



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

D10.3 1st collection of Practice abstracts

Due date of deliverable: 30/09/2022

Actual submission date: 21/09/2022



**Horizon 2020
European Union Funding
for Research & Innovation**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036768

TABLE OF CONTENTS

TABLE OF CONTENTS	1
PROJECT INFORMATION	2
DELIVERABLE DETAILS	3
1 Introduction	4
2 Summary of Practice abstracts	4
3 Description of Practice abstracts.....	5
3.1 The power of grape extracts	5
3.2 Circular wineries: wastes for the future	5
3.3 From wastes to value-added extracts.....	5
3.4 Suitable alternatives to synthetic antibiotics.....	6
3.5 From grape extracts to feed additives.....	6
3.6 Natural therapeutic formulations	7
3.7 Antimicrobial formulation for sperm preservation.....	7
3.8 Benefits of natural treatment to prevent mastitis	7
3.9 Animal treatment with natural formulations: benefits.....	8
3.10 Benefits from using antimicrobial compounds as sperm extenders	8

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:	D10.3
Document Title:	1 st collection of Practice abstracts
Dissemination level	PU – Public
Period:	PR1
WP:	WP10. Cooperating with European Commission Services
Task:	Task 10.2. Cooperating with the EIP-AGRI
Author:	<p>UNIVERSITY OF SANTIAGO DE COMPOSTELA (USC)</p> 
Abstract:	<p>This document corresponds to Deliverable 10.3 1st collection of Practice abstracts. It comprises a total of 10 practice abstracts for the initial collection, covering the period M1-M12, aiming to disseminate the NeoGiANT project (general and individual objectives of each WP) among the target sectors as well as the scientific community.</p>

Version	Date	Change
V1	21/09/2022	Initial version

Disclaimer

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

1 INTRODUCTION

Communicate and disseminate the project is important to ensure its future success. The preparation and publication of practice abstracts is a valuable tool for achieving these goals. Thus, the creation of these informative materials involves different types of knowledge (scientific, organizational, practical, etc) organized into short and concise information packages, in order to reach a wide range of stakeholders. Practice abstracts not only enhance and facilitate the communication of knowledge, but also the contact between potential partners in innovation projects and enable networking activities through conferences, workshops, and seminars.

NeoGiANT project will produce a complete package of practice abstracts containing all results/recommendations which are ready for practice. A "practice abstract" is a short synthesis of about 1000-1500 characters (word count – no spaces) describing the main information/recommendation/practice that can serve end-users in their daily practice. A total number of 40 practice abstracts is expected throughout the project.

This deliverable includes the summary and content of the first batch of 10 practice abstracts already developed as part of the project activity. These abstracts will be adapted to the NeoGiANT's visual identity and publish on the website. Furthermore, they will be shared through the project social media to achieve a wider audience.

2 SUMMARY OF PRACTICE ABSTRACTS

The following table presents the title of the different practice abstracts prepare so far. Some of them have been translated to other languages to be spread to specific communities in these areas. In the following section the summary will only be given in English although the abstracts in all the languages will be uploaded to the website.

Table D10.3.1. List of practice abstracts

Nº	Language	Title
<u>1</u>	English	The power of grape extracts
<u>2</u>	English Galician	Circular wineries: wastes for the future
<u>3</u>	English Galician	From wastes to value-added extracts
<u>4</u>	English	Suitable alternatives to synthetic antibiotics
<u>5</u>	English	From grape extracts to feed additives
<u>6</u>	English	Natural therapeutic formulations
<u>7</u>	English	Antimicrobial formulation for sperm preservation
<u>8</u>	English	Benefits of natural treatment to prevent mastitis
<u>9</u>	English	Animal treatment with natural formulations: benefits
<u>10</u>	English	Benefits from using antimicrobial compounds as sperm extenders

3 DESCRIPTION OF PRACTICE ABSTRACTS

3.1 The power of grape extracts

Customers demand environmentally friendly products as well as solutions for animal health with no side effects for animals and final consumers. The recovery of white grape marc that preserves a significant amount of bioactive compounds enables the obtaining of natural extracts with excellent properties for use as functional ingredients. It is a cost-effective, efficient, and green solution in sustainable circular economy production systems. In this way, the extracts meet customers' demands as an alternative to synthetic compounds with antimicrobial and antioxidant capacity.

The NeoGiANT project includes the development and validation of innovative natural formulations for use in cattle, swine, poultry and farmed fish production in the feeding, health and reproduction areas. The main objective is to reduce the dependence on the use of antibiotics, contributing significantly to the fight against antimicrobial resistance (AMR) arising from farm animal production. The extracts will be used efficiently and cost-effectively, serving also as a prophylactic treatment. Consumer perception for ingredients from by-products and new connections between the agri-food and animal health sectors will be improved.

