Partners	*Reference*
Dept. of Organic and Industrial Chemistry - UNIPR	Marchelli R.
Dept. of Physics - UNIPR	Cassi D.
Dept. of General, Inorganic, Analitical Chemistry and Physical Chemistry - UNIPR	Careri M.
Dept. of Biochemistry and Molecular Biology - UNIPR	Ottonello S.
Dept. of Environmental Sciences - UNIPR	Marmiroli N.
Dept. of Animal Production, Veterinary Biotechnology, Food Quality and Safety - UNIPR	Campanini G.
Dept. of Genetics, Antropology, Evolution - UNIPR	Neviani E.
Dept. of Pathology and Laboratory Medicine – UNIPR	Chezzi C.
Dept. of Botany and Vegetable Genetics - UNIPC	Fogher C.
Dept. of Chenistry “G. Ciamician” - UNIBO	Reschiglian P.
Institute of Biometeorology IBIMET – CNR Bologna	Cristoferi G.
Dept. of Food Sciences - UNIBO	Lercker G.
Stazione Sperimentale per l’Industria delle Conserve Alimentari - PR	Porretta S.
Dept. of Hygene and Public Health - UNIPR	Brighenti F.
Biotech S.r.l. - Parma	Di Cola G.
Progeo S.r.l. - Masone (RE)	Salati C.
Neotron S.p.A. - Modena	Gatti M.

Objectives

1. **Standardization of new methods to control food safety within the productive chain: pesticides, mycotoxins, chemical trace contaminants, residues of phytodrugs and veterinary drugs. Risk prevention.**
2. **New and emerging pathogenic microorganisms, antibiotic-resistence.**
3. **Functional properties of food, change of nutritional quality and xenobiotic formation during industrial/domestic transformation and storage treatments. Food allergens.**
4. **Traditional food and food quality: objective parameters; characterization and preservation od autocthonous microorganims; GMO's.**
5. **Sensorial properties and consumer science.**

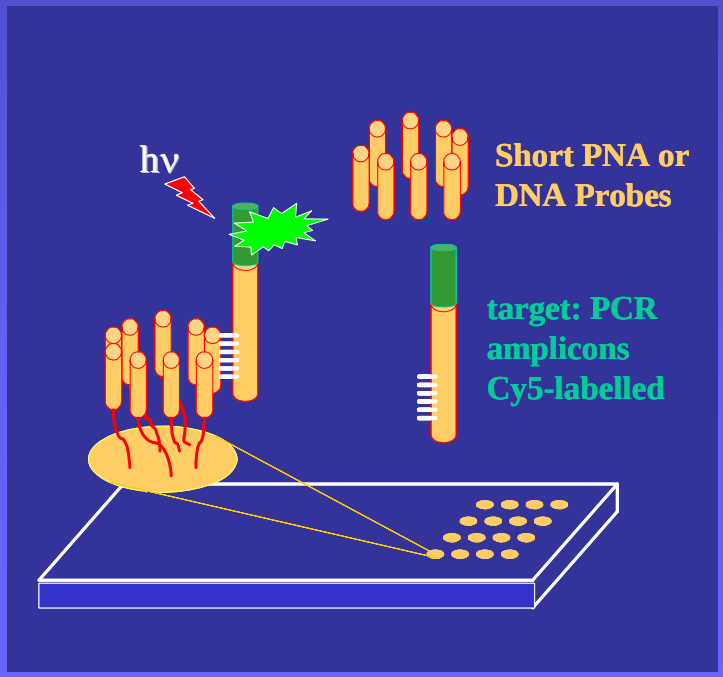
Research Development

Subprojects
1. New methods to control food safety within the productive chain and risk prevention.
2. Detection of known and emerging pathogenic microorganisms within the food productive chain.
3. Wanted and unwanted indesiderate molecular transformations during food technological treatments.
4. Tradition and food quality: molecular traceability and sensorial analyses.

Subproject 1.

New methods to control food safety within the productive chain and risk prevention

Objective achieved
1.1 Sensors, biosensors, microarrays and post-genomic methods



Determinations:

Contaminants (metals, pesticides, mycotoxins)

Xenobiotics and xenoestrogens

GMO

Allergens

Groups involved

UNIPR:

Marchelli

Cassi

Careri

Ottonello

Marmiroli

Other Institutions:

Fogher (PC)

Reschiglian (BO)

Biotech (PR)

Subproject 1.

New methods to control food safety within the productive chain and risk prevention

Objective achieved

1.2 Combined/MS analitical techniques

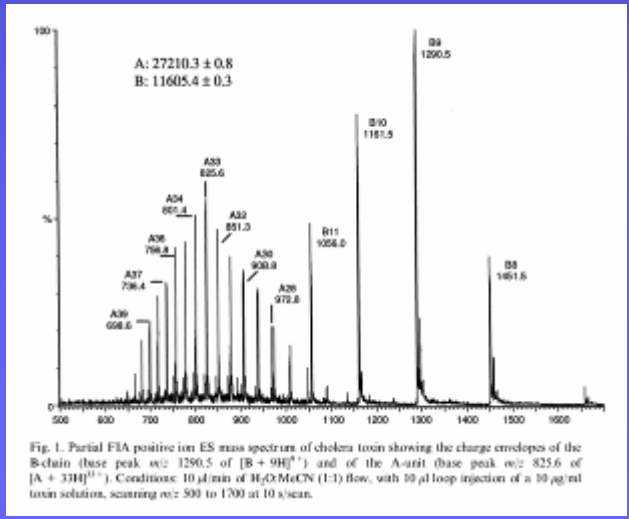


Fig. 1. Partial FIA positive ion ES mass spectrum of cholera toxin showing the charge envelopes of the B-chain (base peak *m/z* 1290.5 of $[B + 9H]^{9+}$) and of the A-unit (base peak *m/z* 825.6 of $[A + 33H]^{33+}$). Conditions: 10 μl/min of H_2O:MeCN (1:1) flow, with 10 μl loop injection of a 10 μg/ml toxin solution, scanning *m/z* 500 to 1700 at 10 s/scan.

