Newsletter # 2

Quarterly newsletter on project advancement and last results

October 2021

Milk quality along the dairy chain for a safe and sustainable milk

MilkQua project in a few words & advancement status

MilkQua in a few words:

Plant extracts to prevent mastitis in Tunisia.
MilkQua's strategic aim is to enhance global food security and dairy food quality by reducing antimicrobial use on Tunisian farms. Our main objective is to improve the milk quality and sustainability of Tunisian agriculture sector by addressing a high priority species-specific disease, mastitis, which is of great importance to animal and agriculture sector economy in Tunisia. MilkQua aims to reduce the use of antibiotics related to mastitis through the Tunisian plant extracts. The project brings together 10 partners in Tunisia, France, Italy, Spain and Portugal.

Project timeline:

More information on MilkQua

News from our last Scientific meeting:

The consortium of MilkQua project met on the 19th March 2021 for a first Scientific Meeting. This event that was scheduled in the middle of the project timeline (M24) enabled partners to share on experiments, methodologies and preliminary results.
Some presentations are online:

- Screening of essential oils against LPS-induced inflammatory mediators on THP-1 macrophages, by Renato Pereira, PhD, UPFF, WP3
- Effects of essential oils on ruminal fermentation parameters and methane production, by Sonia Andres, CSIC, WP4
- OMICs approaches: a deeper look in MicroRNAs in the immunity of ruminants mammary gland", by Chiara Gini, UMIL PhD, WP5

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Newsletter #2: Focus on WP4 and WP7

WP4: *In vivo* evaluation of bioactive molecules and extracts

WP4 objectives are:

1. Definition of the methodology, standard operating protocols and quality strategy to perform *in vivo* feeding experiments, thus having comparable results across different partners involved in these trials (T4.1).
2. Performing *in vivo* feeding trials using essential oils (the best options according to WP3, task 3.3) included in the milk replacer of newborn dairy calves to collect both data (feed efficiency) and samples (plasma and feaces) to be transfered to WP5 in order to determine the effects on the health status during the replacement phase of EOs administered during early life (metabolic programming) (T4.2).
3. *In vivo* trials using EOs extracted from naturally growing woody and herbaceous species to evaluate their curative effect when applied directly on the udder with mastitis in association or not to antibiotics (Small and large scale studies in both France and Tunisia) (T4.3).

WPL: CSIC. Partners involved: Idele, LPAF, ENMV

Feeding the newborn calves with essential oils

Activities performed so far: interview of Sonia Andrès, leader of WP4

What is the role of CSIC in the project
CSIC is coordinating all the *in vivo* experiments in MilkQua. These experiments are focused on two main pillars 1. Evaluation of the effects of essential oils when applied directly on the udder of dairy cows undergoing mastitis processes. 2. Evaluation of the effects of essential oils on health and feed efficiency when being fed to both newborn calves and adult dairy cows.

What are the main actions you already implemented ?
CSIC is conducting a feeding trial with newborn Holstein dairy calves to test the long-term effects of oregano essential oil when included in the milk replacer during the first days of life. The feed efficiency of the animals being fed oregano essential oil was improved before weaning. At the moment, CSIC is testing the long-term effects promoted by oregano essential oil during the replacement period of these animals.

What are further actions?
Biological samples obtained during all the *in vivo* experiments will be used to feed the WP5, where metabolome and microbiome will be analysed to understand the effects caused by essential oils at these levels.

What is your personal vision of the project ?
MilkQua is an ambitious project that will implement a milk quality program to manage mastitis and reduce antimicrobial residuals in milk, thus improving the food safety of this product.

MilkQua will focus on solutions based on essential oils to increase milk quality and food safety. With this purpose, the project will intend to decrease the use of antibiotics for mastitis therapy, which is regarded as one of the main causes of antibiotic resistance in both humans and animals.

MilkQua will try to improve as well feed efficiency and health status of the animals using essential oils included in the diet of animals trying to modulate the gut microbiome, and hence health status and feed efficiency of dairy cows.

The success and the achievement of these objectives may allow to increase the sustainability and food safety along the whole dairy chain in Tunisia, thus benefiting the

economical profitability of the farmers and strengthening the food safety of the consumers.

WP7: Consumer assessment of milk practices and studies of sensorial properties and consumer acceptance of enriched EOs UHT milk

Reminder of WP7 objectives:

1. To assess knowledge, attitude and practice (KAP survey) of Tunisian consumers towards milk and dairy products using e-mail web-based questionnaires as a research tool. This work will be conducted in close collaboration with the "National Observatory of New and Emergences Diseases" of Tunisia (ONMNE). New dietary assessment technologies offer potential benefits in terms of cost and researcher and respondent burden, and therefore scalability of population nutrition surveys as well as the ability to produce dietary datasets more rapidly (1, 2, 3). The UK NDNS RP is considering the inclusion of dietary assessment methods more aligned with recent technological developments.
2. Drive a consumer test panel to evaluate the sensorial properties and acceptance of the enriched milk with encapsulated OEs.

WPL: LPAM. Partners involved: Idele, STLO

Collection of aromatic and medicinal plants

Activities performed so far: interview of Ibtissem Hamrouni, leader of WP7

What is LPAM? What is the role of LPAM in the project?
Within the framework of MilkQua project, the LPAM - CBBC laboratory contributes in several WP:

- Collection and extraction of essential oils from 10 Tunisian aromatic and medicinal plants
- Study of the biological activities, especially antioxidant and antimicrobial of essential oils derived from those plants
- The micro-encapsulation of these essential oils to increase their stability and effectiveness
- The formulation of encapsulated essential oils as liquid soap against mastitis

What are the main actions you already implemented?
We are involved in 5 WPs. Work packages 3 and 7 are totally completed. Work packages 2, 4 and 6 are in progress. In WP3 we have done the collection, extraction and identification of bioactive molecules of essential oils. In WP7, two surveys have been carried out. The first one is about the analysis of encapsulated essential oils and the second one is a study of consumer practices in Tunisia.

