NeoGiANT

The power of grape extracts: antimicrobial and antioxidant properties to prevent the use of antibiotics in farmed animals: 101036768

D8.1

Due date of deliverable: 30/11/2022

Actual submission date: 29/11/2022

Horizon 2020
European Union Funding
for Research & Innovation

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PROJECT INFORMATION

Project full title: The power of grape extracts: antimicrobial and antioxidant properties to prevent the use of antibiotics in farmed animals

Acronym: NeoGiANT

Call: H2020-LC-GD-2020-4

Topic: LC-GD-6-1-2020

Start date: 1st October 2021

Duration: 48 months

List of participants:

No.	Acronym	Participant organisation name	Country
1 (Coord)	USC	Universidade de Santiago de Compostela	Spain
2	MRI	Moredun Research Institute	United Kingdom
3	IBPRS	Instytut Biotechnologii Przemysłu Rolno-Spożywczego im. prof. Wacława Dąbrowskiego	Poland
4	VRI	Veterinary Research Institute	Czech Republic
5	MATE	Nemzeti Agrárkutatási és Innovációs Központ	Hungary
6	FUB	Freie Universität Berlin	Germany
7	FCUP	Universidade do Porto – Faculdade de Ciências	Portugal
8	ULL	Universidad de La Laguna	Spain
9	UNE	Asociación Española de normalización	Spain
10	JU	Jihočeská Univerzita	Czech Republic
11	CONICET	Consejo Nacional de Investigaciones Científicas y Técnicas	Argentina
12	ASAJA	Asociación Agraria de Jóvenes Agricultores	Spain
13	ATM	Anitom S.L	Belgium
14	i-GRAPE	i-GRAPE	Spain
15	CTA	Contactica S.L	Spain
16	NUS	Nutrition Science	Belgium
17	CZV	CZ VACCINES	Spain
18	LBE	LIFEBIOENCAPSULATION SL	Spain
19	BIAN	BIANOR BIOTECH	Spain
20	MAGA	MAGAPOR S.L.	Spain

DELIVERABLE DETAILS

Document Number:	D8.1
Document Title:	Data collection template for LCSA and process eco-design of NeoGiANT
Dissemination level	PU – Public
Period:	PR1
WP:	WP8
Task:	Task 8.1
Author:	CONTACTICA S.L.
Abstract:	D8.1 is a data collection template designed for partners to introduce parameters and values from best experiments with grape marc extraction and product formulation to be used in Life Cycle Sustainability Assessment (LCSA) and process eco-design in WP8.

Version	Date	Change
1	25/11/2022	Version 1

Disclaimer

The views and opinions expressed in this document reflect only the authors' views, and not necessarily those of the European Commission.

1 INTRODUCTION

This document shows the data collection template that has been designed for partners to introduce parameters and values from best experiments with grape marc extraction to be used in Life Cycle Sustainability Assessment (LCSA) and process eco-design in WP8.

1.1 Key information about data collection template:

Regarding the collection of the required data, which includes various types of sensitive and massive information, the authors would like to highlight that:

- The actual instrument that will be used to collect information is an excel file containing all tables to be completed. Not all partners will have to fill all tabs, as the information collection follows the Life Cycle stages of NeoGiANT product and consequently requires different information alongside the value chain.
- The data collection will be performed by means of interview sessions with partners to instruct them on how to use the spreadsheet, and, in some cases, collect raw data from partners for subsequent processing and input on the spreadsheet by CTA.
- It is assumed that all shared data is confidential and will be used by CTA only for the purposes of WP8.

1.2 Objectives of Data collection template

As the WP8 aims for a full LCSA assessment of NeoGiANT solutions from environmental, economic and social perspective, different types of data are required to perform a coherent analysis: from material resource use to price range of final products, various tables have been prepared to follow the life cycle stages of the NeoGiANT solutions from cradle (i.e.., grape marc obtention) to grave (i.e.., final application on animals). In parallel, to perform the simulation of grape extraction and evaluate the feasibility of scale-up processes, it is highly desirable to gather tables from different experiments (different solvents, trials, conditions, applications etc) and compositions, to improve the accuracy of the simulation and the eco-design assessment.

1.3 Template use instructions

Cells have been customized to guide you to know where to put each type of information.

Partners are asked to follow the colour code indicated on Table 1.