Groups involved

UNIPR:

Marchelli

Careri

Campanini

Other Institutions:

Reschiglian (BO)

Progeo (RE)

Subproject 2.

Detection of known and emerging pathogenic microorganisms within the food productive chain.

Objective achieved

2.1 Antibiotic-resistence

2.2 Microbial and viral pathogens and new methods of detection

2.3 Toxin-producing fungi e moulds

Groups involved

UNIPR:

Neviani

Chezzi

Marchelli

Campanini

Other Institutions:

Reschiglian (BO)

Neotron (MO)

Subproject 3.

Wanted and unwanted molecular transformations during food technological treatments.

Objective achieved

3.1 Functional properties of food, change of nutritional quality and xenobiotic formation during industrial/domestic transformation and storage treatments. Food allergens.

Groups involved
UNIPR:
Brighenti
Careri
Neviani

Other Institutions:
Lercker (BO)

Subproject 3.

Wanted and unwanted molecular transformations during food technological treatments.

Objective achieved

3.2 Detection and inactivation of allergens in technological processes; criptic allergens in food

Groups involved
UNIPR:
Marchelli
Careri

Other Institutions:
Fogher (PC)
Biotech (PR)
Neotron (MO)

Subproject 4.

Tradition and food quality: molecular traceability and sensorial analyses.

Objective achieved

4.1 Autocthonous food identification and characterization of traditional products (DNA, protein, peptide, flavouring, metabolite, isotope analysis)

Groups involved
UNIPR:
Marchelli
Careri
Ottonello
Marmiroli
Campanini

Other Institutions:
Fogher (PC)
Ibimet CNR (BO)
Neotron (MO)
Progeo (RE)

Subproject 4.

Tradition and food quality: molecular traceability and sensorial analyses.

Objective achieved

4.2 Characterization and preservation of autocthonous microorganims in traditional food

Groups involved
UNIPR:
Neviani

Other Institutions:
Reschiglian (BO)

Subproject 4.

Tradition and food quality: molecular traceability and sensorial analyses.

Objective achieved

4.3 Detection of Genetically Modified Organisms (GMO's)

Groups involved
UNIPR:
Marchelli
Careri
Marmiroli

Other Institutions:
Fogher (PC)
Biotech (PR)
Progeo (RE)
Neotron (MO)

Subproject 4.

Tradition and food quality: molecular traceability and sensorial analyses.

Objective achieved

4.4 Sensorial properties and consumer science.

Groups involved
UNIPR:
Marchelli
Cassi

Other Institutions:
Ibimet CNR (BO)
SSICA (PR)

Contacts:

Rosangela Marchelli

Department of Organic and Industrial Chemistry

Parco Area delle Scienze, 17/A

University of Parma – 43100 PARMA

Tel: 0521-905410

Fax: 0521-905472

E-mail: rosangela.marchelli@unipr.it

Units

University of Parma

Faculty of Veterinary Medicine

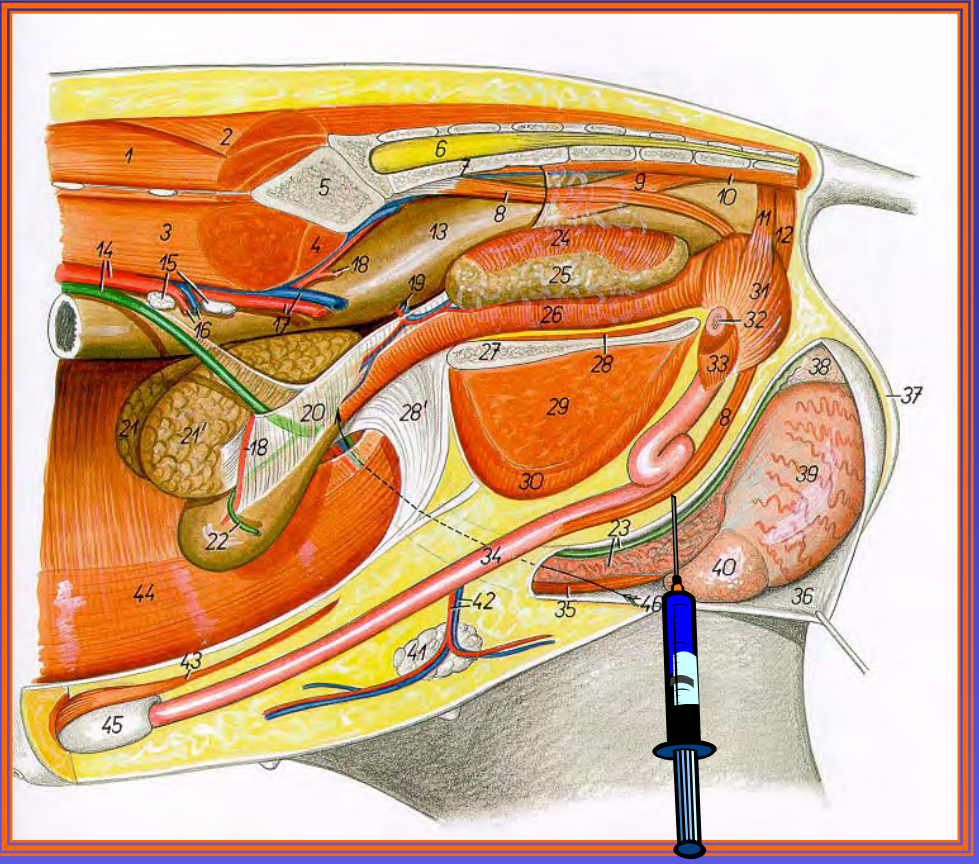
- Anatomy
- Animal Nutrition
- Animal Production
- Biochemistry
- Dairy Sciences
- Feed Science and Nutrition
- Food Inspection
- Food Quality and Safety
- Infectious Diseases
- Pathology
- Internal Medicine
- Parasitology
- Pharmacology and Endocrinology
- Physiology

