



## PRIMA SCALA-MEDI NEWSLETTER August 2023- ISSUE 03

PRIMA  
SCALA-MEDIIMPROVING SUSTAINABILITY AND QUALITY OF SHEEP AND CHICKEN PRODUCTION BY  
LEVERAGING THE ADAPTATION POTENTIAL OF LOCAL BREEDS IN THE MEDITERRANEAN AREA.

## EDITORIAL

Dear readers,

We are happy to present the third issue of the SCALA-MEDI newsletter. In this issue, we will provide updates on project progress from September 2022 to August 2023. We introduce the Tunisian partners and share with you the events that took place during this second phase of the SCALA-MEDI project. We hope you enjoy reading this newsletter and encourage you to share it with others.

## SCALA-MEDI PROGRESS

In this phase the project focused on collecting data and biological samples in North Africa. The effort was remarkable, considering climatic conditions and remote areas reached by teams of researchers and students. Below is a summary of what has been collected, a very valuable set of samples and data, including farm and farm community descriptors, animal phenotypes and environmental data.

**Socio-economic data.** Questionnaires were collected from 260 sheep and 329 chicken farms, 18 policymakers, 78 veterinarians, 524 sale points, and 438 consumers.

**Sampling:** A total of 2493 sheep and 989 chicken blood samples were collected from the North African countries (Algeria, Morocco, and Tunisia)

**DNA:** All samples of sheep and chicken have been extracted in each North African country and are currently undergoing rigorous quality checks for SNP and LUMA analyses, and a subset of samples for RRBS sequencing.

**Phenotypes:** Detailed morphometric data has been gathered for all the animals included in the sampling. The data are currently being processed and statistically analyzed.

### *SCALA-MEDI co-coordinator visit to Algeria*

One of the SCALA-MEDI goals is to set up chicken breeding programs in Algeria, Tunisia and Morocco and a sheep reference population for genomic selection in Morocco.

From February 13th to 15th, 2023, Dr. Michèle Tixier Boichard, the co-coordinator of the SCALA MEDI project, visited Algeria, where the chicken breeding program will start from village chickens collected within Scala-Medi. The visit was



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to take note of ITELV's work program progress and the finalization of upgrades to the rearing infrastructure at Tlemcen station for the local chicken breeding project. Before heading to Tlemcen, which is over 500 km from the capital, Dr. Boichard visited Algiers ITELV station.



During this visit, an agreement was reached regarding the distribution of the chicken population, which will be reared and selected, across two ITELV stations. This will mitigate any potential health incidents, particularly considering that the chickens will be housed in open-air aviaries.

Leveraging the existing local poultry farming at ITELV, which has been in operation for many years, 105 samples were collected from ITELV's chickens at Algiers and Tlemcen stations in addition to in-field sampling.

A coordination meeting was convened at ITELV Tlemcen, where Dr. Tixier-Boichard engaged with all Algerian partners, she introduced the project and the selection program, which was followed by a discussion on the project's financial aspects at Tlemcen University.



After the meeting Dr. Tixier-Boichard saw the preparations for the construction of a building intended for chicken breeding and to provide an overview of the breeding system of the project in Algeria.



### **SCALA-MEDI training**

From May 22nd to May 26th, 2023, a training course on reproductive biotechnologies was held, with participants from Morocco, Algeria, and Tunisia. The course took place at the Laboratory of Reproductive Physiology and Behavior, situated within the research center of the National Institute for Agriculture, Food, and Environment (INRAE) in Nouzilly, Tours, France.



The training program included both theoretical and practical sessions, concentrating on the preservation of chicken semen and the preparation of primordial germ cells from chicken embryos.

### SCALA-MEDI annual meeting

The annual project meeting was organized in Tunisia by ESAM, INAT, and ODESYPTANO from 05 to 08 June 2023.



Both the meeting and Summer School were attended in person and accessed online.



During the initial two-day period, there were presentations on the progress of work for the different Work Packages and

a meeting of the Executive Committee. These events were at INAT.

Subsequently, on June 7 and 8, a training session was organized at ESAM and led by the project partner Nature 4. The focus of the training was on sensors. The first day was primarily theoretical, with a practical test carried out on sheep.



A sensor equipped with an AnimalCollar was attached to the sheep, to record movement and environmental temperature and humidity. These data will be used to understand behavior, and activity levels of the sheep, and how they respond to different environmental conditions.



On the second day, a practical test on chickens was carried out. An RFID chip, equipped with a temperature sensor was placed on 5 adult White Leghorn hens. Three body sites were tested: under the skin, either behind the neck (N) or under the wing (W), or into the breast muscle (B). The injections were performed by the Veterinarian in charge of the experimental flock at ESAM. A bird received one or two chips in order to have two animals for each location. Temperature signals were captured with two types of antenna. The



sensor on the neck worked the best. The distance between the bird and the antenna had to be short for signal transmission so that the antenna is currently being re-designed.

