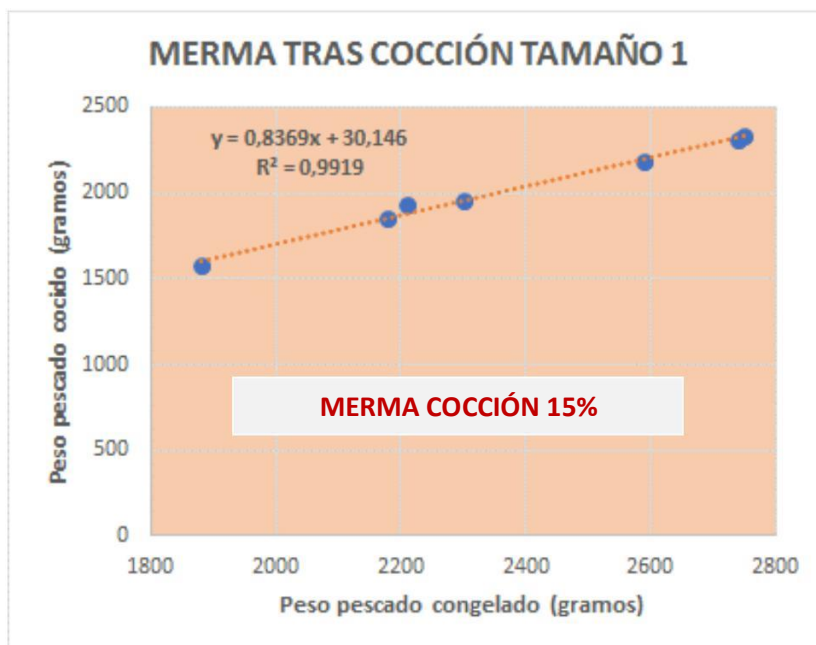


- Size 2.

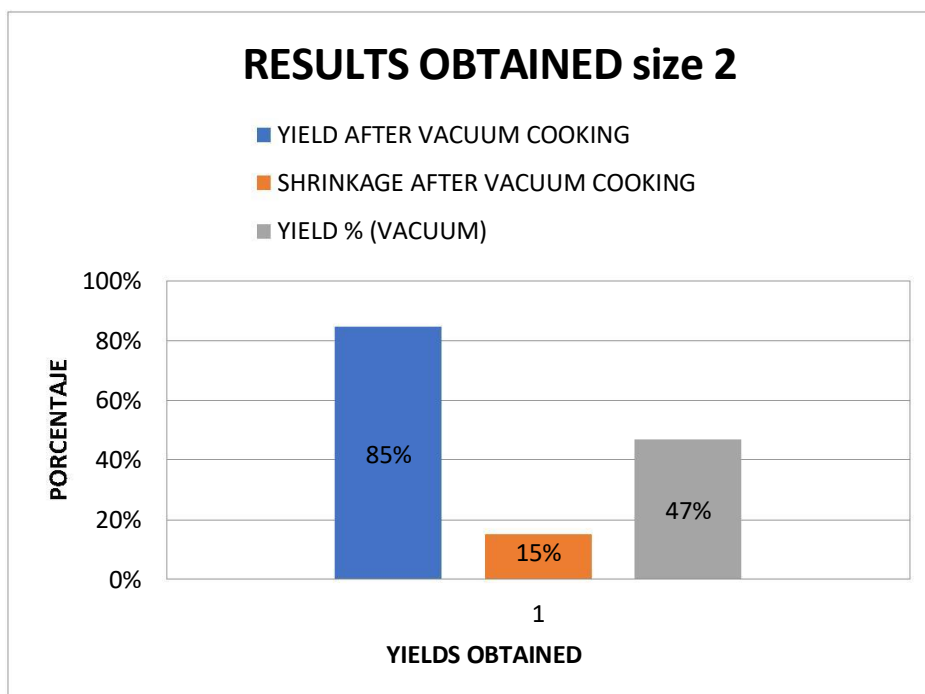
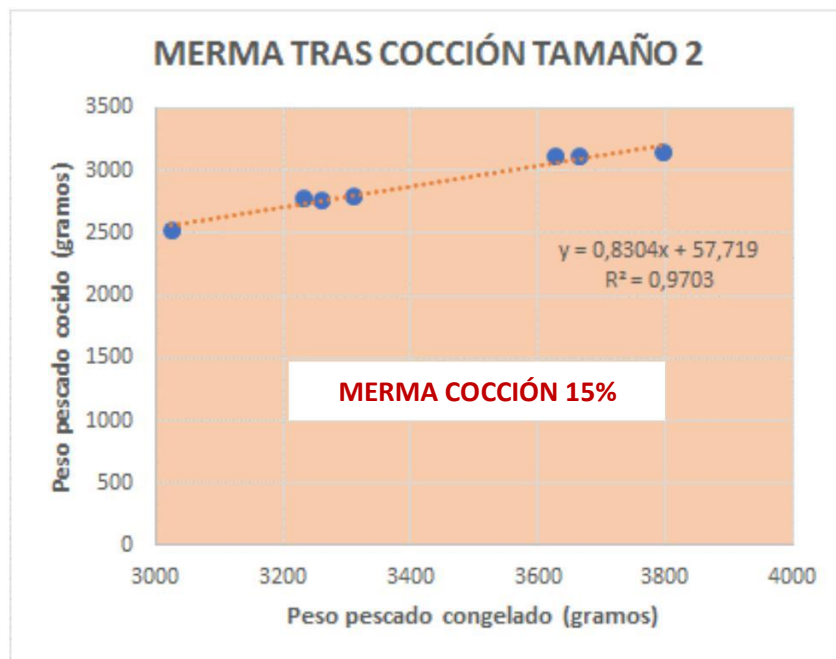