Section of Anatomy of the Animals of Medical-Veterinary Interest

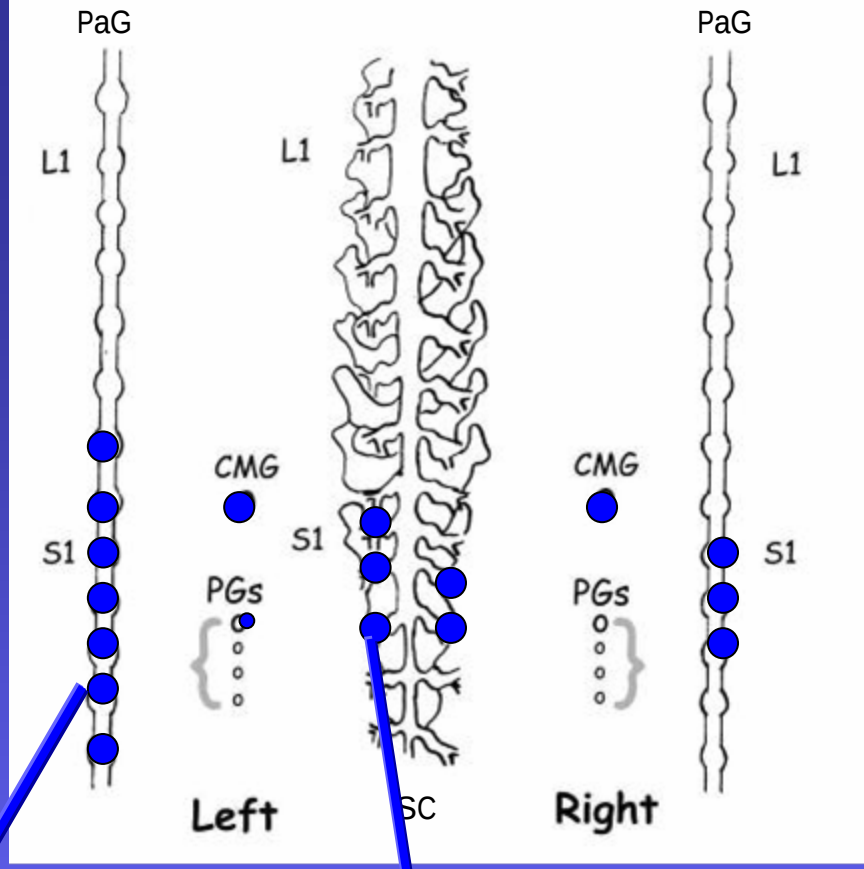
Coordinator
Panu R.?

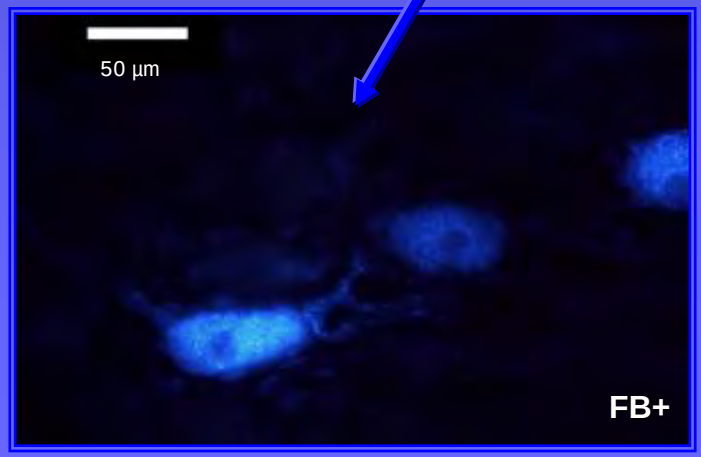
Localization and immunohistochemical characteristics of neurons projecting to the musculature associated to the genital organs in relation to animal fertility and welfare

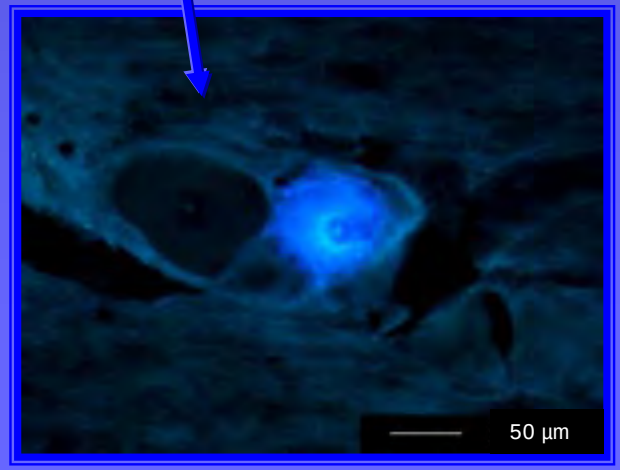
DA SCEGLIERE QUALI DIAPOSITIVE TENERE
(ho compattato quelle che erano possibili)