Table 1. Colour code of data collection template

TEMPLATE SECTION	**READ ONLY**: title of section - helps guide which project sector is being studied
Requisite	**READ-ONLY**: details of the requisite or parameter that is being requested
input (any text)	**FILL IN** cell with text-type data (and numbers if necessary)
input (numbers)	**FILL IN** cell with numeric-type data
input (drop down list)	**FILL IN** cell by chosing from drop down list. If you do not find the option adequate to your case, choose **OTHER** and describe issue on comments section
> Comments, suggestions and guidance from the template - to be overwritten or deleted	**OVERWRITE** cell with additional information or **DELETE** text as needed. As new information is introduced, the color of the comments in gray text should be changed to black. Any information left in gray will not be considered as official input.

1.4 Index of tabs and tables

To facilitate navigation, the opening tab of the Excel file has a welcome page with an index of tables. The data collection template is composed of the following tables, each one on its specific excel tab:

- Flow Diagrams
- Compositions
- Extract Inputs, Outputs & Costs
- Extraction Process & Equipment
- Formulations Inputs, Outputs & Costs
- Formulation Process & Equipment
- Product storage & Stability
- End-user Requirements

2 FLOW DIAGRAM TAB

This tab is a blank page reserved for partners to introduce any flow chart, drawing, scheme that may help to clarify their process.

3 COMPOSITIONS

For the accuracy of process simulations, the full compositions of the materials used and obtained in the extraction process should be disclosed. Especially for the grape marc extraction process, it is desired that partners disclose the full composition, i.e., components with their CAS numbers and percentage, all adding up to 100%, of the following raw materials:

- GRAPE MARC
- SOLVENTS
- DISPERSANT (SAND)

Additionally, it is highly desirable to have access to the composition obtained for some intermediate streams, by-products and, of course, the final product:

- CAKE RESIDUE
- EXTRACT COMPOSITION
- OTHERS (template available as needed)

Below on Table 2 are two examples of the composition template:

Table 2. Composition template examples

Grape marc composition				
Description	*> Raw material obtained from wine makers. Add the most accurate composition that adds up to 100% mass.*			
Sample code				
Component	**CAS#**	**Quantity**	**Unit**	**Comment**

Dispersant / Sand composition				
Description	*> Dispersant (sand) used in the grape marc fragmentation operation. Add any relevant information about the sand.*			
Sample code		**Particle size**		**µm**
Component	**CAS#**	**Quantity**	**Unit**	**Comment**

4 EXTRACT INPUTS, OUTPUTS & COSTS

This table covers the life cycle of the grape extract from grape marc sourcing to extract obtention. This table will be filled in for every extract sample that may have resulted into promising extract. Here, for every stage, information will be required to perform assessments about:

- Job creation potential: feedstock annual availability.
- LCA: gathering of resources used to manufacture the extract and outputs:
  - Material and energy inputs (solvents, utilities, and other relevant variables used).
  - Material outputs (compute any losses, residues, products, or by-products generated).
- LCC: investment needed to purchase and operate (energy requirements) key equipment to execute every stage of the process and unitary costs of energy and materials.

The structure designed for data collection of this section is shown on table 3.

Table 3. Extract inputs, outputs & costs

Back to Intoduction	EXTRACT DEVELOPMENT - INPUTS, OUTPUTS & COSTS																				
	Extract Sample code				Comments about experiment																
	Effort information				INPUT (process parameters, entries)						OUTPUT (products, by-products, residues)						Production equipment information				
Life Cycle stage	Duration of stage process (h)	Number of workers required	Effort of workers per stage (h)	Workforce cost (€/h)	Input parameter	Quantity input (min)	Quantity input (max)	Unit input	Unitary price (€/unit)	Comment	Output parameter	Quantity output (min)	Quantity output (max)	Unit output	Unitary price (€/unit)	Comment	Key equipment used	Equipment power consumption (kW)	Equipment usage intensity (h used/h of process stage)	Cost of quipment (€/unit)	Comment
Grape marc generation					Total feedstock annual availability																
Transport					Distance to origin (grape marc						Grape marc transportation										
					Transportation modal																
Freezing storage					Grape marc mass						Grape marc storage losses										
					Grape marc volume occupied in freezer																
					Storage temperature																
					Storage time																
Fragmentation					Grape marc mass						Fragmented grape marc										
					Dispersant type						Fragmented grape marc losses										
					Dispersant quantity																
					Fragmentation time																
Extraction					Solvent type						Extract volume										
					Solvent quantity						Extract weight										
					Maceration time						Solid residues (filter cake)										
					Filter type						Total phenolic content (TCC)										
					Single-use filter quantity						Antioxidant activity (AA)										

5 EXTRACTION PROCESS & EQUIPMENT

This section is dedicated to zoom into the engineered extraction process and gather relevant information for process simulation and scale-up. As the amounts of grape increase to an industrial level, is there need for additional equipment or auxiliary processes besides what has been done in the lab? For every step of the extraction, the key information requested in this tab is:

- Equipment used: model, power and usage intensity.
- Process control parameters: what parameters can be controlled (i.e., changed) as the process happens; partners are expected to detail expected range values and inform the appropriate units.
- Quality control parameters: what parameters are monitored (e.g.: analysed) as the process happens to guarantee that the output obtained is acceptable; partners are expected to detail expected range values and inform the appropriate units.
- Other parameters: list any other relevant parameters or issues of concern (e.g.: temperature should not go above a certain value, etc.).