On the afternoon of June 7, an additional training session on the principles of animal selection was held for the benefit of participants and students from ESAM. It was led by Dr. Tixier- Boichard.



In summary, the project is progressing well, and difficulties encountered in this period have been overcome even if we suffered some delay these will be easily recovered in the next two years. The difficult parts of sample and data collection are complete, now we expect molecular data production and thereafter the most interesting part of integrating climatic, phenotypic and molecular data analyses. We will keep you posted!

## SPOTLIGHT ON PARTNERS

We are happy to introduce to you our Tunisian partners.

### *High School of Agriculture of Mateur (ESAM)*

The Higher School of Agriculture of Mateur is an institution of Higher Agricultural Education under the joint supervision of the Ministry of Agriculture (IRESA) and the Ministry of Higher Education and Scientific Research (University of Carthage).



### *National Agronomic Institute of Tunisia (INAT)*

The National Agronomic Institute of Tunisia, or INAT, is a Tunisian higher education institution founded on 17<sup>th</sup> October 1898. It holds the distinction of being the oldest engineering school in Tunisia and Africa. It operates under the joint supervision of the Ministry of Agriculture and the Ministry of Higher Education and Scientific Research. INAT hosts a doctoral school, five laboratories, and a research unit focusing on priority themes related to agro-ecology and agro-industry, the two pillars of agriculture. The institution is known for its strong synergy between higher education and research, with a significant emphasis on sustainable development. It boasts a diverse and internationally recognized team of around a hundred permanent teaching and research staff, covering various areas such as biodiversity, environment, ecosystem engineering, marine ecosystems, water management, and animal production, among others.





### *Office de Développement Sylvo Pastoral du Nord-Ouest (ODESYPARO)*

The North West Sylvopastoral Development Office (ODESYPARO) is a non-administrative public establishment (EPNA) operating with civil legal personality and financial autonomy. It operates under the authority of the Ministry of Agriculture, Water Resources, and Fishing. Its primary mission is to foster sustainable development in the mountainous and forested regions of the North West part of Tunisia, covering the governorates of Beja, Jendouba, Kef, Siliana, and Bizerte. These areas are characterized by small, fragmented farms.

ODESYPARO's core objective is to enhance the income levels of the local population by providing support for both agricultural and non-agricultural activities, while simultaneously improving overall living conditions. To achieve this, the establishment is dedicated to create a robust socio-economic infrastructure. ODESYPARO adopts a participatory and integrated approach, engaging closely with rural communities and development stakeholders in collaborative efforts. By fostering partnerships with the local population and relevant actors, the organization effectively implements development programs that lead to tangible progress in the region.



Office de Développement  
Sylvo Pastoral du Nord-Ouest

### *National Gene Bank of Tunisia*

The National Gene Bank of Tunisia (NGBT) began its operations in November

2007 and is under the supervision of the Ministry of Environment. Its primary mandate is the conservation of animal and plant genetic resources, as well as microorganisms. In 2016, the NGBT was designated as the regional gene bank for animal genetic resources by the African Union-Inter-African Bureau for Animal Resources (AU-IBAR). In 2022, it was elevated to the status of a center of excellence for animal seed preservation. The activities of the NGBT's animal biotechnology laboratory can be categorized into five main areas:

- 1/ Inventory and data collection;
- 2/ Characterization and evaluation of animal genetic resources;
- 3/ Conservation of animal genetic resources (ex-situ in vivo and cryopreservation);
- 4/ Capacity building;
- 5/ Publications and supervision of students.



### *About the Tunisian Team*

#### *Pr. Naceur M'Hamdi*



Naceur M'Hamdi is a Professor in the Animal Science Department at the National Agronomic Institute of Tunisia, University of Carthage.

He holds a Bachelor of Science in Animal Sciences from the Higher School of Agriculture of Mateur, and a Master of Science in sustainable agriculture,



specializing in animal production, from the Higher Institute of Agronomy of Chott-Meriem, University of Sousse, Tunisia. He earned his Ph.D. in Animal Genetics and Biostatistics from the University of Sousse, Tunisia. With over 10 years of experience in research and teaching, Naceur M'Hamdi's expertise spans various areas within animal sciences, including biotechnology, genetics, animal welfare, adaptation to climate change, and greenhouse gas emissions from livestock. He has actively participated in numerous National and International conferences and international programs. He has been involved in national and international research projects focusing on animal welfare, reproduction, genetics, and climate change.

