





## Una manera de hacer Europa



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# Programa Operativo de Castilla y León

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Fondo Europeo de Desarrollo Regional

## Good Practice presented by the Agricultural Technological Institute of Castilla y León consisting in improving the pig production and reproduction technology, TECNIPOR.

The Castilla y León Agricultural Technology Institute, hereinafter ITACyL, co-finances the development of knowledge generation projects related to strategic regional sectors, to improve the sustainable competitiveness of the regional agricultural and agri-food sector. These projects include that entitled "Improvement of pig production and reproduction technology", which aims to clarify different aspects related to nutrition (legumes for feed) and genetic resources (semen conservation) of this livestock species.

The project, which is presented as a good practice, covers the entire value chain, from agricultural production, with the study of leguminous plants as an alternative source of protein to soybeans, to the improvement of current pig production and reproduction systems. It studies local crops that serve as an alternative to soya in animal feed, which is important because it boosts the regional agricultural sector, while reducing dependence on imports, mainly from America, as this crop, which is the basis of many animal feeds, does not occur in Europe.

Work is being carried out to ensure that these new raw materials become part of the feed of this species of pigs, which must be improved in a sustainable way, allowing better growth of the animals and a quality end product.

In addition, the TECNIPOR project seeks to improve pig reproduction systems. To this end, semen conservation protocols are being updated and new methods are being created to improve insemination systems in order to improve production rates while respecting animal welfare.

The project's total budget amounts to 128,063 euros, from which ERDF aid amounts to 64,031 euros.

With this project, a saving of up to 20% in the cost of production is achieved by replacing the use of soya in pig feed, a raw material imported from Argentina, the USA or Brazil, with other sources of protein, such as local legumes.

This action is considered a good practice as it meets the following criteria:

## 1. The operation has been appropriately disseminated to beneficiaries, potential beneficiaries and the general public.

You can access the project's information through the website and social media of the Instituto Tecnológico Agrario de Castilla y León (Agricultural Technological Institute of Castilla y León), in the section of Research and innovation in livestock (genetics and animal reproduction) or through the specific section <a href="http://www.itacyl.es/investigacion-e-innovacion/nuevo-modelo-de-investigacion-agraria-y-agroalimentaria-de-castilla-y-leon/financiacion-de-proyectos/feder?showDifusion=1">http://www.itacyl.es/investigacion-e-innovacion/nuevo-modelo-de-investigacion-agraria-y-agroalimentaria-de-castilla-y-leon/financiacion-de-proyectos/feder?showDifusion=1</a>



#### **Infographics**



The project has also been disseminated through a video that can be accessed from the ITACyL website.

The action's co-financing is also informed through plaques that are placed on the livestock buildings and laboratories where most of the work is carried out.



The results are disclosed on ITACyL's social media (Facebook and twitter). Mention is made of the ERDF in all cases.





On the other hand, the results and goals of the project have been disclosed as a good practice in transfer actions among different groups, from the scientific to the primary sector, through different events, forums and conferences.

Research and Health Conference of the Andrés Laguna Association (Segovia, 15th March 2019)



1St Forum on the Countryside, Innovation and future. Pig sector. Chatún (Segovia) and Angel Fair in Fuentepelayo (Segovia) on 5 March 2020







CONFERENCE at the University of Salamanca for students of the UNIVERSITY MASTER'S DEGREE IN AGRICULTURAL ENGINEERING. Faculty of Agricultural and Environmental Sciences of the University of Salamanca (2018-2019).





Similarly, disclosure actions haves been carried out through congresses and scientific articles, such as the National Congress. Eighteenth Conference on Animal Production and the Interprofessional Association for Agricultural Development (AIDA; May, 2019), with these two papers and the International Congress of the Spanish Association of Animal Reproduction (Toledo 7-8/09/2019) and at the European Society for Domestic Animals Reproduction (ESDAR) Congress, Córdoba 28/09/2018.



Aspartate aminotransferase (AST) activity in seminal plasma and their relation with sperm freezability in Iberian and Pietrain

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Aspartate aminotransferase (AST) activity has been evaluated and correlated with sperm motility and cellular damage in boar semen. And both, in pigs and in other species its increase has been related to damage associated with cold shock and freezing. The objective of this study was to relate the levels of AST in seminal plasma (SP) with the sperm freezability in Iberian and Pietrain pig.

Two aliquots from 35 Iberian, and 21 Pietrain ejaculates were centrifuged to recover the SP (5000 x g/30 min), or the sperm pellet (2400 x g/30 min) which was frozen with fructose-egg yolk-glycerol (Iberian sperm) or lactose-egg yolk-glycerol (Pietrain sperm). Post-thaw sperm samples were assessed at 30 min for the percentage of total motile sperm (%TM; CASA system), and the percentage of live sperm (%LS; fluorescence microscope SYBR14/PI). After this, 2 groups were determined by their freezability resistance with significant difference (P<0.05) (Iberian: High: H, n=19; Low: L, n=16; %TM: 50.1% vs. 29.9%±1.44; %LS: 55.6% vs. 42.3%±1.37; respectively; Pietrain: High: H, n=13; Low: L, n=8; %TM: 41.9% vs. 20.9%±1.69; %LS: 53.7% vs. 43.2%±1.88; respectively by cluster contine AST activity (III) of SP was

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#### 2. The actions incorporate innovative elements.

