Assessment of the use of winter pea, as a Mediterranean protein source, as a replacement for soybeans in diets for fattening pigs

Summary

The need for protein-providing raw materials for feed is increasing year by year, and insufficient production of these raw materials in the European Union makes it the world's largest soybean meal importer. One way to minimise the risk posed by the high cost of and dependence on soybeans, while also aiming to increase protein self-sufficiency, is to use alternative protein sources, such as local legumes adapted to the Mediterranean climate, with low water requirements. In this context, the pilot project consisted of replacing soybeans with peas, taking into account the so-called anti-nutritional factors of peas (mainly protease inhibitors, such as trypsin), by increasing the inclusion of peas during fattening (20%, 30% and 40% at start, growth and finishing), and assessing the effect on production parameters and the quality of the fresh and cured meat. The results showed that including up to 40% pea in the diet of a pig slaughtered at 140 kg is biologically feasible and an alternative to imported soybeans, as the slaughter weight and carcass weight were equal to pigs fed on soybeans. Although at the end of the completion phase, peas provided a higher conversion rate than soybeans, the cost of the diets would be the same or lower if peas were available throughout the year. Nor were there any significant differences in carcass quality or percentage of fat infiltration in the meat. In the sensory analysis of the cured pork products from pea-fed pigs, consumers rated the taste attributes, chewiness, juiciness and overall assessment positively, with no negative differences compared to the soybean control diet.



Objectives

The general objective of the project was to assess the possible effects of using peas as a substitute for soybeans in the diet of rustic genotype fattening pigs (Berkshire x Duroc), slaughtered at heavy weights, and intended mainly for the production of cured meats.

The technical objectives were to analyse technical and economic viability and sustainability in the use of new feed formulas, using peas as a protein source, adapted to the soil and climatic conditions of Catalonia. Feed was formulated to suit the protein and amino acid requirements at the three stages of pig fattening, at 40-80 kg, 80-110 kg and 110-140 kg, and the effects on production in the farm, the yield and quality of the carcass and meat, and finally the sensory evaluation of cured derived products were assessed.

Description of the actions carried out in the project

- Formulating isoproteic, isoenergetic and isoaminoacidic diets using local peas as a protein source, and soybeans as a control group, in three fattening phases: start, growth and finishing.
- Assessing the productive parameters of the pig in the fattening phase: average daily gain, average daily intake and feed conversion ratio. As well as the costs and savings from the availability of local peas to replace imported soybeans.
- Studying and assessing the feeding behaviour of pigs to determine possible effects on animal welfare and health improvements.
- Assessing the effects of diet on carcass quality (carcass weight, lean percentage, carcass yield, subcutaneous fat thickness) and meat (percentage intramuscular fat and fatty acid composition and total fatty acid profile).
- Sensory assessment of cured products, such as cured pork loin and hams, by consumers (tasting).

Final results and practical recommendations

Final results:

- The pea diet in fattening pigs produced the same slaughter and carcass weight results as with pigs fed on soybeans.
- However, pea-fed pigs at the end of the fattening phase (from 110 kg) had higher feed conversion rates than pigs fed on soya; the total cost of the pea diet was equal to and/or less than the soybean diet. The lack of local pea availability would cause the price of the diet to fluctuate over the year.
- The feeding behaviour study showed that pea-fed pigs had more passive behaviour, with less tail biting.
- In terms of carcass quality, no significant differences were observed between pea- and soybean-fed pigs (lean percentage, carcass yield and subcutaneous fat thickness). The percentage of intramuscular fat was also equal in pigs on both soya and pea diet.
- Consumers rated the sensory qualities of the cured products made from pea-fed pigs positively, equal or superior to those made from soya for attributes such as taste, chewability, succulence and overall rating.

Practical recommendations:

- The production of local peas for fattening phase pig diets would allow partial and/or full substitution of imported soybeans, without affecting the quality of meat and cured products. The current lack of availability would make it difficult to use in the formulation of diets for pigs.

Conclusions

- The pea diet in fattening pigs produced the same slaughter and carcass weight as with soybean-fed pigs.
- Pea-fed pigs at the end of the fattening phase (from 110 kg to 140 kg) had a higher feed conversion rate than soybean-fed pigs.
- In the feeding behaviour study, it was observed that pea-fed pigs showed a more passive behaviour, with less tail biting.
- For carcass quality attributes, no significant differences were observed between pigs fed pea or soybean diets (lean percentage, carcass yield and subcutaneous fat thickness). The percentage of intramuscular fat was also equal between pigs fed soy and pea diets.
- In terms of sensory qualities, cured products made from pea-fed pigs were rated positively by consumers, equal to or superior then those made from soya, for attributes such as taste, chewiness, succulence and overall rating.

Leader of the Operational Group

ORGANISATION: MATADERO FRIGORIFIC D'AVINYÓ, SA

Coordinator of the Operational Group

ORGANISATION: University of Lleida

Other members of the Operational Group (grant recipients)

ORGANISATION: Conservas AUSA, SA

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: CELLER COOPERATIU DE SALELLES, SCCL

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	BAGES

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

- "Matins d'Innovació: noves fonts de proteïna i alternatives en alimentació animal" (Innovation Mornings, new sources of protein and alternatives in animal feed) (2022): UdL. Actuacions de recerca i innovació en alimentació animal (Research and innovation actions in animal nutrition)
- Animals | Free Full-Text | Locally Grown Crops and Immunocastration in Fattening Heavy Pigs: Effects on Performance and Welfare (mdpi.com)
- UdL news: "El pèsol d'hivern, possible alternativa a la soja pels porcs d'engreix" (Winter pea, a possible alternative to soybeans for fattening pigs) (udl.cat)
- Catalan News Agency: "Estudien el pèsol d'hivern com a possible alternativa a la soja pels porcs d'engreix La República" (Winter pea studied as a possible alternative to soybeans for fattening pigs) La República (larepublica.cat)

Project website

https://grupdavinyo.com/ca

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €203,361.53
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sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1531/2019, of 28 May, announcing the call for the grant.

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