

Optimisation of product homogeneity and reduction of residual brine in the cured ham industry

Summary

Cured ham production in Catalonia is an important part of the economy. Cured ham is the pork product with the highest economic value, generating a turnover of over €1 bn (Alimarket, 2016). Despite its economic importance, cured ham has been identified by several organisations as an unhealthy product, due to its high salt content.

Reducing the salt content in cured ham is not easy. This is partly due to the great variability of salt content between batches and within the same batch. The current process of curing ham produces very heterogeneous products. Therefore, before reducing the salt content, heterogeneity of production must first be reduced, subsequently reducing the salt content while maintaining the safety and quality (appropriate texture and aroma) of all production.

In addition, there is a clear interest on the part of society in consuming healthier products. Therefore, companies seek to incorporate nutritional claims such as 'low salt'. These products improve company competitiveness as long as the product maintains the same quality as the traditional product and the information is true.

The aim of this project is to develop innovative salting systems for the production of cured ham with a lower, homogeneous salt content, thereby reducing the discharge of residual brine and decreasing energy spending.

Objectives

The overall objective of this project was to optimise cured ham processing in order to obtain a product that is healthier (lower salt content) and higher quality (no defects and the salt bliss point), while maintaining food safety (*Listeria*) and using a sustainable process (reduction in brine discharges and energy costs).

Description of the actions carried out in the project

Several actions have been carried out at different stages of processing (raw material, the salting stage, end of the salting stage and end of process):

1. Identify and classify the most suitable raw material to permit processing that produces safe, low-salt, cured ham that is free of sensory defects (assessing raw materials).
2. Define the improvement actions during the salting process to reduce the variability of the product's salt content and brine discharges without affecting its quality.
3. Intelligent readjustment of the salting process to reduce variability in the product salt content and decrease energy use during the drying process, homogenising the characteristics of the batches and facilitating their management.
4. Characterisation, classification and specific labelling of the product, incorporating nutritional declarations and improving the competitiveness of the product.

Final results and practical recommendations

The results show that there is significant variation in fat content and weight of the raw material that reaches the companies to make cured ham. This variability can increase when there are several suppliers and can occur throughout the year. Weight and fat content are important factors that determine the process of salt acquisition by ham. For this reason, significant variability of salt content on output in the industry has been observed, with deviations of up to 2.5-3%. Categorising production by different classification systems and/or modifying some of the steps in the manufacturing process allow the deviations in salt content currently existing in the industry to be reduced. The different strategies evaluated in the project, such as flat salting and using the right amount of salt, categorising the raw material by weight and/or fat content and classification by salt content at the end of salting, are strategies that have reduced the variation in salt between batches and within the same batch. There are currently several non-destructive technologies available on the market for categorising the raw material. These are technologies based on electromagnetic induction and X-rays. The same technologies not only help optimise the production process but also characterise the final product. X-ray equipment enables estimates of the salt content in sliced and whole products (bone and block) online at the industrial level with errors of around 0.4%. The magnetic induction equipment assessed enables more accurate estimates of salt content in fresh ham (0.1%-0.3% error). With cured products, the errors obtained with lean cured boned products are similar, but higher prediction errors are obtained for other types of product (with bone and fatty products). The usefulness of the above equipment and predictive models depends on the accuracy of their prediction but also on the mean salt content and homogeneity of each company's production.

Conclusions

The proposed process modifications reduced the heterogeneity of the salt content in production. This was achieved by adapting the production process to the fat content of the raw material. However, this heterogeneity could be reduced further if other raw material quality parameters (e.g. pH, water retention capacity) or other factors that may vary throughout production were taken into account.

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Subject area(s) of application

- ☐ Agricultural production system
- ☐ Agricultural practice

<input type="checkbox"/>	Agricultural equipment and machinery
<input type="checkbox"/>	Livestock farming and animal welfare
<input type="checkbox"/>	Vegetable production and horticulture
<input type="checkbox"/>	Landscape / Territorial management
<input type="checkbox"/>	Pest and disease control
<input type="checkbox"/>	Fertilisation and nutrient management
<input type="checkbox"/>	Soil management
<input type="checkbox"/>	Genetic resources
<input type="checkbox"/>	Forestry
<input type="checkbox"/>	Water management
<input type="checkbox"/>	Climate and Climate Change
<input type="checkbox"/>	Energy management
<input type="checkbox"/>	Waste and by-product management
<input type="checkbox"/>	Biodiversity and environmental management
<input checked="" type="checkbox"/>	Food quality/processing and nutrition
<input type="checkbox"/>	Supply chain, marketing and consumption
<input type="checkbox"/>	Competitiveness and agricultural and forestry diversification
<input type="checkbox"/>	General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
GIRONA	GARROTXA GIRONÈS

Dissemination of the project (publications, seminars, multimedia, etc.)

- a) INNOVACC annual magazine 2019 where there is an article on the project. See p. 22 of the link:
https://issuu.com/innovacrevistadigital/docs/revista_innovacc_2019_ok_br
- b) Presentation at the 10th World Ham Congress, from 17 to 19 September 2019.
- c) Presentation of the Extraordinary General Assembly of INNOVACC, on 18 December 2019 See
 page 40 of the following link:
<https://www.innovacc.cat/wp-content/uploads/2020/02/0-Presentaci%C3%B3-AG-18des2019-1.pdf>
- d) Presentation of the Ordinary General Assembly of INNOVACC, on 15 June 2020
- e) INNOVACC's 2020 annual magazine, which includes an article on the project. See p. 14 of the link:
https://issuu.com/innovacrevistadigital/docs/disseny_revista_innovacc_2020_ok_2

Project website

<https://www.innovacc.cat/2018/07/23/el-projecte-optimitzacio-de-la-homogeneitat-de-producte-i-reduccio-de-salmonres-residuals-en-industria-elaboradora-de-pernills-curats-a-obtingut-un-ajut-de-grups-operatius-del-darp-20/>

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): June 2018	Total budget: €173,098.00
Completion date (month-year): September 2020	DARP funding: €70,741.56
Current status: Executed	EU funding: €53,366.44
	Own funding: €48,990.00

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Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1868/2017, of 20 June, announcing the call for the grant.



Generalitat de Catalunya
Departament d'Agricultura,
Ramaderia, Pesca i Alimentació



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