The structure designed for data collection of this section is shown on table 4.

Table 4. Extract process & equipment

Back to introduction	EXTRACT PROCESS & EQUIPMENT																				
Process stage	Process simulation ?	Unit operation	Equipment	Equipment Model	Equipment Details	Equipment Power (kW)	Equipment usage intensity (h used/h of process stage)	Process control parameter	Process control parameter - target or range	Process control parameter - target (unit)	Quality control parameter	Quality control parameter - target	Quality control parameter - target (unit)	Other parameters	Other parameters - target	Other parameters - target (unit)	Comments
Fragmentation	Yes																
Extraction	Yes																
Drying - Spray drier	Yes																
Drying - Liophilization	Yes																

6 PRODUCT INPUTS, OUTPUTS & COSTS

This table covers the life cycle of the final product from extract sourcing to formulation in the desired format.

This table will be filled in for final product formulation that may have resulted into promising extract.

Here, for every stage, information will be required to perform assessments about:

- Job creation potential: number of workers required for each stage, as well as their dedicated effort
- LCA: gathering of resources used to manufacture the extract and outputs:
    - Material and energy inputs (solvents, utilities, and other relevant variables used).
    - Material and energy outputs (compute any losses, residues or by-products generated).
- LCC: investment needed to purchase and operate (energy requirements) key equipment to execute every stage of the process.

The structure designed for data collection of this section is shown on table 5.

Table 5. Product inputs, outputs & costs

Back to Intoduction	FORMULATION PROCESS & EQUIPMENT																
Final product name	Target animal	Product format	Final formulation type		Application		Final product ID	Extract sample code	Comments about experiment								
Process stage	Process simulation ?	Unit operation	Equipment	Equipment Model	Equipment Details	Equipment Power (kW)	Equipment usage intensity (h used/h of	Process control parameter	Process control parameter - target or range	Process control parameter - target (unit)	Quality control parameter	Quality control parameter - target	Quality control parameter - target (unit)	Other parameters	Other parameters - target	Other parameters - target (unit)	Comments
Formulation/Mixing	no																
Formulation/Mixing	no																
Formulation/Mixing	no																
Formulation/Mixing	no																
Formulation/Mixing	no																
Formulation/Mixing	no																

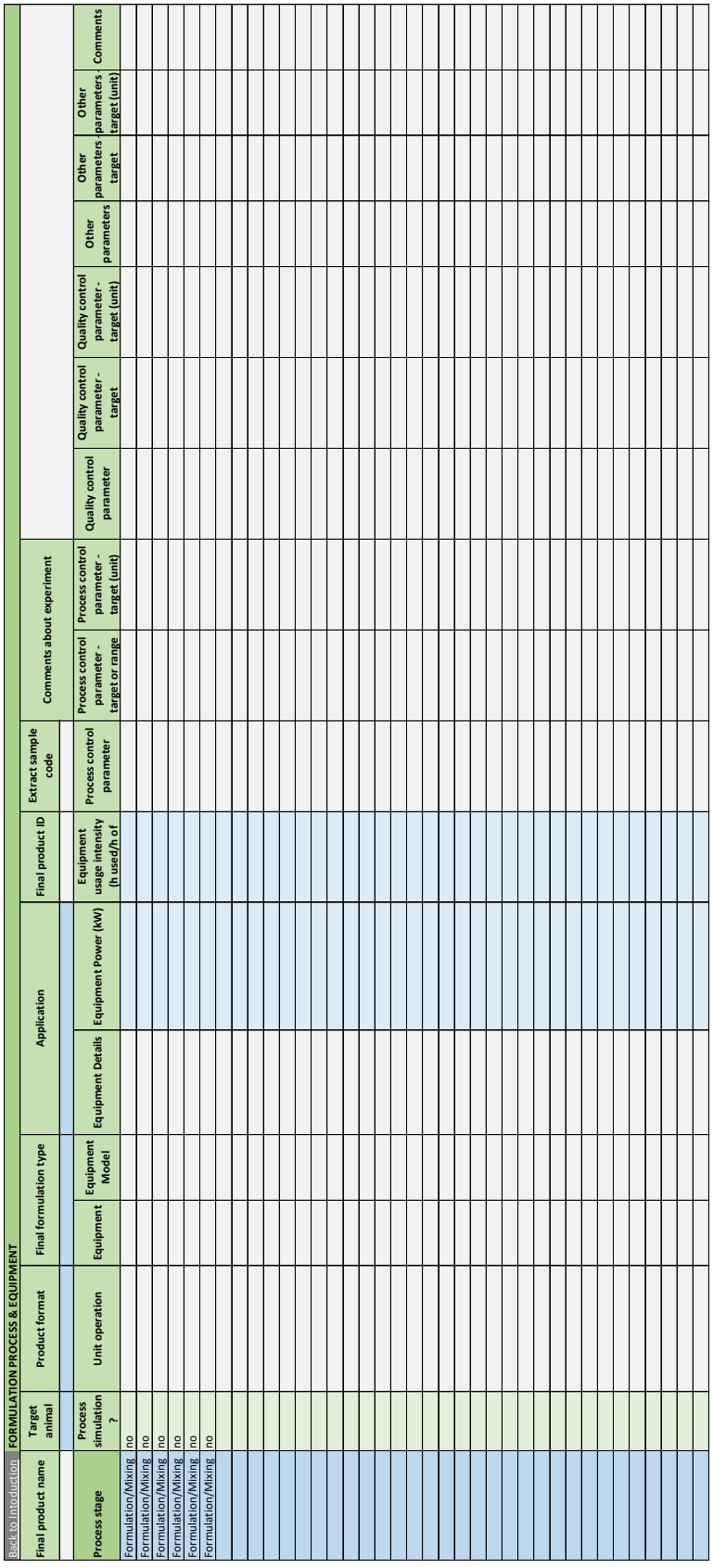
Since there are various types of final product formats, this table has been designed to be customized according to the process. A few of the categories of process stages to be detailed are:

