Selection of feed for gilt pigs to improve the lipid profile of high-quality cured sausages

Summary

Cured sausages are one of the fattiest foods in Spanish consumers' diet. Therefore, the meat industry plays a very important role in providing consumers with healthier foods with a better nutritional profile (Nehir and Simsek, 2012). Consequently, varying the composition of some raw materials through animal genetic selection and/or feeding could be a useful way of obtain healthier foods.

Achieving this goal without reducing the sensory quality of the food is an additional challenge, since this is what influences its acceptance and determines subsequent success in the product market.

In addition to nutritional improvement, a further concern is sustainability and environmental improvement. Hence, the project also focused on assessing the environmental profile of three types of feed used in fattening farms, in order to obtain quality feed while minimising environmental impacts.

Objectives

The general objective of the project is to improve the lipid profile of the sausages by modifying the animal's feed with the aim of improving the nutritional status of the consumers, and in short, their quality of life and well-being.

Description of the actions carried out in the project

- Study the effects of modifying the animals' feed on the lipid profile of the meat.
- Assess the viability of using pork with a better lipid profile as the raw material for the sausages being studied.
- Assess the nutritional and sensory properties of the sausages.
- Determine the colour and texture profile of the sausages.
- Assess the variation of the environmental impacts attributed to the variation of the animals' feed and identify the critical points of the value chain to optimise the consumption of resources and energy.
- Assess the impact of the incorporation of a sustainability mark on the labelling of the products as an important marketing and dissemination tool: "Sausage produced with a high-quality nutritional and environmentally responsible profile'.

Final results and practical recommendations

Results of the physico-chemical, nutritional and sensory analysis of meat and cured sausages:

- Animal feeding as well and the seasonality of fattening have a clear impact on the chemical and nutritional properties of fresh meat, in particularly its fatty acid profile.
- A special diet high in unsaturated fatty acids (UFA) is shown to increase the amount of UFA in meat significantly and reduce that of saturated fatty acids (SFA).

- This increase in UFAs is due to a particularly significant increase in polyunsaturated and monounsaturated FAs. This shows that feeding animals on a UFA-rich diet has an impact on the final nutritional profile of the meat, reducing SFAs and increasing UFAs, thereby making it healthier from a nutritional point of view.

- These changes in composition are not identified in the composition of the cured product, thus showing that longer term studies on animal diet modifications are required.

- In the cured product, although no differences are observed in chemical composition, changes were observed in terms of sensory characteristics and acceptability.

Results of the study on environmental impacts attributed to variations in animal feed:

- The study shows that feed can be produced with the appropriate nutritional quality in the fattening phase while significantly reducing environmental impact generated during production. New feed compositions show that significant reductions can be obtained in impact categories such as eutrophication, acidification or climate change compared to conventional fattening feed composition.

- A farm/reception unit for the last fattening phase does not have a notable impact on the region, minimising direct emission into the different environmental vectors (water, soil and air).

- Through correct management of the region in extensive farms/reception units, the environmental quality of the landscape, the presence of pollinators and the biodiversity of agro-industrial ecosystems can be improved.

- An even greater reduction in emissions is possible if environmental criteria, such as reducing protein content to adapt to real nutritional needs, are incorporated into the feed formulation.

Conclusions

In conclusion, it may be said that the animal's diet and its fattening season have a clear impact on the chemical and nutritional properties of fresh meat, which is especially notable in the fatty acid profile. A special diet high in unsaturated fatty acids (UFA) is shown to increase the amount of UFA in meat significantly and reduce that of saturated fatty acids (SFA). These changes in meat composition are not detected in the cured product, thereby showing that longer term studies on animal diet modifications should be carried out. Although chemical changes in cured sausage are not significant, there are sensory changes that show how other elements not analysed in this study, such volatile aroma compounds, may be modified during fattening.

Feed production is the phase in the pork production value chain with the highest environmental impact, hence improvement in feed formulations from an environmental, not just a nutritional, point of view is a key factor in improving the sustainability of the pork industry. In this context, the new feed compositions used in the last fattening phases developed within the framework of this project were shown to have a clearly better environmental profile than the conventional formulation, thereby significantly reducing the total environmental impacts per kg of pork meat marketed.

Furthermore, the feasibility of building extensive reception units for pig fattening has been demonstrated; taking sustainability and biodiversity criteria into account in the design phase of the facility has shown that agro-forestry systems can be created that improve the quality of the ecosystem and increase the biodiversity and resilience of the landscape, while also allowing profitable economic activities.

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Subject area(s) of application

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

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	OSONA

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

a) INNOVACC annual magazine 2019, where there is an article on the project. Action planned in the Project Dissemination Plan. See p. 19 of the link: https://issuu.com/innovaccrevistadigital/docs/revista_innovacc_2019_ok_br

b) Presentation of the Extraordinary General Assembly of INNOVACC, on 18 December 2019. Action planned in the Project Dissemination Plan. See page 39 of the following link: https://www.innovacc.cat/wp-content/uploads/2020/02/0-Presentaci%C3%B3-AG-18des2019-1.pdf

c) Presentation of the Ordinary General Assembly of INNOVACC, on 15 June 2020. Action planned in the Project Dissemination Plan.

Project website

https://www.innovacc.cat/2018/07/23/el-projecte-seleccio-de-l-alimentacio-de-truges-no-reproductores-per-a-la-millora-del-perfil-lipidic-dels-embotits-curats-dalta-qualitat-a-obtingut-un-ajut-de-grups/

More information on the project

PROJECT DATES	TOTAL BUDGET
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Current status: Executed	EU funding: €28,790.06
	Own funding: €26,429.06

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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.

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