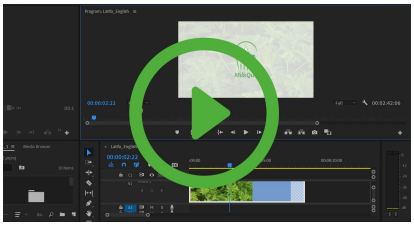
What results did you achieve, what are the further actions to implement?
We obtained interesting results, in particular the selection among the 10 essential oils of which 3 showed important biological activities (Thyme, Laurel, Coriander). Then after the analysis of the antimicrobial activity by David Pereira, UPFF), we chose to concentrate on Thymus capitatus. Now, we will work on the formulation and the incorporation of microencapsulation in liquid soap that will be the final product.

What is your vision of the project?
For LPAM, the project is innovative and very interesting because the plant world is associated with the animal world to help solve human health problems such as antibiotic resistance and substitute synthetic molecules by natural ones in order to preserve the environment and the quality of our health.

Latest News & Events

MilkQua at DOHAD Congress

Latifa Najar, coordinator of MilkQua, will participate in the 5th edition of the DOHAD congress (the French Society for the Understanding of Developmental, environmental and epigenetic origins of Health and Diseases) from 17 - 19th November 2021, In Jouy en Josas, France (INRAE). This event aims to gather scientists from the area of health, diseases, environment and epigenetics She will present MilkQua and first results obtained.

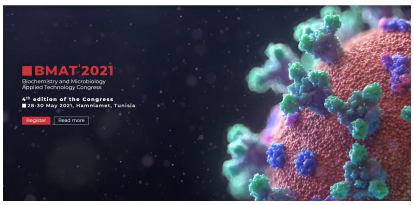


1st MiklQua video is coming

After a first pilot video was published in December 2020, MilkQua project is about to broadcast its first official video. The video will present the main objectives of the project and the role of each partner in the project. They have been shot in their workspace so you will discover MilkQua project behind the doors.

A look back on the project annual Steering Board

The consortium of MilkQua project finally met up physically (27th & 28th September, 2021) in Lodi, Italy, on the new Campus of the University of Milan (UMIL). During these two days of great work, partners shared with the consortium the work they've done with their tasks, results obtained so far and next steps coming up. This was also the occasion to discuss about future actions and collaborations to be considered in the framework of the project. A special issue of this newsletter will be dedicated to this meeting.



LPAM will participate in the BMAT'2021 Congress

Riadh Ksouri, Director of LPAM, partner of MilkQua and leader of WP7 will participate in the 4th edition of the BMAT'2021 Congress, the Biochemistry and Microbiology Applied Technology Congress (5th - 7th November 2021 in HammametTunisia) as Associate Conference Chairs. Many subjects related to health & nutrition and connected with MilkQua application fields will be discussed. LPAM will share on first results,especially on the extraction of bioactive molecules of essential oils.

Save the dates !

- **5-7 November 2021: 4th edition of the BMAT'2021 congress in Hammamet, Tunisia**
- **18th - 19th November, 2021 : 5th edition of the DOHAD Congress in Jouy en Josas, France**
- **March 2022: ITA Innov contest award at Internatiopnal Agricultural Fair, Paris, France**

Latest publications :

- ANDRES, S. et al., *Administración de l-carnitina durante el periodo de cebo en corderos con restricción alimentaria durante la lactancia*, XIX Jornadas sobre Poducción Animal, AIDA, p57.
- Andrés, S., Abdennebi-Najar, L., Giráldez, F.J., *Dietary administration of oregano essential oil to newborn dairy calves improves ffed efficiency and*

weight gain during the suckling period, EAAP - 72nd Annual Meeting of the European Federation of Animal Science
- Ceciliani, F., Audano, M., Addis, M-F., Lecchi, C., Ghaffari, M-H., Albertini, M., Tangorra, F., Piccinini, R., Caruso, D., Mitro, N., Bronzo, V., The untargeted lipidomic profile of quarter milk from dairy cows with subclinical intramammary infection by non-aureus staphylococci, Journal of Dairy Science, 16/06/2021
- Falleh, H., Benjemâa, M., Zohra Rahali, F., Hamrouni, I., Daaloul, M., Ksouri, R., Pereira, D., and Abdennebi-Najar, L., *Investigation of selected essential oils antibacterial potentials*. 4 th International Congress on Biochemistry & Microbiology Applied Technologies - BMAT-2021, May 28-30 th , 2021. Hammamet, Tunisia
- Martín, A., Abdennebi-Najar, L., Ksouri, R., Mateos, I., Ranilla, M.J., López, S., Giráldez, F.J., Andrés1, S., *The effect of natural essential oils and synthetic essential oils on ruminal fermentation*, EAAP - 72nd Annual Meeting of the European Federation of Animal Science

Deliverables already submitted

- D1.1 Management committee constitution
- D3.1 Sampling/extraction protocol and list of plants
- D3.2 Bioactive extracts for subsequent biological assessment
- D3.3 Phytochemical profile of selected samples
- D3.6 Safety report on selected samples
- D4.1 Protocols and data collection
- D8.1 Communication and dissemination materials
- D8.2 Plans for dissemination and exploitation of the results
- D8.3 Completed and planned communication activities

You like our news ? Keep in touch !
Don't forget to follow up this email to your friends and contacts who could be interested in our project and its major achievements.

MilkQua Project
Latifa.najar@idele.fr

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