His research primarily centers on the assessment of animal welfare, adaptation of farming systems to climate change, and the investigation of the effectiveness of antioxidants on reproductive parameters. Additionally, he is interested in studying the biochemical and molecular mechanisms of fertilization and sperm cell energy metabolism. Naceur M'Hamdi is a prolific author, with more than 130 scientific journal publications and 2 books to his name. He also serves as an Editorial board member for more than 10 international journals, contributing to the advancement of knowledge in the field of animal sciences.



**Dr. Manel Ben Larbi**

Manel Ben Larbi has been an Assistant Professor of Animal Production and Genetics since 2015; a member of the Research Unit:

biodiversity and resource development in mountain areas of Tunisia (UR17AGR14), Higher School of Agriculture of Mateur, University of Carthage, and a member of

Animal Science Department of ESAM. She graduated from the National Agronomic Institute of Tunisia (INAT), University of Carthage, a master's in 2006 and Ph.D. in 2013. She was awarded 1st World Prize for Best Paper and Best Oral Presentation (Genetic Session) at World Rabbit Congress 2012 Sharme chikh-Egypt. Her research work focuses on molecular polymorphism and genetic diversity of broilers and the improvement of poultry farming systems.



**Dr. Haifa El Hentati**

Dr. Haifa El Hentati holds a National Engineering degree in Biological Engineering, a

Master's degree in Genetics and Bioresources, and a Ph.D. in Biological Engineering with a specialization in Animal Biotechnology. From 2009 to 2015, she taught courses on physicochemical analysis techniques, biochemistry, molecular biology, and animal biology at the Higher Institute of Biotechnology in Monastir, Tunisia. Since December 2015, she has been a permanent researcher at the NGBT and currently holds the position of Assistant Professor. Currently, she is the head of the Animal Biotechnology Laboratory and Cryopreservation Unit at the National Gene Bank of Tunisia (NGBT). Her research work focuses on molecular polymorphism and genetic diversity in livestock, studying the genetic predisposition to scrapie disease in sheep, investigating sources of variation in weight and productivity in sheep, conservation of livestock through in situ and ex-situ methods (in-vivo and cryopreservation), as well as disease detection in animals using real-time PCR. Dr. Haifa El Hentati has been invited several times as an expert by the AU-IBAR, notably in the development of a technical procedure manual "Technical procedures for the



collection, handling, transport, and storage of animal genetic materials," published in 2016. She has been a member of the National Commission for Animal Genetic Resources since June 2019. In 2023, she taught the module "Sustainable Use Plans and Animal Cryobanks" to students in the "Smart Farming" master's program at the National Agronomic Institute of Tunisia. She was an invited panelist for the AU-IBAR session "Driving knowledge-based economies through science, technology, and innovation as tools of change" in Kenya.



#### *Dr. Hichem KHemiri,*

Director General of ODESYPANO; General Engineer; graduated from the University of Missouri

– Columbia USA in 1991; in charge of Management and implementation of an integrated development project at the ODESYPANO; author of many research reports and papers; member of many national and international committees.

#### *Dr. Bochra Bejaoui*



Bochra Bejaoui holds a Ph.D. and serves as an Associate Professor of analytical chemistry in the Department of Chemistry at the Faculty

of Sciences in Bizerte. Additionally, she is an esteemed researcher at the National Institute of Research and Physico-chemical Analysis (INRAP), affiliated with the Laboratory of Useful Materials located in Technopark of Sidi Thabet, Tunisia. Her academic journey includes a master's degree from the Faculty of Sciences in Tunis, Tunisia, and she obtained her Ph.D. in analytical chemistry from the same university in 2005. Bochra Bejaoui's contributions to the field are substantial, with numerous original papers authored by

her. Furthermore, she has had the honor of being a Guest Editor for a special issue of the journal Materials MDPI and has also served as a reviewer for several journals. Engaging in international collaboration, Bochra Bejaoui is an active member of various international projects. Her research focus lies in analytical chemistry, bioactive molecules, as well as separation and purification techniques.

#### *Dr. Cyrine Darej*



Dr. Cyrine Darej has a Ph.D. and is Assistant Professor at the Department of Animal Sciences at the National Agronomic Institute of Tunisia, University of

Carthage. She earned her Ph.D. in Animal Nutrition from INAT. Cyrine Darej's expertise spans various areas within animal sciences, including biotechnology, nutrition, production system, sustainability, and climate change. She has actively participated in numerous National and International conferences and international programs. She is the author of more than 30 publications and has been involved in national and international research projects focusing on animal nutrition, and climate change.

#### *Dr. Ikram BenSouf*



Ikram BenSouf has a Ph.D. and is currently has Postdoc position at the Department of Animal Sciences at the National Agronomic Institute of Tunisia, University of Carthage.

