

Assessment of the use of winter peas as a Mediterranean source of protein to replace soy in diets for fattening pigs

Summary

There is an increasing need for high-protein raw materials for feed every year, and insufficient production levels in the European Union means that it is the world's leading importer of soybean meal, at 20.1 million tons per year. One way to minimise the risk involved in the high cost and availability of soy, and with a view to increasing self-sufficiency, is to use alternative sources of protein, such as local pulses adapted to the Mediterranean climate, which have low water requirements and environmental nitrogen fixation capacity. In this regard, the pilot project will consist of the assessment of the use of winter peas instead of soy in diets for fattening pigs with a primitive genotype, intended primarily for the production of cured meats (sausages and hams). The effect of anti-nutritional factors in peas (mainly protease inhibitors such as trypsin) on the production and quality parameters of fresh and cured meat will be studied by gradually increasing the peas during fattening (20%, 30%, and 40% at the start, during growth, and at the end, respectively).

Objectives

1. Analyse the technical and economic viability and sustainability of using new formulas for fattening pigs, using the winter pea as a protein source, which is adapted to the soil and climate conditions in Catalonia.
2. Study protein and amino acid needs in the three phases of pig fattening (start, growth and end), and determine the effect of anti-nutritional factors in peas, such as protease inhibitors in the diet, on production and the physiological parameters of locally bred pigs slaughtered at heavy weights (120-130 kg).
3. Study the effect on the quality of fresh and cured meat of replacing soy with winter peas, in terms of both the percentage of intramuscular fat and the fatty acid profile, and the volatile compounds involved in the aroma and the sensory quality of the cured product.

Description of the measures planned in the project

- Formulate isoprotein, isoenergetic and isoamino acid diets using soy and peas as a protein source.
- Study the production parameters of pigs in the fattening phase.
- Assess the effects of the diets on the carcass (subcutaneous fat thickness), meat (% of intramuscular fat and fatty acid composition) and cured products (volatile compounds and sensory analysis).

Expected results and practical recommendations

The project will quantify the optimum level for the inclusion of peas in the preparation of feed for fattening pigs, and will enable the various sectors in the food chain to assess their interest in the production of peas (farmers) and their use (feed producers and livestock farmers). The proposed strategy will help with decision-making for reducing costs by all those involved in the production chain, from farmers to feed producers.

This experimental trial is backed by other similar studies carried out in Spain (ITACYL, by Gómez-Izquierdo *et al.* (2019) which have obtained similar or better productive yield results with winter peas (inclusion levels ranging from 20% to 60%, depending on the fattening phase) compared to a soy-based control feed. Other international studies such as Gichobi (2008), found no differences in the production parameters when including up to 30% of peas in the diets of finishing pigs; and Stein *et al.* (2006) studied pigs weighing from 22 to 123 kg, and observed no differences in production yield or carcass quality, when supplying 36%, 48% and 66% of spring peas without soy during the different fattening phases, compared to a diet with soy and cereal. Likewise, FEDNA (2010) and Feedipedia (2016) recommend a maximum inclusion rate of peas in feed of 20% in the pig fattening phase, possibly as a preventive measure against the various anti-nutritional factors that they may present.

The hypothesis is that the pigs' age will influence tolerance levels of anti-nutritional factors arising from a feed with peas, with tolerance in the initial phases being lower than in the finishing phase, with no reductions in the productive parameters, the quality of the carcass or of high-quality cuts, the intramuscular fat content of the loin, the proportion of main fatty acids in subcutaneous fat or in the production of volatile compounds involved in the aroma of cured products.

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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

<input type="checkbox"/>	Waste and by-product management
<input type="checkbox"/>	Biodiversity and environmental management
<input 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 checked="" type="checkbox"/>	General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	BAGES

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

- Dissemination to the various stakeholders involved in the livestock farming sector in Catalonia. First, to various associations and/or livestock farms and specialists in the sector interested in introducing locally produced pulse-based alternatives in the production of pig diets; and second, talks at feed factories and to farmers who are potential pulse producers.
- Organisation of seminars as part of the annual plan (PATT) of the Catalan Ministry of Agriculture to present the results of the study; and drafting of technical data sheets for dissemination of the most important results and their implications in the Catalan agricultural and livestock sector.
- Publication of the most important results in technical journals. Dissemination through websites and official accounts on social networks of the University and the food and agriculture, forestry and veterinary campus of the University of Lleida (Facebook, Twitter).
- Finally, the thorough nature of the experimental design will enable us to study and discuss the results of farm records and analyses of meat samples (raw and cured) for international dissemination in journals with peer-reviewed assessment of the quality of the research, which will have an impact in terms of ensuring the quality of the work done.

Project website

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More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €203,361.53
Completion date (month-year):	DARP funding: €83,109.63
Current status: Underway	EU funding: €62,696.74
	Own funding: €57,555.15

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



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