P. Popesko “Atlas of Topographical Anatomy of the Domestic Animals ”, vol. 3, ed. Grasso; Edimediche.





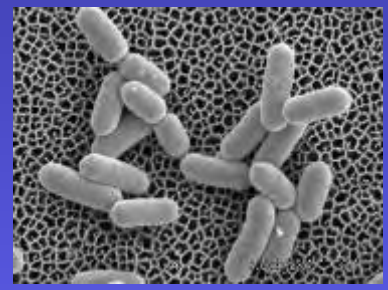


Dpt. of Animal Production, Veterinary Biotechnology,
Food Quality and Safety

Feed Science and Nutrition Unit

Coordinator: Prof. A. Quarantelli

Research:



1. **Digestibility of forages employed in Parmigiano-Reggiano cheese production process**

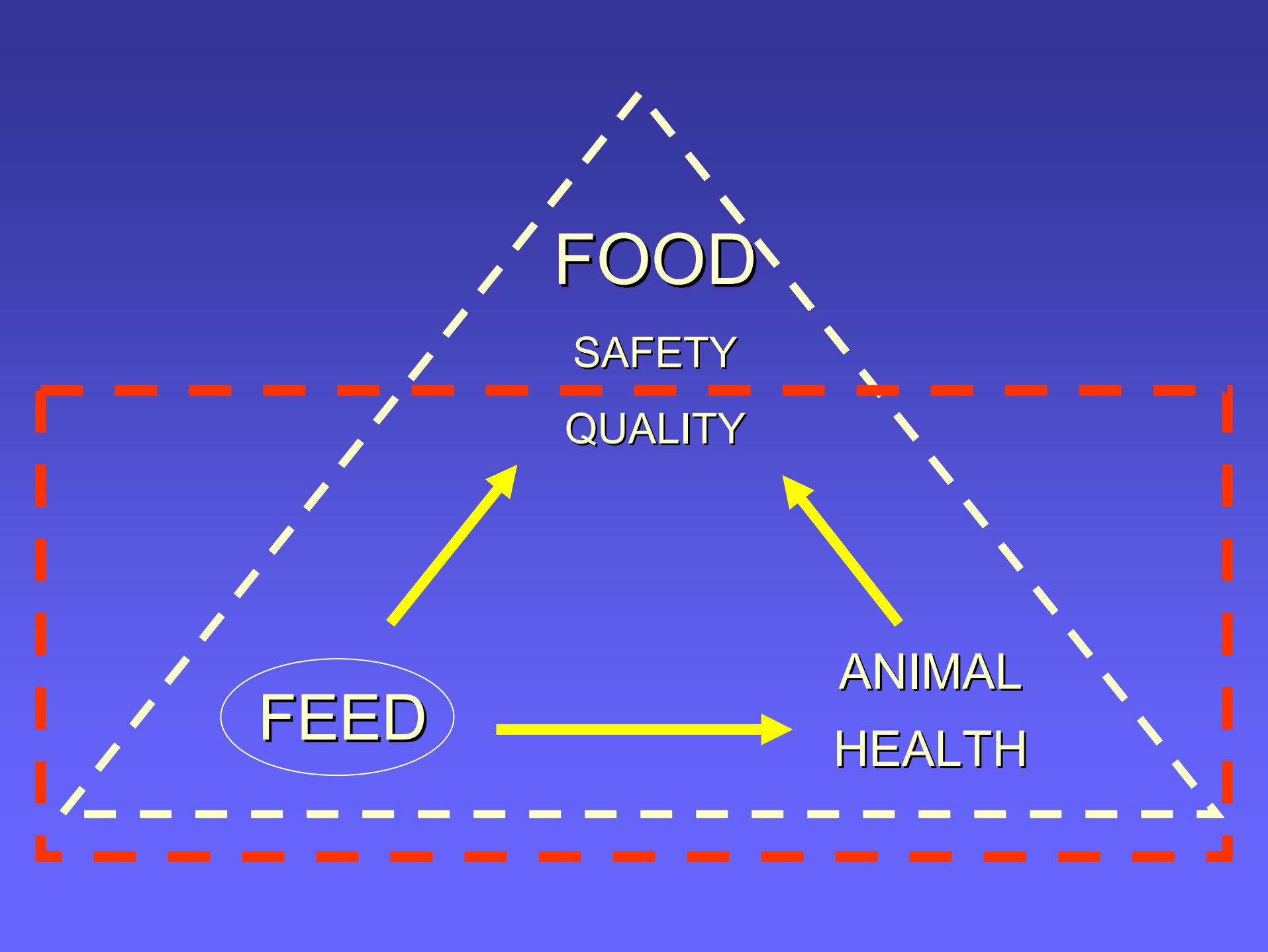
2. **Effects of nutrition on animal products quality**

3. **Probiotics, enzymes and botanicals use in animal nutrition**

4. **Mineral and vitaminic supplementation of the rations**

5. **Effects of oxidative stress on animal performances**

6. **Oxidative process and antioxidant presence in feeds**


FOOD
SAFETY
QUALITY
FEED
ANIMAL
HEALTH

Animal Production Unit

Coordinator: Prof. A. L. Catalano

- Productivity and reproductive efficiency of local (Emilia-Romagna) animal breeds
- Assessment of genetic diversity in animal population (pedigree analysis)
- Growth and milk production (mathematical models)
- Milk production in first lactation in dairy cow (ß-lactoglobulin)
- Genetic diversity in wild animal populations

