Comprehensive improvement of pork meat through productive strategies at farm level and innovative, online NIRS tools for classification at slaughterhouse level

Summary

The pig industry faces the important challenge of guaranteeing consistent quality to obtain a product with homogenous and regular characteristics throughout the year. The homogeneity of the product is often compromised by the intrinsic variability of animal farming, as well as by seasonal changes in our territory, with the hot seasons being the most critical due to the thermal stress that animals endure. This thermal stress, aside from its implications for the well-being of the animals, also triggers a reduction in yield and a less homogenous, more seasonal, and more variable production. In recent years, this problem has gained importance due to climate change, especially in vulnerable zones, such as the interior region of Catalonia, rendering it essential for the sector to take measures to mitigate its effects.

One such measure is the segmentation of production at the slaughterhouse level. The classification of the product into categories with different characteristics allows maximisation of the value of the production and guarantees consistent quality for each product segment. Currently, slaughterhouses have technologies that allow the classification of carcasses and primary cuts based on weight and total fat content. This classification is not only useful to establish the price of carcasses at the origin, but also to establish product categories targeted to specific markets. Despite this, there are no other non-destructive technologies that allow the monitoring of quality parameters online. Among these parameters, intramuscular fat content and fatty acid composition are two of the most relevant variables, since they have a direct impact on the organoleptic and nutritional properties of the product.

Objectives

The main objective of this project is to improve the sensorial and nutritional quality of pork meat, and to ensure its regular and homogenous production throughout the year. To attain this objective, we have developed several innovative strategies for the current production system that will allow optimisation of the production process and will increase the economic value of the final product. On one hand, specific actions at the genetic, nutritional and handling levels will be implemented to globally improve the quality of the meat in terms of intramuscular fat content (higher level of infiltration) and of fat composition (higher content of polyunsaturated fat). We will also tackle the integration at the slaughterhouse level of a dynamic technology that enables the inspection and classification of prime matter. This technology, based on near-infrared spectroscopy (NIRS) will enable the online analysis of the characteristics of the product in a minimally invasive fashion, thus allowing the classification of the production into different categories.

Specifically, to achieve the main objective of improving the sensorial and nutritional quality of pork meat, and ensuring its regular and homogenous production, we must tackle the challenge on all fronts and with different agents of the chain. To this end, we envision the following preliminary objectives:

Objective 1. Increase in intramuscular fat to 4%.

Objective 2. Quantitative improvement of the fatty acid profile.

Objective 3. Reduction of variability: constant and homogenous quality throughout the chain.

Objective 4. Quantification and classification of the quality with dynamic NIRS-Online at the slaughterhouse

Objective 5. BIG DATA: Integration of data at the genetic, production and slaughterhouse levels.

Description of project activities

Action 1. Genetic strategy: Comparison of the different Duroc paternal lines to obtain a better quality of meat.
Action 2. Sexual strategy: Immunocastration of female pigs to obtain a better quality of meat, with increased fat infiltrates.
Action 3. Nutritional strategy: Reduction of vitamin A and protein to obtain a better quality of meat.
Action 4. Nutritional strategy: Introduction of flax to the diet.
Action 5. Genetic strategy: Introduction of York sows.
Action 6. Reduction of thermal stress to reduce heterogeneity.
Action 7. Develop a technology capable of efficiently, economically and immediately categorising meat items based on their quality characteristics.
Action 8. Use of advanced computational techniques to extract as much information as possible to optimise the productive process and quality of the final product.
Action 9. Dissemination of the project and its results.

Expected results and practical recommendations

•We aim to increase the percentage of fat infiltrates by 4%. To increase the impact of the treatments, we will combine them. The effect of the different genetic lines will be compared to the effect of immunocastration, as will the different nutritional strategies.
•To increase the percentage of omega-3 and omega-6 fatty acids, while maintaining a balanced ratio of the two.
•We envision being able to obtain the percentage of lean meat, fat and the composition profile of fatty acids in an immediate and individualised manner.
•We aim to obtain the results of the various applied treatments and with these make the necessary decisions in terms of which actions to implement at the farm level.

Operational Group Leader

Entitat: **MATADERO FRIGORÍFICO DEL CARDONER SA**

E-mail de contacte:	Tipologia d'entitat:
jordi.marti@mafrica.es	**Indústria agroalimentària**

Operational Group Coordinator

Entitat: **IRTA**

E-mail de contacte:	Tipologia d'entitat:
anna.carabus@irta.cat	**Centre de recerca**

Other Operational Group members (beneficiaries of aid)

Entitat: **AGROPECUÀRIA CATALANA SCCL**

E-mail de contacte:	Tipologia d'entitat:
ignasi@agrocat.com	**Cooperativa**

Entitat: **CATALANA DE PINSOS SA**

E-mail de contacte:	Tipologia d'entitat:
gerencia@catpinsos.com	**Indústria agroalimentària**

Other Operational Group members

Entitat: **LENZ - INSTRUMENTS, SL**

E-mail de contacte:
jacobo.alvarez@lenz-instruments.com

Tipologia d'entitat:
Empresa tecnològica

Keyword-category

Farming practice
Food quality / processing and nutrition

Territorial scope

Province	*County*
Tarragona	Bages
Lleida	
Girona	
Barcelona	

Project dissemination *(publications, seminars, multimedia...)*

- Vídeo divulgatiu (públic)
- Jornades PATT de transferència
- Fira Ramadera de Vic 2018 o 2019 (en funció de l'execució)
- Pòster a la web de les 5 empreses implicades (MAFRICA, AGROCAT, Catalana de Pinsos, LENZ Instruments I irta)

Project website

www.mafrica.es
www.irta.cat
www.agrocat.com
www.lenz-instruments.com

Other project information

Project period

Starting date (month-year): Maig 2017
End date (month-year):
Project status: *Ongoing*

Approved budget

Total budget:	**248.482,50 €**
Funding source DARP:	*100.854,52 €*
Funding source EU:	*76.083,23 €*
Own funds:	*71.544,75 €*

With the support of:

Project funded by Operation 16.01.01 (Cooperation for innovation) of the Rural Developement Program of Catalunya 2014-2020.

Basic regulation: Ordre ARP/96/2016, de 27 d'abril, per la qual s'aproven les bases reguladores dels ajuts a la cooperació per a la innovació a través del foment de la creació de grups operatius de l'Associació Europea per a la Innovació en matèria de productivitat i sostenibilitat agrícoles i la realització de projectes pilot innovadors per part d'aquests grups, i es convoquen els corresponents a 2016.

Project id.: E+C 2016