Partners will produce grape extracts and formulations and evaluate antimicrobial activity *in vitro*, for small-scale feed or sperm preservation and for the treatment of animal diseases. *In vivo* effects on the gastrointestinal tract and the immune system will be evaluated. Eco-design and commercial validation at pre-industrial scale will be studied. Aspects such as market, exploitation, legal requirements, cooperation with the European Commission services will be considered. The results will be communicated and disseminated.

3.2 Circular wineries: wastes for the future

The winemaking industry generates considerable quantities of grape marc by-products in regions such as Galicia, and the accumulation and management of this organic waste constitutes important environmental and economic problems.

Not everyone knows that the white grape marc remaining after the winemaking process hides an incredible treasure as it contains an important amount of natural chemical substances (known as polyphenols). These bioactive compounds are the phytoarsenal that grapes produce to defend themselves. In addition to being involved in sensory properties such as colour, taste, acidity or in the ageing and maturing processes of wines, they also exhibit many interesting properties and beneficial for humans.

The NeoGiANT project aims to find a sustainable solution by reusing this grape agro-waste as biomass feedstock. The approach for the sustainability of vinification is explored with the complete exploitation of grape marc and its conversion into natural products as useful functional ingredients for application in different sectors. In addition, it searches for routes that come closer to the circular economy concept by achieving a zero-waste process and reducing the amount of waste that wine producers have to dispose.

3.3 From wastes to value-added extracts

White grape marc is an abundant winery by-product from the wine production keeping most of the original polyphenolic load of the grapes. Extracts with a high content of bioactive substances can be obtained from white wine grape marc as raw material. The availability of modern analysis technologies along with both 'Green Chemistry' and 'Green Analytical Chemistry' principles, allow the effective reuse of agri-food by-products by

producing value-added products. A simple and sustainable extraction at medium scale is proposed under environmentally friendly conditions, with green and non-toxic solvents and low energy costs. This extraction procedure will allow the further scale-up to pre-industrial production. In this way, an integral exploitation and valorisation of a natural waste is performed, making it into antimicrobial and antioxidant high value products as useful ingredients.

The NeoGiANT work focuses on obtaining different products based on these multi-component ready-to-use extracts as a green solution to achieve functional ingredients in a sustainable approach, creating new value chains in the agricultural and livestock sectors. The proposal is to develop and validate innovative formulations to be used in cattle, swine, poultry, and fish, considering the whole circle in animal production (feeding, health, and reproduction). The last goal is to provide effective complements and alternatives with antimicrobial activity to reduce the main synthetic antibiotics used in farmed animals using more affordable natural functional products from alternative sources.

3.4 Suitable alternatives to synthetic antibiotics

Current social demands for a food production as sustainable as possible imply the reduction of the consumption of antibiotics widely used in animals (European strategy called "*Farm to fork*"). Some commercial products are emerging as alternatives to satisfy these new demands. Although the beneficial effects of many of these developed alternatives are well demonstrated, there is still a lot of disinformation about them.

This project proposes the use of safe natural extracts as complementary solutions to the use of synthetic antibiotics in animal production. From the concentrated active extract of white grape marc, therapeutic compositions that do not represent any risk for industries, livestock farmers, and consumers will be obtained. It will be necessary to know the chemical composition in bioactives and their efficacy to ensure the adequate efficiency of these new products as well as to meet market requirements.

The presence of certain substances known as polyphenols gives this alternative added antimicrobial properties. In addition to inhibiting the growth of microorganisms in feed, as a natural preservative, and modulating the microbiota, these products also improve the antioxidant status of the animals and control possible infectious diseases. As a result, the health status and welfare of the animals will be significantly improved, ensuring food safety and also the protection of the environment.

3.5 From grape extracts to feed additives

In recent years, there has been a significant increase in natural alternatives to animal feed additives that promote growth and improve intestinal health.

The NeoGiANT project proposes the upgrading of winemaking residues to obtain natural extracts for use as feed additives for cattle, poultry, swine, and fish. Nutraceutical compositions with antioxidant and antimicrobial properties that do not constitute any risk for animals or consumers will be obtained. Due to their recognized properties, the extracts will also serve as natural preservatives for animal feed.

The formulation and technology parameters are aimed at maximum preservation of the antimicrobial and antioxidant activities of the extracts. The additives will be easy to handle, introduce and mix with the feed and will show an adequate shelf life, with optimal formulations being achieved. The resulting designed products will follow EU regulations being approved for use in animal feed and the beneficial properties of the feed additives will be validated on "in vivo" models. These suitable natural additives will improve animal feed, quality, and

appearance, as well as the impact of livestock production on the environment. In addition, feed efficiency will be increased, which will reduce feed costs, and promote overall performance leading to increased profitability.

3.6 Natural therapeutic formulations

One of the lines of the NeoGiANT project concerns the use of natural extracts obtained from white grape marc as an antioxidant and antimicrobial active ingredient to develop products for the treatment of diseases with high incidence in animal production. Natural therapies for certain diseases in aquaculture, mastitis or exudative epidermitis will be developed.