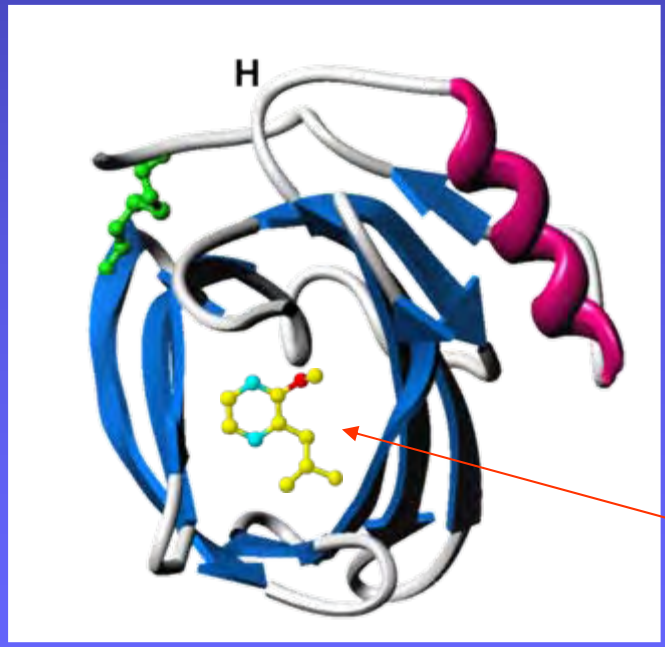
Veterinary Biochemistry Unit

Coordinator: **Prof. Roberto Ramoni**

Biosensors for the detection of small hydrophobic molecules

Odorant Binding Proteins (OBP)
(LIPOCALINS)

Nasal mucosa of vertebrates and other tissues (Humans)



PORCINE ODORANT BINDING PROTEIN (pOBP)

small hydrophobic molecules

(MW 150 – 250 Da)

Odorant Binding Proteins (OBP)
(human – bovine – porcine)

→ **binding properties complementar to those of antibodies and enzymes**

OBP ligands

1. **natural and synthetic flavours**
2. **volatile anaesthetics**
3. **explosives, additives, plasticizers**
4. **toxic compounds (from PUFA)** →

Ageing
Cancer
Alzheimer
Heart infarct
Cataract

↓

Production of OBP mutants specific for *SINGLE UNIQUE* ligands

Section of Dairy Science and Technologies

Coordinator: Prof. Mariani

Research

- Genetic factors and milk quality: effects of cattle breed and genetic polymorphism of milk proteins

- Seasonal/monthly variations of herd milk quality in Parmigiano-Reggiano cheese production area

- Effects of storage conditions (time and temperature) on physico-chemical and dairy-technological properties of milk for Parmigiano-Reggiano cheesemaking

- Set-up of a quick test for the quantification of the B genetic variant of k-casein in bulk milk samples

- Physico-chemical and structural characterisation of milk from other species

Section of Food Inspection

Coordinator: Prof. Franco Brindani

1. **Detection of foodborne pathogens** in
   - slaughtered animals
   - fresh meat and meat products
   - raw milk and milk products

   and study of their impact on **human health**

2. **Detection of virulence genes** in foodborne pathogens

3. **Antibiotic-resistance** in *Salmonella enterica* isolates

4. **Shelf-life evaluation** of vacuum-packed foodstuffs

5. Improvement of **sanitization procedures** in food industry

Food Quality & Safety Unit

Coordinator: **Prof. Ianieri**

RESEARCH

Safety

- Biological hazards
- Chemical hazards

Quality

- Characterization of traditional meat products
- New meat products (low fat, low salt)
- Preservation techniques

- **Microbial flora of traditional dry fermented sausages**
- **Carcass decontamination**
- **Epidemiology of *L. monocytogenes***
- **Lipid oxidation in food of animal origin**
- **Heavy metal contamination**

Unit of Epidemiology, Microbiology and Infectious Diseases of Domestic Animals

Coordinator: **Prof. Sandro Cavirani**

Laboratory of
- **bacteriology**
- **virology**
- **microscopy**
- **serology**
- **biotechnology**

Diagnostic activity

- **Bacteriological investigations mainly on cattle**

- **Virological investigations mainly on cattle samples**

- **Serological investigations mainly on cattle sera**

Research

- **Control strategies for bovine paratuberculosis**

- **Control of Bovine Viral Diarrhea Virus infection**
  Diagnostic tools to detect PI animals
  Efficacy of vaccines to protect against BVDV field strains

- **Epidemiological studies on emerging pathogens involved in respiratory (coronavirus) and genital (Chlamydia and Coxiella) diseases of cattle**

- **Cloning and expression of immunodominat antigens for vaccine applications**

- **Engineering BoHV-4 genome for gene delivery**

- **Interaction of viral pathogens with bovine endometrium**

Internal Medicine of Large Animals

Coordinator: **Prof. P. Martelli**

- Swine Medicine
- Research topics:
  - Aujeszky's Disease
  - PRRS
  - *Mycoplasma hyopneumonaie*
  - PCVAD
  - Enteric Disorders
    - Brachyspira hyodysenteriae
    - Lawsonia intracellularis
    - PED (more recently)

Department of Animal Health
Pathology Unit

Coordinator: **Prof. A. Corradi**

Research

1. Development of the pig **immune system** and **interaction** with **neuroendocrine system**
>> Welfare and Adaptive Response to psycho-physical stressors (Collaboration: Physiology Unit)

2. Immune response to **pathogens**: new vaccine protocols and ways of vaccine administration

- Pig > PRRSV – ADV – PCV2 – Influenzae Virus – *M. hyopneumoniae*
- Bovine > BHV1