- Extract transportation; Storage
- Solution preparation; Dispersion (and compression)
- Formulation / mixing; High-shear homogenization
- Evaporation; Drying; Lyophilization; Spray drying
- Final product packaging; Storage

7 FORMULATION PROCESS & EQUIPMENT

This table is a template for supplementary, nice-to-have, information to support on the assessment of scale-up viability of formulation of final products. Partners are invited to share the same type of information asked on section 5 for extracts, but for their formulation manufacturing processes. The table is also customizable according to product format. Subjected to confidentiality and relevance to WP8. The structure designed for data collection of this section is shown on table 6.

Table 6. Product process & equipment



8 PRODUCT STORAGE & STABILITY

This table is a template is designed to collect information on the best experiments regarding product stability. It is meant to collect information about the extract and the final formulation types (liquid feed, solid tablets, sprays, etc). Ideally, composition before and after storage should be reported, as well as key performance indicators such as TPC, AA and density. The structure designed for data collection of this section is shown on table 7.

Table 7. Product storage & stability

Back to Intoduction	FINAL PRODUCT STORAGE AND STABILITY						
Sample code							
Sample description							
Product format		Formulation type			Storage method		
Storage time (days)		Storage temperature (°C)			Remarks about stability		
Analyses		Product - initial properties			Product - final properties		
TPC (mg GAE . L^{-1})							
AA (mmol TRE . L^{-1})							
IC50 (mg . L^{-1})							
Density of stored product							
Component	CAS#	Quantity	Unit	Comment	Quantity	Unit	Comment

9 END-USER PRODUCT REQUIREMENTS

This template is designed to collect data about the key performance indicators of the intended final products and applications. Each final product application will have its own table. End-users are requested to report market information such as intended countries of commercialization, expected price ranges of extract, as well as quality requirements for the extract. Finally, application details are solicited, such as administration and dosage levels (which can vary greatly according to application). Also, partners are inquired about some collateral effects of the NeoGiANT product use since those are relevant to assess the impacts of the product when performing the LCA. The structure designed for data collection of this section is shown on table 8.

Table 8. End-user requirements

Back to Intoduction	END-USER PRODUCT REQUIREMENTS				
Application	Target animal	Product format	Final formulation type	Final product ID	Extract sample code
Final product name					
Function description					
Functional unit of product					
Performance against benchmark					
Target Countries for product use					
Requirement for NeoGiANT extract	Minimum value allowed	Maximum value allowed	Unit	Comment	
Density					
Total polyphenol content (TPC)					
Antioxidant capacity (AA)					
Product dosage					
Range of feasible prices to acquire extract					
Specific quality indicator (eg.: total motility, etc.)					
> Quantified collateral effects (e.g. excrement variation)					
> Other requirements or collateral effects					