Ikram Ben Souf's expertise spans various areas within animal biotechnology and genetics. She has actively participated in



numerous National and International conferences and international programs.

### *Moncef Kthiri*



Mr. Moncef Kthiri is the Head of the Rural Animation and Technical Support Division, he brings a wealth of expertise to his role. His educational

journey has been remarkable, reflecting his dedication to agricultural sciences. In 2012, he attained a senior engineer degree from the National Institute of Agricultural Sciences in Tunisia, specializing in animal production. Prior to that achievement, he secured a state engineer degree in 2000 from the Higher School of Agriculture in Mateur, with a focus on animal production. Going further back, in 1985, he completed an assistant engineer degree from the Higher School of Agriculture in Mograne, specializing in agricultural economics. This unique blend of qualifications equips him with a comprehensive understanding of both animal production and agricultural economics, enabling him to lead the Rural Animation and Technical Support Division with a multifaceted perspective.

### *Chaima Sdiri*



Chaima Sdiri has been a Research Consultant in animal production at ODESYPANO since 2023. In 2019, she achieved the title of an

engineer in animal and forage production, show-casing her commitment to the field of agriculture. Her thirst for knowledge led her to pursue a Master's degree in animal genetics and biotechnology, which she successfully completed in 2021, further enhancing her expertise. In 2023, she took on the role of a consultant in animal

production with ODESYPANO, where she continues to apply her specialized knowledge to contribute to the organization's endeavors. Simultaneously, she is currently immersed in her doctoral studies, focusing on animal genetics, at the research laboratory of ecosystems and aquatic resources within the National Institute of Agriculture in Tunisia

### *Beya Hdhiri*



Baya Hdhiri is a Chief Technician, marking a significant milestone in her career. She has had the privilege of accessing an extensive array of technical and social training through

various national and international organizations, thanks to her involvement in diverse projects undertaken by ODESYPANO. This exposure has not only enriched her knowledge but has also allowed her to develop a versatile skill set. Her journey showcases a commitment to continuous growth and learning, underscoring her dedication to contributing effectively within her field.



### *Nouri Berouagui*

Mr. Nouri Bergaoui is the Chief of the Financial Affairs Division at ODESYPANO

### *Lazhari Boudali*



Mr. Lazhari Boudali is a Senior technician and advisor in agricultural production at ODESYPANO





### *Ms. Wissal Derouiche*

Ms. Wissal Derouiche holds a Bachelor's degree in Life Sciences with a specialization in Cellular Biology, Molecular Biology, and Biotechnology. She actively participates in various laboratory activities, including mentoring students, DNA typing of livestock, and quality control of animal semen. She has undergone several training programs in molecular techniques, real-time PCR, and cryopreservation. Ms. Wissal Derouiche is a Senior Technician at the Animal Biotechnology Laboratory of the National Gene Bank of Tunisia (NGBT).



### *Safa BEJAOU*

Ms Safa Bejaoui is a PhD student in Animal Sciences at the National Agronomic of Tunisia (INAT).



### *Nour Elhouda FEHRI*

Ms Nour Elhouda FEHRI is Ph.D. student in sustainable agriculture and the environment at the Higher agricultural School of Kef- University of Jendouba-Tunisia



### *Racha DEBBICHE*

Ms Racha Debbiche is a PhD student in Animal Sciences at the National Agronomic of Tunisia.



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## INTERESTING EVENTS

- Dr. Michèle Tixier-Boichard, INRAE - Presentation at Salon the Casablanca Poultry Fair “Dawajine October, 22<sup>nd</sup> 2022, on the subject “Poultry sector: the challenges of modernizing distribution”.

- Prof. Giovanni Chillemi from Tuscia University, Viterbo, Italy on January, 26<sup>th</sup>, 2023 Participated in the event Climate Change in Italy – Supercomputing as a tool to deal with impacts on the territory, Sala Borsa Auditorium E. Biagi – Bologna

Dr. Marco Milanesi presented a paper entitled “Machine Learning NIR wavelength selection: application for a low-cost portable instrument for livestock feed management” during the IEEE International workshop on Measurements and Applications in Veterinary and Animal Sciences (MEAVEAS) held in Naples on April 26-28, 2023. This paper related to the SCALA-MEDI project received the award as best conference paper. The award recognizes the most outstanding paper presented at IEEE MeAVeAS 2023.



- Prof. Ajmone-Marsan made a presentation entitled “SCALA MEDI: Investigation of genetic and epigenetic adaptation mechanisms in North African livestock”, at the ASPA2023, Bari, Italy on June, 13-16<sup>th</sup>2023.

## SUGGESTED READING

***We strongly recommend that you visit our website, where you can find more information about the project.***

[www.scala-medi.eu](http://www.scala-medi.eu).