3. Effects of **mycotoxins** on **immune competence** (Collaboration: Microbiology Unit)

- Mouse / Rat / Pig / Bovine > ochratoxin A – aflatoxins – trichothecens

4. Effects of **anti-stress agents / growing promoters** and **immunostimulants**:

Chromium Nicotinate / Zinc Saccarinate (pig) - Steroid hormones (bovine)

ANALYSES

PHENOTYPICAL / FUNCTIONAL LEUCOCYTE MARKERS

Flow cytometry

- RESTING / ACTIVATED cells in : BLOOD (PBMC, BALF)
  TISSUES (spleen, lymph nodes, thymus)

PLASMA IMMUNO-MODULATORY HORMONES/CYTOKINES

ELISA / RIA

- GH-IGF1, PRL, Cortisol
- Inflammatory / Immune Cytokines
- Immunoglobulins

EXPRESSION LEVELS of INFLAMMATORY and IMMUNE CYTOKINES

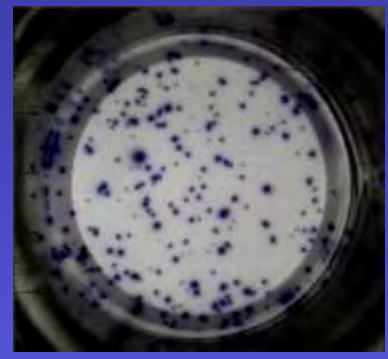
RT-PCR / Real Time PCR

- Blood (PBMC)
- Tissues (GALT, Peyer's Patches)
- Biological fluids (BALF cells)

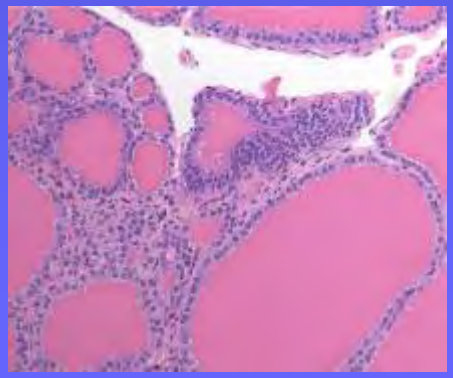
ANALYSES

- ***In vivo* IMMUNE EFFICIENCY** through ***ex vivo* CELL IMMUNE REACTIVITY**

  - ELISpot Assay (IFN-γ Secreting Cells)
  - Intracellular Staining (IFN-γ Secreting Cell phenotype)

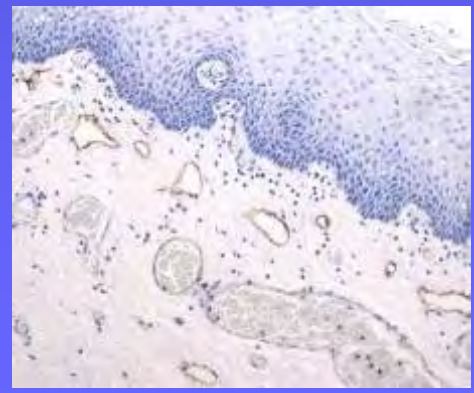


- ***In vivo* IMMUNE CELL CHARACTERIZATION** and **DISTRIBUTION**



- Light microscopy
  microscopic
  alterations

- ICC / IHC
  immune antigens
  in cells and tissues



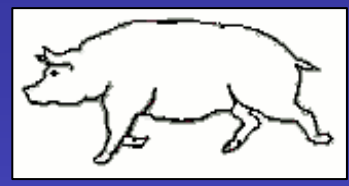
Department of Pathology and Laboratory Medicine
Microbiology Unit

Coordinator
Prof. L. Polonelli
Prof. Valter Magliani

RECOMBINANT and GENIC
AF MIMETICS

AF CONJUGATES to
CARRIER PROTEINS

suckling



SOWS

PARENTERAL and/or MUCOSAL IMMUNIZATION

detection of **AF** in tissues

MICE

Monitoring of specific **antibodies** in serum

PIGLETS

evaluation of ***performances***

monitoring of specific **antibodies** in serum, feces, urine and/or nasal discharge

AF ADMINISTRATION through DIET

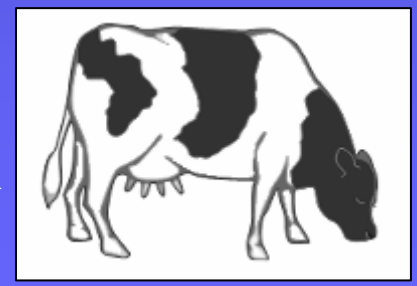
RATS

monitoring of specific **antibodies** in serum, feces, vaginal discharge and/or urine

AF detection in feces, urine and/or tissues

COWS

monitoring of specific **antibodies** in serum, feces, urine, nasal discharge and/or milk



AF detection in feces, urine, milk and/or tissues

Food Microbiology Laboratory

Department of Genetics, microorganism Biology, Anthropology, Evolution

Prof. Erasmo Neviani, Full Prof.

Prof.ssa Monica Gatti, Associate Prof.

Dr.ssa Camilla Lazzi, Res.

Dr.ssa Valentina Bernini, Res.