In view of the expansion of aquaculture and despite the availability of prevention measures and treatments, infections are still a major problem in this area. Within the NeoGiANT project, a viable alternative for the control of microbial diseases in aquaculture and for the stimulation of the immune system will be developed, which will constitute a significant progress.

Mastitis is usually treated by intramammary infusion of different antibiotics, and the presence of antibiotic resistant strains can play an important role in the dairy industry, since milk has to be discarded over a certain period of time. NeoGiANT proposes a natural and innovative solution based on intramammary formulations that will be a real advance as they are compatible with the milk collection and sale due to the properties of the extracts employed.

Exudative epidermitis is also often treated with antibiotics, but antimicrobial resistance (AMR) of the bacteria responsible for this disease to the most common antibiotics used has been demonstrated. The product developed in this project will be the first natural-based topical treatment to combat this disease at the same time as reducing AMR.

3.7 Antimicrobial formulation for sperm preservation

Since microorganisms can reduce fertility and even cause infections, broad-spectrum antibiotics are components in semen extenders intended for artificial insemination to control bacterial contamination and growth. However, the rate of resistance to conventional antibiotics in semen preservation media has increased. Demand for semen diluents is still growing and, for this reason, the development of new antimicrobial alternatives is required.

Although several studies are conducted to search for alternative methods, further research is still needed to know the dosage necessary to achieve efficacy without damaging sperm quality.

NeoGiANT proposes the use of bioactive white grape marc extracts as substitutes for conventional antibiotics in semen extenders for mammalian but also for poultry and fish. As a result, this natural-based semen extender proposed will also help to reduce antimicrobial resistance. The focus will be on the development of specific formulations to improve the existing extenders. Stability tests of the formulations will be carried out for different industrial applications: short or long term refrigerated storage or freezing. Finally, it will be necessary to ensure that the properties of these innovative formulations are preserved throughout the storage time.

3.8 Benefits of natural treatment to prevent mastitis

Mastitis reduces milk production, changes milk composition, shortens the productive life of affected cows and is one of the most important causes of economic losses in the European dairy industry. Both prevention and

elimination of the infection are needed. However, resistance to the commonly used antibiotics and milk discard during treatment are serious problems.

NeoGiANT proposes intramammary syringes against mastitis based on natural extracts with antimicrobial properties. The antimicrobial activity of the formulations can be tested against two of the most common mastitis pathogens in cattle: *Staphylococcus aureus* and *Streptococcus uberis*. This is the first product that allows “in vivo” administration, and its main benefit is that it will allow the treatment of infections and, at the same time, the collection and sale of milk shortly after treatment or during disease management. In this sense, milk samples will be collected for bacterial study.

By avoiding the use of conventional antibiotics and other synthetic additives and replacing them with organic products, strict health and safety requirements will be met. As a result, potential consumers will be interested in the non-antibiotics policy of these farms, improving their competitiveness, and the dairy sector will become more resilient and sustainable.

3.9 Animal treatment with natural formulations: benefits

The World Health Organization (WHO) recommends that farmers and the food industry stop routinely using antibiotics to promote growth and prevent disease in healthy animals. In addition, consumers and food chains are also driving demand for meat raised without the routine use of antibiotics.

The natural formulations developed will be designed to control and prevent many infectious diseases of utmost importance in animal production. As a result, NeoGiANT aims to provide effective alternatives to conventional antibiotics widely used in animals, contributing to the goal of reducing their use and abuse, by using them only for the treatment of severe infections and not as an indiscriminate preventive action. At the same time, the rate of emergence of new antimicrobial resistances will be reduced and the existing ones will be better controlled.

The application of bioactive compounds to treat diseases in aquaculture will constitute an alternative for microbial control and will also place the EU in a more competitive position in the world market.

The topical treatment for exudative epidermitis, will allow to fight against this disease and simultaneously, as this product is natural, the animals treated by the new formulation will respond to the demand of the consumers “*Raised without antibiotics*” tendency.

3.10 Benefits from using antimicrobial compounds as sperm extenders

Antibiotics are widely used in semen extenders to control contamination and bacterial growth. Broad-spectrum antibiotics are extensively used for artificial insemination but since they are very potent agents, they can produce sperm toxicity in different combinations. Resistance to these antibiotics has been detected in bacteria found in semen preservation media of different species, so additional antibiotics or even a step further, the development of new antimicrobial alternatives, would be necessary. The search for antimicrobial alternatives has been increasing but it is also necessary to evaluate the long-term effect they may have on fertility.

NeoGiANT will investigate the use of bioactive white grape marc extracts as substitutes for conventional antibiotics in semen extenders, contributing to the reduction of antimicrobial resistance. In addition, the novelty of the study in the reproduction line will not only focus on mammals, poultry and fish will also be considered. The natural antimicrobials will bring added value to these products and the preservation of their properties during storage will ensure the artificial insemination process. Since it is a natural alternative, it also contributes to reducing the use of synthetic antibiotics, providing a more consumer-friendly vision.