# REDUCE\_PORK IMPACT\_TED2021-129454B-I00

A DMP created using CORA. eiNa DMP

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Grant number: TED2021-129454B-I00

#### Project abstract:

The pork production is one of the major industries in Spain. However, the size of this productive sector, and the geographical concentration of farms, is rising an increasing debate about their environmental risks, with an enormous impact on the social perception. Several environmental issues are related to pork production, including those derived from crop cultivation for feed (feeding pigs requires large amount of feed resources), enteric emissions (minor for pigs), and emissions in pids and ponds during farm storage and from manure management and treatment (pigs excrete annually large amounts of organic matter, nitrogen and phosphorus to the environment). The last one is usually the most evident locally and represent a main concern of acidification and eutrophication.

The project proposes that a great potential exists to reduce environmental impacts of the swine industry, while preserving their competitiveness. The goals of this ambitious project are i) - to provide evidences about the full potential of approximate and connect crop and pig production in new more sustainable and social attractive systems to reduce agricultural waste and GHG emissions, including the proper treatment and use of slurries as fertilizers through coupling the crop and livestock production, and the utility of enhancing the feed use of local more sustainable protein crops and byproducts (e.g. spring peas, faba beans, sunflower or rapeseed meal and processed

animal proteins) and new rye or white shorgum varieties as energy sources; ii) - develop equations and rapid digital tools to characterize the growing pig body nitrogen and phosphorus retention, and predict feed digestibility values and N and P balance in pigs; iii) make use of the previous information on feed values, nutrient requirements and N & P balances to develop a multiobjective formulation approach and manure estimation model, to best fit the protein deposition curves, environmental impact and economic objectives in different scenarios (e.g. prices of energy and protein, and pig products, pig genotypes, feeding and management practices, sanitary status, among others); iv.- provide inputs to improve Best Available Techniques values and data to align the objectives of RD 306/2020 at the ECOGAN pollutant emissions management system of the Spanish Ministerio de Agricultura, Pesca y Alimentación; v.- provide environmental Life Cycle

Assessment indicators as input data to supply the multi-objective decision tool for the holistic management of the pig industry and its value chain. Novel methodologies and circular economy strategies, that enables to include sustainability objectives, in addition to economic ones, in assessing feed formulation, farming management, and manure operation decisions using life cycle assessment (LCA) approach based on ISO14040:2006, will allow to reduce the environmental impacts of the pig production, while not penalizing animal growth performance,

efficiency and return. The technological approach and solution will be a model to be replicated for the rest of livestock production sectors.

Last modified: 22-03-2023

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# 1. Data summary

#### Provide a data summary

The data will originate from measurements registered of nutritional value of ingredients, the body composition of the animals, and the manure emission in farms (experimental and commercial), and from lab analyses of samples taken from these animals for physiological, productive and environmental conditions. It will be used in meeting the project's objectives and in conference and peer-reviewed publications.

Experimental data will be collected by the research team in order to meet objectives: Objective 1: Develop a multi-objective feed formulation tool that integrates animal growth models and evaluates manure management strategies and feeding impact to include sustainability objectives, in addition to economic ones, in the management of the pig industry. Objective 2: -Demonstrate and provide evidences about the utility and opportunity of enhancing crop production, specially of new local more sustainable protein and cereal crops, and the use of byproducts to close link the animal husbandry (including the anaerobic fermentation of manure and the proper use of slurries as fertilizers through coupling of crop and livestock production) to reduce agricultural waste and GHG emissions. Objective 3: -Provide environmental Life Cycle Assessment indicators to be used in the multi-objective decision tool, with the aim of a comprehensive management of the pig industry and its value chain.

Environmental sustainability will be allocated at the center of decision objectives to align the future competitiveness of the swine industry with the development of rural areas, and the emerging need to attend the environmental sustainability of the livestock production. A triangular design will provide a leading role to the pig companies to find and propose best environmental and economic solutions for the feeding and management of animals and manure at different productive scenarios or geographical areas. The operations will assume that the inherent design of feed formulas, considering the enhanced use of more sustainable cereal and protein sources, with a genuine improvement of feed evaluation tools and knowledge of protein body deposition curves, and manure management strategies, including the proper use of slurries as fertilizers through coupling of crop and livestock production and new technologies for reducing and recovering emissions, will have a major influence on the economic and environmental impact of the pig production.

#### 1.B Data Type & Format

The majority of the data will be in ASCII (American Standard Code for Information Interchange) data files, eg comma separated variable (CSV) format, which can be imported into rich-text files for word-processing or into spreadsheets. If specialised software is used, then information about free readers will be provided. Data will be generated in the following formats: Graphics: jpeg, odg, pdf, png, pttx

Tables: odsu, opj, xlsx Text: docx, pdf, txt Other: nb, cpp

#### 1.C Re-use of existing data

Not expected

1. D Data Origin

The data will originate from experiments performed along the project at experimental and commercial facilities. Data may also originate from the collaboration with other colleagues at SNiBA, UAB and IRTA

#### 1. E Data Size

The expected size of the data is not currently known, but it is likely to be <10 GB with individual files being ≤50 MB.

#### 1. F Data Suitability

The data will be suitable for use by other research groups working on the following topics: animal efficiency, microbiology, genotyping, animal behavior, nutrition

# 2. FAIR Data

2.1 Data findable (including metadata)

## 2.1.A

The institutional repository provides a unique URL to access the document with the format doi asignado y/o dominio uab [ddd.uab.cat/record/numregistro]

## 2.1. B

Files will be structured in terms of project and objective identification, and figure and filenames.