Dr.ssa Benedetta Bottari, PhD

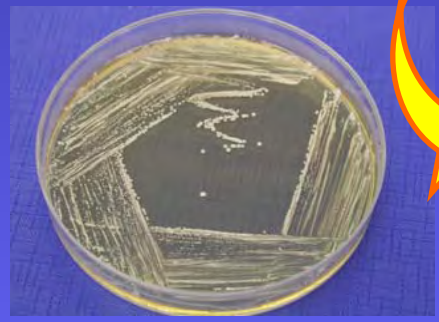
Dr. Juliano De Dea Lindner, PhD

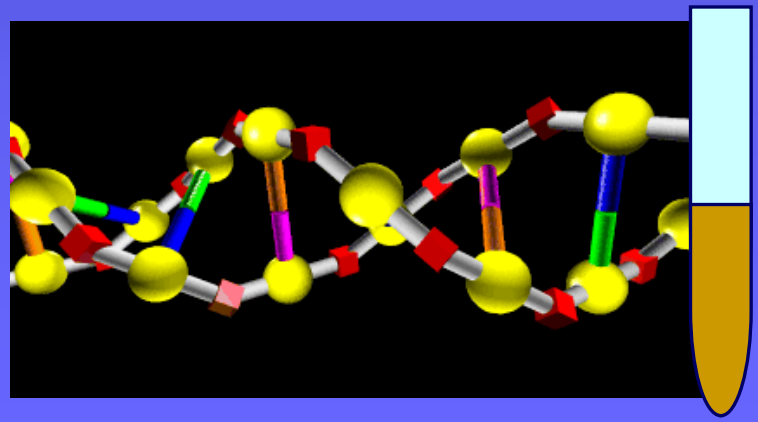
Dr.ssa Francesca Turroni, PhD

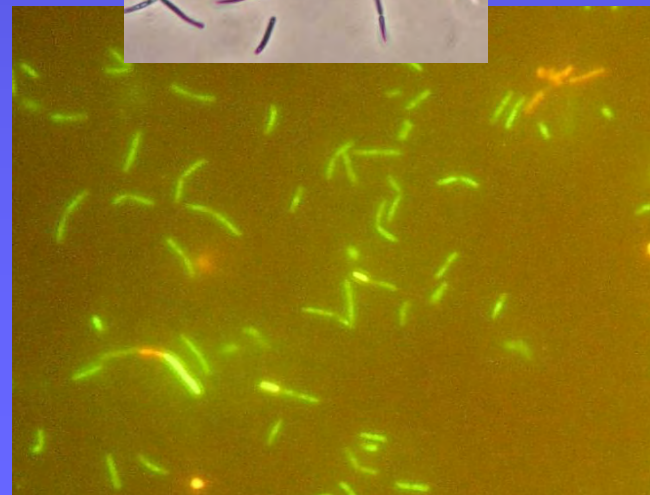
Dr.ssa Angela De Lorentiis, doctor

Dr Claudio Bove, doctor

Dr.ssa Marcela Santarelli, doctor







Research

- Food safety (pathogens, toxins, Challange tests)
- Food quality (useful microorganisms) characterization and typification of product microorganisms
- “Autochthonous” Microflora in characteristic products
- Lactic bacteria and technological use
- Quality and safety of dairy products
- Phenotypic and genotypic characterization of food microorganisms
- Enzymatic activity and ripening of foodstuff
- Use of innovative technologies for the study of microbic populations
- Interaction and comunication between microorganisms in complex ecosystems
- Probiotics
- Bacterial Genomics

Strumentations

- Thermal cyclers (PCR)
- DNA sequencer
- Fluorescence microscopy
- Pulsed field electrophoresis
- Real time-PCR
- Infrared imaging system
- Statistic and bio-informatic software (data processing)

TECnologie e impianti per l'industria ALimentare (1)

TECAL is a net-lab of HI Mech District
of the Emilia-Romagna Region
recognized by MIUR

TECAL's proposal:

- organize technological research on processes and plants for food industry
- create a regional reference centre in Emilia Romagna for technical-scientific research for the development of mechanical-food-sector

Main researche:

- products transformation and stabilization technologies
- logistic/distributive processes that allow the supplying of these products

TECAL – Laboratorio TECnologie e impianti per l'industria ALimentare (2)

Main projects

<u>subproject 1</u> "Aseptic processes for food industry"

- Optimization of aseptic systems for safety and quality of food products
- Development of fluid-filling valves
- Use of ultrasounds in cleaning and sterilization in food industry

TECAL – Laboratorio TECnologie e impianti per l'industria ALimentare (2)

<u>subproject 2</u> "Innovation and improvement of other processes for food treatment"

- Conditioning and packaging of food products
- Use of high pressure for treatment of fluid food systems
- Planning and functional optimization of extruders in food industry
- Optimization of heat processes for industrial products formulation

<u>subproject 3</u> "New technologies and processes for traceability and food supply chain"

- Re-engineering and optimization of logistic processes for traceability
- Radio-Identification systems UHF for the traceability of typical food products
- Biosensors

TECAL – Laboratorio TECnologie e impianti per l'industria ALimentare (3)

Coordination

- University of Parma - Department of Industrial Engineering; Prof. Gianluca Medri
  Parco Area delle scienze 181/A Parma

  Staff for research activity and innovation :
  19 new researchers (38 years/man)

TECAL – Laboratorio TECnologie e impianti per l'industria ALimentare (3)

Participants

- University of PARMA - Dep. Of Industrial Engineering, Dep.of Information Engineering, Dep. Of Public Health ; University of BOLOGNA DISA- Dep.of Food Science; University of MODENA and REGGIO EMILIA - Dep. Of Agronomy Science Health Formation and Programmation; University of MODENA and REGGIO EMILIA - Dep. Of Mechanic and Civil Engineering CNR - IMEM Institute of PARMA, CRPA Center of researches and Animal Productions REGGIO EMILIA, CONSORZIO DEL PROSCIUTTO DI PARMA, MARTINI ALIMENTARE srl, F.I.A.M.A. srl, Officina FREDDI s.r.l.