This action addresses two major problems that the pig sector faces today: the sources of protein in feed and the conservation of seminal doses.

The inclusion of leguminous plants native to Castilla y León in the feed is innovative. It is intended to provide a cost-effective, affordable and nutritionally efficient source of protein, involving the regional agricultural sector.

On the other hand, the conservation of seminal doses through cryopreservation techniques and/or new methods is also an innovation. At present the artificial insemination systems, although they work correctly for the sector's demand, have a problem which is that of the temporary viability of the sperm cells, a situation that complicates the management of the whole process, that is to say: production, storage-conservation, distribution and in short the quality of the seminal doses.

#### 3. Adapting the results obtained to the established goals.

The general goals of the TECNIPOR project are promoting pig production from the nutritional and reproduction point of view, especially in the Iberian pig breed, which has been less studied and selected than the white layer breeds.

The local legumes that were tested in the TECNIPORC project feeds (alberjon, titarro, winter pea) are a viable alternative to soya, even replacing it completely, with the possibility, in the case of alberjon, of controlling the intake, growth and therefore the age of slaughter (adapting it to the Iberian pig standard).

On the other hand, they are of great economic interest for agriculture due to their productive capacity and resistance to adverse environmental conditions and to the usual pathologies of legumes.

In the case of trials with seminal cryopreservatives, i.e. compounds that protect the spermatozoa from damage caused by freezing, the results represent improvements for a more durable preservation of semen, facilitating its handling and, by extension, its production costs.

## 4. Contribution to the resolution of a problem or weakness detected in the territorial scope of implementation.

This project contributes to identifying native legume varieties of agronomic interest (productive, disease resistant), with low and/or acceptable levels of natural compounds present in legumes that reduce the digestibility of the diet (bioactive factors). Varieties of leguminous plants with acceptable levels of compounds called bioactive factors need to be obtained, as certain levels can cause problems in digestibility, preventing the animals from assimilating the nutrients, in extreme cases even rejecting the feed. Only legumes with acceptable levels of these compounds may be incorporated as part of pig feed. This will benefit agricultural and livestock farmers, the environment and consumers, without depending on soybean exports from America.

In the same way, an improvement in the conservation of the seminal doses increases their viability and enables its management, reducing the costs for the farmers.

#### 5. High coverage of the target population.

The pig sector represents 14% of the final agricultural production in our country, occupying, with 39%, the first place in final livestock production in terms of economic importance. It is, therefore, the most important sector of our livestock farming and the one that contributes most to the income of our livestock farmers.

Spain is currently the third largest producer of pigs in the world after China and the USA. In the EU Spain leads the pig census being the second largest producer of meat of this species, with 19% of the tons produced.

In addition, Spain has a self-sufficiency surplus (it produces 188% of the country's needs), which makes exports a key element for market balance.

If we refer to Castilla y León, our Autonomous Community has an undeniable weight in the national pig industry. In 2019 its census represented 14% of the Spanish census, with nearly 7 million slaughterings and 13.6% of the pork produced (633,000 t).

The actions carried out so far in this sector, plus those planned, will provide the sector with sufficient information on the possible improvements obtained with this project, from farmers and stockbreeders to consumers (and public opinion), without forgetting the insemination centres.

In addition to the disclosure carried out in congresses attended by researchers and technicians of pig production companies, the results are disseminated in social media of ITACYL (Facebook and twitter) and on the web. Visits are received from pig companies at the Pig Testing Centre where the purposes and results of the project are explained to them.

### 6. Consideration of the cross-cutting equal opportunities and non-discrimination criteria, in addition to social responsibility and environmental sustainability.

From the point of view of its impact, the operation presented as a good practice has a neutral effect on the principle of equality between men and women.

In addition, the activities to be developed in this project are defined in the context of a sustainable agrifood system, which promotes the respectful use of technology and agricultural practices, so as to maintain or increase productivity without depleting or damaging natural resources.

The use of new varieties of legumes will reduce dependence on soybean supply from third countries, resulting in less movement of these goods with the consequent reduction of CO<sub>2</sub> and energy costs (local products and circular economy).

#### 7 Synergies with other policies or public intervention instruments.

This project is related to regional strategic sectors, identified in the Smart Specialisation Strategy of Castilla y León, 2014 - 2020, focused on agri-food and natural resources. Specifically in R+D+i in Livestock and Aquaculture, seeking to increase the sustainability, quality and profitability of production, genetic improvement and animal reproduction, in addition to innovation in processes, products and services.

The good practice presented is also in line with the Rural Development Programme of Castilla y León which promotes the Iberian sector and high value-added arable crops.

In the same way it is in line with the European Strategy Horizon 2020, and the new Horizon Europe Strategy 2021-2027 and the EU Biodiversity Strategy for 2030, where the European Union opens different ways to promote the production of vegetable proteins (native legumes).







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