PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II

PhD Student: Maria Teresa Verde

Cycle: XXXVII

Training and Research Activities Report

Year: First

Tutor: prof. Leopoldo Angrisani

Co-Tutor: Francesco Bonavolontà

Date: December 12, 2022

Training and Research Activities Report

PhD in Information Technology and Electrical Engineering

Cycle: **Author:**

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1. Information:

- ➢ **PhD student: Maria Teresa Verde**
- ➢ **DR number:**
- ➢ **Date of birth: 21th May 1991**
- ➢ **Master Science degree: Veterinary Medicine**   **University: UNINA Federico II**
- ➢ **Doctoral Cycle: XXXVII**
- ➢ **Scholarship type:** *PON Dottorati di ricerca su tematiche dell'innovazione e green - Azione IV.5 (Green)*
- ➢ **Tutor: Leopoldo Angrisani**
- ➢ **Co-tutor: Francesco Bonavolonta'**

2. Study and training activities:

Activity	Type[1]	Hours	Credits	Dates	Organizer	Certificate[2]
"La termografia come strumento di precisione nell'allevamento degli animali da reddito."	Seminar	1	0.2	02/03/2022	ASPA, Commission e Precision Livestock Farming Dr. Fabio Abeni	Y
"Transdairy Living Lab's Open Day ICT & Bio Nanotechnology"	Seminar	7.5	1.5		Prof. Luigi Zeni	Y
Picariello Lectures on Data Science – II Cycle Ethics and Politics of A.I, Prof Mark Coekelbergh	Seminar	2	0.4	11/04/2022	Picariello Lectures on Data Science – II Cycle	Y
Picariello Lectures on Data Science – II Cycle Can a Text-to-Speech Engine Generate Human Sentiments?	Seminar	1	0.2	28/02/2022	Picariello Lectures on Data Science – II Cycle	Y
Protozoi Intestinali come ospiti sgraditi: Giardiasi e Trichmoniasi nella pratica clinic	Seminar	0.5	0.1	02/03/2022	INNOVET ITALIA Srl Tommaso Furlanello	Y
Elementi di Automazione e Introduzione al concetto di domotica. Smart Building e vantaggi del sistema nelle strutture ricettive. I sistemi di comunicazione e la connessione tra i dispositivi. Il concetto di attuatore e di cavo bus.	Seminar	1	0.2	07/03/2022	Prof. Francesco Bonavolontà	Y

Running towards Car Electrification, ST MICROELETRONICS	Seminar	2.5	0.5	16/05/2022	Salvatore Cannavacciuolo	Y
Artificial Intelligence @ The Deep Edge	Seminar	6	1.2	01/06/2022	UNINA, DIETI	Y
Augmented reality for remote use of measurement Instrumentation	Seminar	1.5	0.3	24/05/2022	5G ACADEMY	Y
Powe Electronics: control and architecture. A mini Campus.	Seminar	15	3	8/07/2022	STMICROELETRONICS	Y
Il futuro della medicina alla luce dell'applicazione dell'intelligenza artificiale e della robotica	Seminar	2.5	0.5	15/11/2022	Il Sabato delle idee	Y
Focus on di Ginecologia	Seminar	3	0.6	4/11/2022	SIVAR	Y
Piattaforme di misura e monitoraggio basate su Internet of Things.	Courses	30	6	28/04/2022	Corso di dottorato in Ingegneria Industriale "Federico II":	Y
Big Data Architecture and Analytics	Courses	16	5	29/06/2022	Proff. Giancarlo Sperlì, Giovanni Improta, Jari Haukka, Peter van Ooijen	Y
Sensori e Trasduttori di Misura	Courses	72	9	29/06/2022	MsD Electronic engineering	Y
Sensori e Smart Metering	Courses	72	9	20/06/2022	MsD Electronical engineering	Y
Intelligenza Artificiale	Courses	48	6	07/07/2022	MsD	Y

1) Courses, Seminar, Doctoral School, Research, Tutorship
2) Choose: Y or N

2.1. Study and training activities - credits earned

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1			3		3
Bimonth 2	6	2.6	3		11.6
Bimonth 3	23	2	3		28
Bimonth 4	6	3	3		12
Bimonth 5			6		6
Bimonth 6		1.1	6		7.1
Total	**35**	**8.7**	**24**		**67.7**

Expected	30 - 70	10 - 30	80 - 140	0 – 4.8	

3. Research activity:

Describe the topic, methodology and results of the research carried out in the current year

The goal of the Ph.D., entitled "*Smar farm in ambito bufalino*", is to study and develop new measurement sensors and instruments for PLF applications.

Specifically, during the first year, the activity focused on:

- the study and identification of parameters of interest, knowledge of which is useful in establishing Mediterranean buffalo welfare and breeding sustainability;
- The study and design of innovative measurement systems to measure parameters of interest.

Animal welfare assessment take into account several multi-dimensional aspects:

- Good Feeding
- Good Housing
- Good Health
- Appropriate behaviour

For each aspect, there are several criteria to be evaluated to obtain a comprehensive information on animal welfare, production, and environmental sustainability.