TECAL – Laboratorio TECnologie e impianti per l'industria ALimentare (4)

Contacts

- Prof. Gianluca Medri (University of Parma - Dep. Of Industrial Engineering): gianluca.medri@unipr.it; tel. 0521-905882; fax. 0521-905705.
- Prof. Roberto Massini, responsible subproject 1 (University of Parma - Dep. Of Industrial Engineering): roberto.massini@unipr.it; tel. 0521-905852; fax. 0521-905705.
- Prof.ssa Elisabetta Guerzoni, responsible subproject 2 (University of Bologna - Dep.of Food Science): guerzoni@foodsci.unibo.it; tel. 051-2096573/0547-338135; fax. 051-2099782/0547-382348.
- Prof. Carlo Morandi, responsible subproject 3 (University of Parma - Dep.of Information Engineering): carlo.morandi@unipr.it; tel. 0521-905823; fax. 0521-905798.
- Prof. Roberto Montanari, responsible communication (University of Parma - Dep. Of Industrial Engineering): roberto.montanari@unipr.it; tel. 0521-905851; fax. 0521-905705.

NEUROCHEMISTRY LABORATORY FOR FOOD ANALYSIS

° **Prof. Enrico Bignetti**

Scientific Program

Neuronal cells cultures for food quality assessment (in particular for the detection of specific nutrients, toxic residues or psycho-active substances)

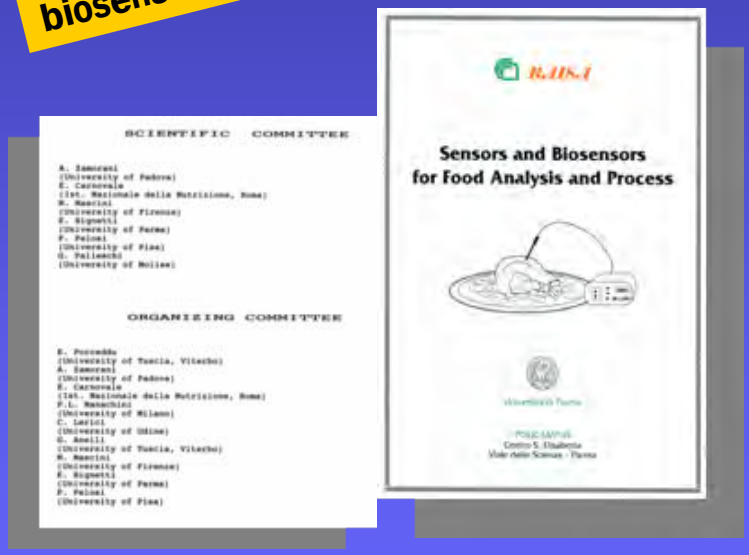
Specific Project

Development of food biosensors based on immobilized neuronal networks

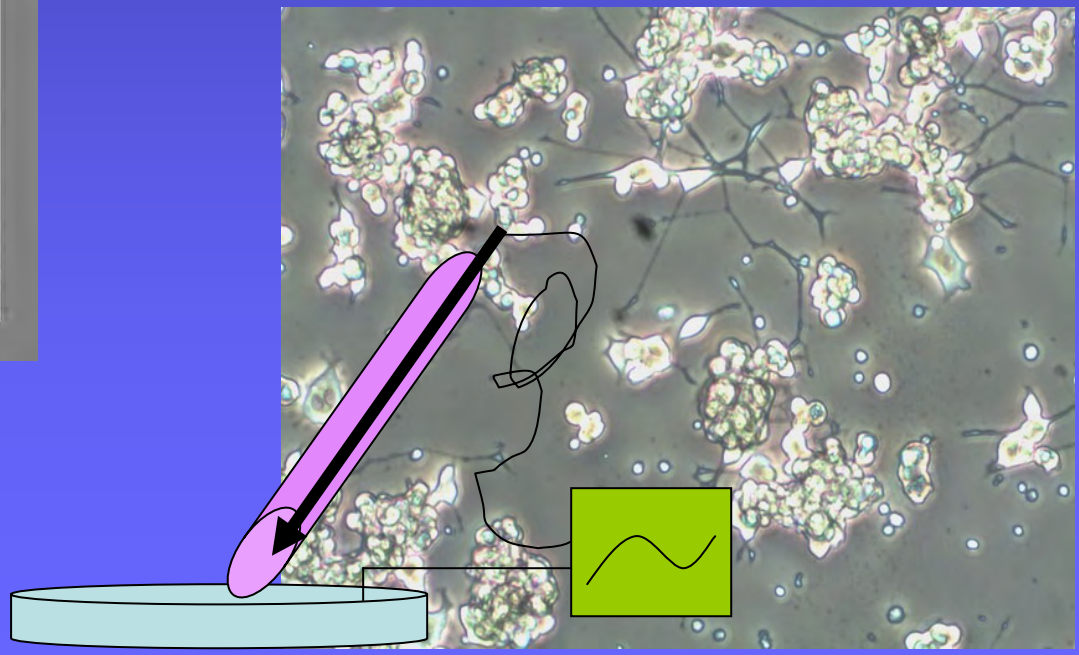
° **Professor of Clinical Biochemistry and Molecular Biology at the Faculty of Veterinary Medicine (Parma)**
Address: Dept. of Physics - tel. +39(0)521 90 5277-6228; email: enrico.bignetti@unipr.it

SOME HIGH-LIGHTS

YESTERDAY
The 1st intl. cong. on food-biosensors held in Parma in 1993



TOMORROW
Neuronal network-based biosensors (microcapillary devices)



- Food Quality
- Food Safety
- Probiotic
- Genomics