✓ Yields obtained.

○ Size 1.



- Size 2.



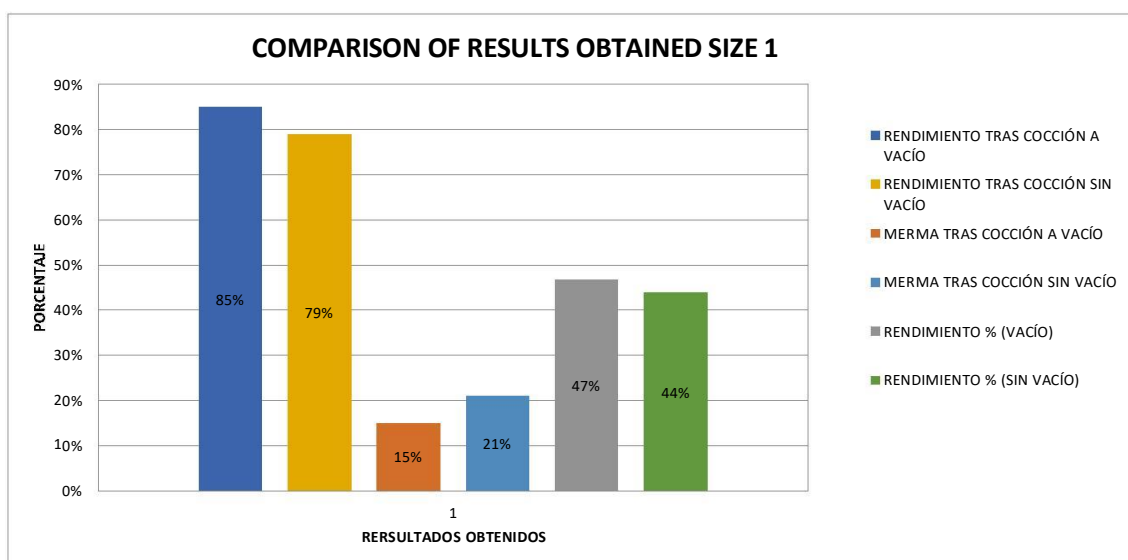
- ✓ Defrosting and cooking times without vacuum.

In parallel, similar conditions were applied with a non-vacuum firing process, the results of which compared to the vacuum firing process are shown below.