- Temperature Humidity Index (THI)
- GreenHouse Gas emissions (GHG)
- Air Quality
- Body Condition Score (BCS)
- Cortisol Concentration
- Mastits

For the time being, the focus has been on:

- Mastits
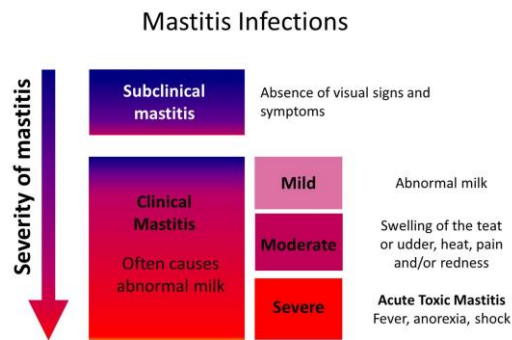- Cortisol Concentration

Mastitis

Mastitis is generally defined as the inflammation of the mammary gland. Mastitis reduces the number and activity of milk producing epithelial cells and contributes to decreased milk production, reduced milk quality, decline in animal health and welfare, and added cost of treatment.
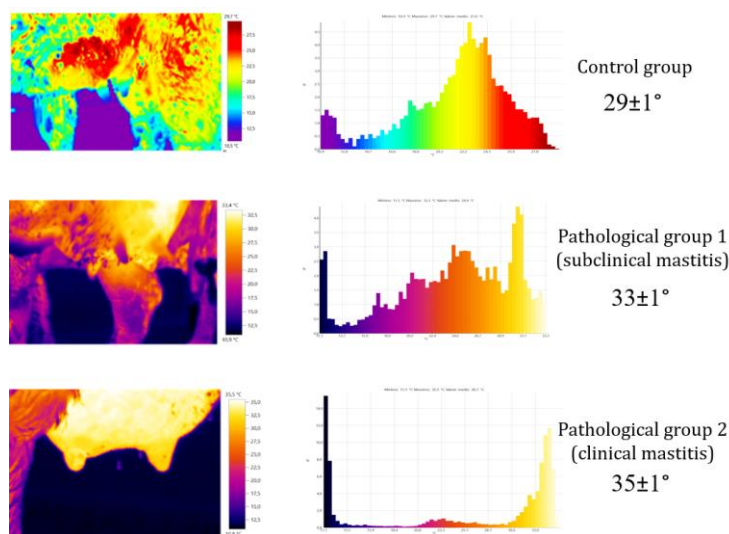
Mastitis Infections

It is important to detect mastitis early, even in the absence of visual signs and symptoms. However, with traditional techniques, problems are often detected too late, when mastitis has already caused abnormal milk. The aim of the research activity is to develop, fine-tune, and validate an innovative rapid and contactless measurement method for early detection of subclinical mastitis. Take into account that udder surface temperature increases at the onset of inflammation, the use of Infrared Thermography for Early Detection of Mastitis (Subclinical Mastits), has been studied and evaluated.
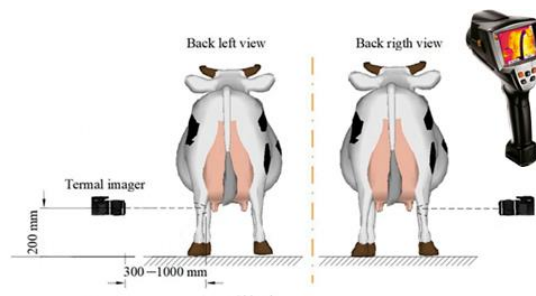
Preliminary results highlight the feasibility of the proposed measurement method. The average temperature increases with the severity of inflammation.

Control group
29±1°

Pathological group 1
(subclinical mastitis)
33±1°

Pathological group 2
(clinical mastitis)
35±1°

Cortisol concentration

The assessment of cortisol concentration in biological samples is one of the main tools to evaluate the stress in animals.

The study on cortisol concentration has allowed to validate a reliable radioimmunoassay method to assess cortisol concentration in buffalo milk to provide a preliminary data for the calibration of future biosensing technologies for non-invasive assessment of cortisol to be integrated in milking parlour systems.

The results of the research are detailed in the following paper:

Alessio Cotticelli, Maria Teresa Verde, Roberta Matera, Isabella Pividori, Alberto Prandi, Gianluca Neglia & Tanja Peric (2022) Validation of a radioimmunoassay method for cortisol in buffalo milk whey. A preparatory step for future sensor technology, Italian Journal of Animal Science, 21:1, 1622-1631, DOI: 10.1080/1828051X.2022.2147868

4. Research products:

List the products of your research in the current year (e.g., scientific papers, prototypes, etc.)
For papers, list: author(s), journal or conference full name, acronym, current status (submitted, accepted, published), year of publication. Specify if the publication venue is NOT indexed in Scopus or ISI Web of Science.

Alessio Cotticelli, <u>Maria Teresa Verde</u>, Roberta Matera, Isabella Pividori, Alberto Prandi, Gianluca Neglia & Tanja Peric (2022) **Validation of a radioimmunoassay method for cortisol in buffalo milk whey. A preparatory step for future sensor technology**, *Italian Journal of Animal Science, 21:1, 1622-1631, DOI: 10.1080/1828051X.2022.2147868*

5. Conferences and seminars attended

List the conferences/workshops/tutorials you attended, providing their details (full conference name, acronym, place, dates); specify if you presented a paper

6. Activity abroad:

Describe the exact study and research periods, the hosting institution(s), and the activities carried out abroad, and the framework of the scientific co-operation with the hosting institution

At the end, provide the number of months spent abroad in the current year

7. Tutorship

List the tutorship activities (including nr of hours) for undergraduate or graduate (ONLY activities authorized by the ITEE Board and by the related BSc or Msc Program Committee)