2.1. C

All open project results deposited in a repository will provide search keywords together with their metadata. Keywords for open data will be selected from controlled vocabularies that are suitable for the specific type of data. 2.1. D

Version control mechanisms should be established and documented before any data are collected or generated.

2.1. E

The data are expected to be provided in ANSI SQL, XML or text (ASCII) format. For this dataset, data citation and metadata practices derived from the community will be considered.

## 2.2 Data accessible

2.2.A About which data will be made openly available

When no embargo period applies and a data package related to a case study has been marked as public, it will be made openly available. Only data gathered by partners outside of the project work plan and protected by IPR, or inside the work plan but containing confidential information will be kept closed for privacy reasons.

2.2. B About how the data will be made available

Potential users will find out about the data through publications. Data will be made available on publication of the associated paper and will be made accessible on request, under conditions agreed on a case-by-case basis, and after agreement of the project consortium. Once processing, quality control, organisation, analysis and publication are complete, the data will be made accessible by deposition in open access repositories.

2.2. C About methods and software tools needed to access the data

The data will be accessible using the following software: MS Office, Open Office, Adobe Reader, Image Viewer.

2.2. D and E Specific software

Standard publicly available software will be used where possible, but if specialist software tools are developed, i.e. created within Matlab, a short text file (e.g. ASCII) will be provided with the data file to explain the software required. The majority of the software programmes are available as commercial products or as freeware.

2.2. F Where to store project data

Data, metadata, documents will be stored in the institutional research data repository DDD

2.2. G Have you explored the appropriate arrangements with the repository

The DDD, the UAB Digital Repository of Documents, is the tool that collects, manages, disseminates and preserves the scientific, educational and institutional production of the University. The DDD repository shows an organized, open access and interoperable collection.

2.2. H Any restrictions on use?

Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0)

2.2. I Need for a data access committee.

Because of the small scale of these experiments, there is no need for a data access committee.

2.2. J Conditions for access

Free but under conditions established in 2.2.H

## 2.2. K Identity of the person accessing the data

Identity of the person accessing the data will not be directly ascertained. However, we expect users to follow the standard norms of scientific citation and use of the data in this context will be tracked through scientific citation.

#### 2.3 Data interoperable

## 2.3. A Interoperability of our data

The data produced in the project will be interoperable as the datasets will adhere to standardised formats: ASCII, txt, csv, xml, tiff. If MS Office, pdf viewer or image viewer cannot be used, a text (ASCII) file will be provided with the dataset that explains where a free reader can be obtained. Other types of data have been registered following internal codifications, clearly specified within the file.

#### 2.4 Data reusable

## 2.4. A How

We will use Creative Commons licences. When reusable dataset is deposited to the repository, an Attribution-NonCommercial license (by-nc) will be requested.

## 2.4. B When

The data will remain re-usable after the end of the project by anyone interested in it, with no access or time restrictions.

2.4. C Specify whether the data will be usable by third parties and conditions

Each archived data set will have its own permanent repository ID and will be easily accessible. We expect most of the data generated to be made available without restrictions and only data sets subject to IPR and confidentiality issues will be restricted. Where this is going to be the case, agreements will be made based on the individual data sets. Requests for the use of the data by externals will be approved by the project consortium.

2.4. D

The data quality is ensured by different measures. These include validation of the sample, replication and comparison with results of similar studies and control of systematic distortion.

2.4.E

For re-usability the data will be stored on the webpage or on a repository system when implemented for at least ten years.

## 3. Allocation of resources

Explain the allocation of resources

There are no costs associated to the described mechanisms to make the database FAIR and long term preserved. The project coordinators or IPs have the ultimate responsibility for the data management in the project

## 4. Data security

Address data recovery as well as secure storage and transfer of sensitive data

Institutional servers and backups of the UAB Information Service.

The DDD preservation policy aims to ease and guarantee access, in the medium and long term, to its digital content. The Universitat Autònoma de Barcelona is committed to devote efforts and allocate resources in order to preserve University documents created or managed in a digital support and archived in the institutional repository, to guarantee access to them in the future, and entrusts the management of this goal to the Library Service and the IT Service.

## 5. Ethical aspects

To be covered in the context of the ethics review, ethics section of DoA and ethics deliverables. Include references and related technical aspects if not covered by the former

ETHICAL ISSUES: The use of animals for research purposes is necessary in the three main objectives. Due to the lack of alternative procedures available to replace the use of animals, we have designed all the experiments according to European and Spanish laws on the protection of animals used for scientific purposes (Directive 2010/63/EU, R.D. 53/2013) and the 3Rs criteria.

## 6. Other issue

Refer to other national/funder/sectorial/departmental procedures for data management that you are using (if any)

As part of Universitat Autònoma de Barcelona commitment to ensuring FAIR and Open data, all research active staff (Postdoctoral fellows, PhD students) are expected to prepare DMPs for their own data, as per the University's Research Data Management Policy. The UAB data management policy defines research data as "the evidence that underpins the answer to the research question and can be used to validate findings regardless of its form." Thus, data covers quantitative and qualitative statements, raw data from measurements and derived data—either cleaned or extracted from a researcher's primary dataset or derived from an existing source.

# 7. Futher support in developing your DMP

Further support in developing your DMP

This DMP has been created with the tool "eiNa DMP" (https://dmp.csuc.cat).