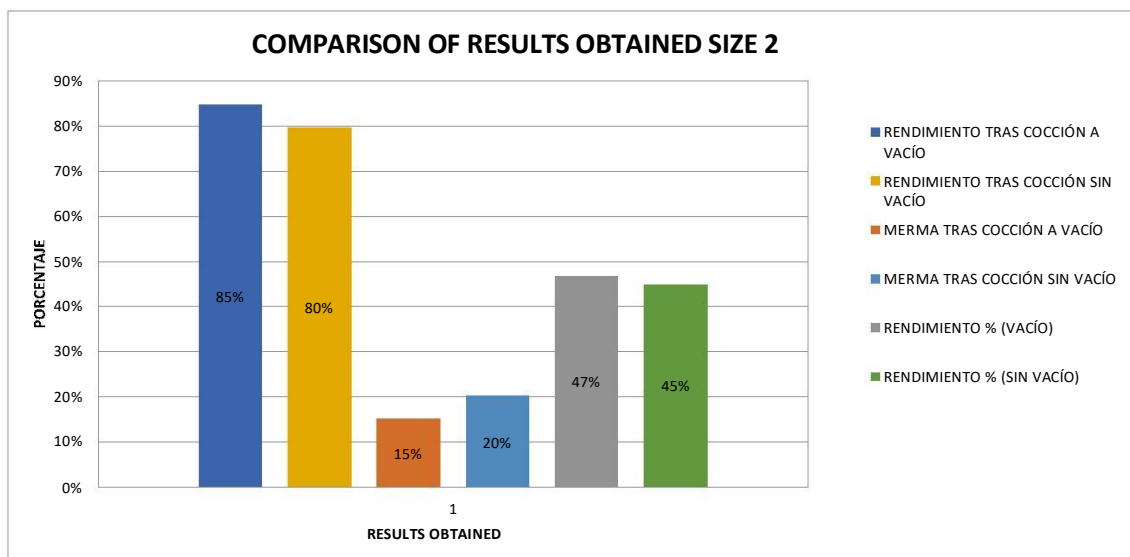
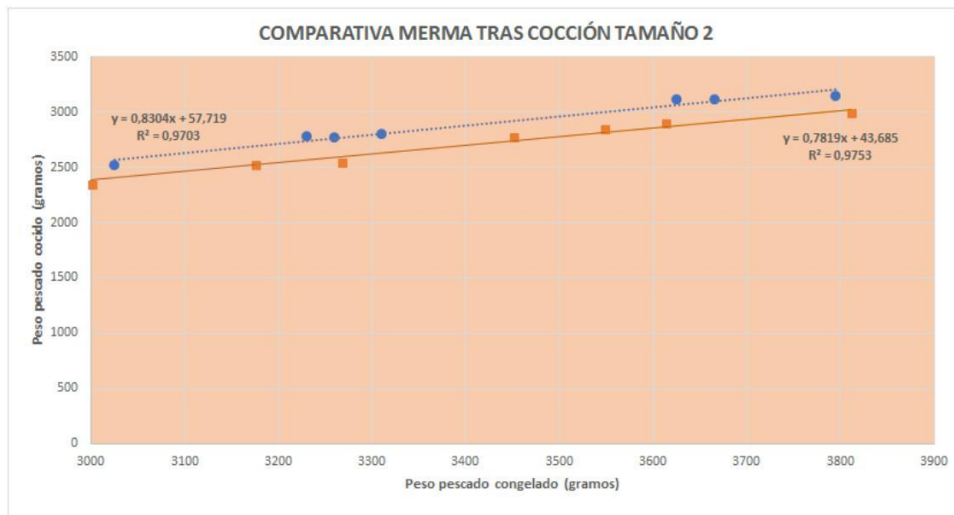
Size	Weight	Defrosting times (minutes)	Cooking times (minutes)
1	1.850 - 2.750 g	105	110
2	3.025 - 3.795 g	130	185

- ✓ Comparison of results of vacuum cooking process vs. non-vacuum cooking process.

- ✓ Size 1.



- Size 2.



The results obtained are obtained under pilot plant conditions. A customized study is recommended in order to determine the degree of improvement with respect to the normal process of the COMPANY under the customer's conditions and product..

## ➤ VALIDATION OF THE FIRING PROCESS

The U.S. Food and Drug Administration (FDA) establishes that companies that carry out tuna handling and transformation processes must implement adequate strategies to control histamine formation and eliminate or reduce as much as possible the risk of histamine formation.

The FDA establishes that these strategies should contemplate the maximum cumulative time that the fish is exposed to temperatures above 4.4 °C, so that exceeding the limit of 12 hours / 24 hours (depending on the exposure temperature) would imply the impossibility of being able to ensure the absence of elevated levels of histamine in all the pieces.

From the moment the fish is exposed to ambient temperatures above 21.1°C, the 12 hours established as a limit are insufficient to safely carry out the entire process; from thawing, cooking, cleaning and packaging, to the start of heating inside the autoclave.

To meet this stringent safety requirement, it is necessary to establish firing as a preventive process control point (critical point). This implies that the COMPANY must validate all the factors that impact the cooking time of its product and must establish an adequate sampling plan to monitor the final internal temperature of the fish to guarantee a minimum value of 60°C for the fish bone.

Your TUNIVAC® cooker guarantees you a homogeneous distribution of the process and its correct reproducibility, but we also put at your disposal our Processes Department that will help you to adapt your working procedure to meet the objectives of the Food and Drug Administration and validate your tuna cooking process with the TUNIVAC® system, as a preventive process control point under the new FSMA law.