



# 2013

Annual Report

**CReSA<sup>R</sup>**  
Centre de Recerca en Sanitat Animal

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Presentation

01

# Who are we?

## What is CReSA?

The Centre de Recerca en Sanitat Animal (CReSA) is a foundation created in 1999 to conduct research into animal health. It was founded by initiative of the Universitat Autònoma de Barcelona (UAB) and Institut de Recerca i Tecnologia Agroalimentàries (IRTA).

The CReSA unites the human potential for research into animal health of both founding institutions, and takes advantage of a technologically advanced building, with level-3 biocontainment (BSL3) for conducting research, grouping efforts and channeling new resources in this field.

The CReSA researchers are searching for innovative and

effective vaccines, study epidemiology, immunological responses and pathogenic mechanisms, while assessing risks for human health and developing standardised infection models and diagnosis techniques.

In general terms, the objectives of the CReSA are: research and technological development, and all aspects of studies and education in the field of animal health. The projects are carried out in collaboration with the UAB, IRTA, other institutions, and the private sector.

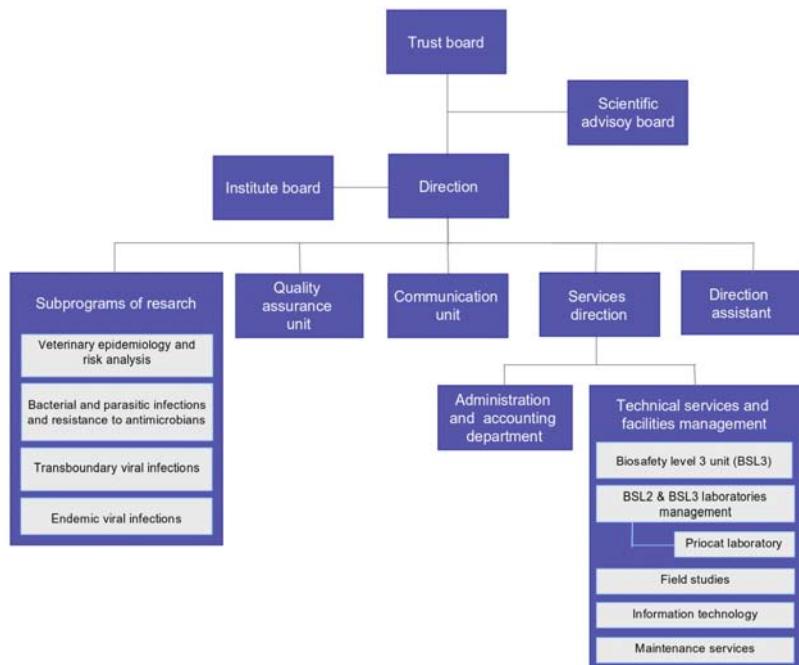
To achieve our objectives:

- We develop research and development programs within the field of animal

health.

- We transfer the scientific advances that we achieve to the agrifood sector.
- We offer services in the research and development field by means of arranged R&D programs.
- We advise agrifood companies and public administration and offer technological support in the field of animal health.
- We organize scientific and technical training programs.

## Organization chart



# Board of trustees

The maximum decision-making body is the Board of Trustees, which approves the statutes and amendments, annual reports, strategic plans, budgets and annual accounts.

## PRESIDENT

**Ferran Sancho Pifarré**  
UAB Rector

## BOARD MEMBERS DESIGNATED BY THE IRTA AND UAB

**Josep Maria Martorell Rodón**  
General Director for Research of  
DECO



## VICEPRESIDENT

**Josep Maria Monfort i Bolívar**  
General Director of IRTA

**Miquels Molins Elizalde**

General Director for Agriculture and  
Livestock of DAAM



## BOARD MEMBERS DESIGNATED BY THE UAB

**Pilar Dellunde Clavé**  
Vice-rector for Research

**Lluís Rovira Pato**

ICERCA Program



**Lluís Tort Bardolet**  
Vice-rector for Strategic Projects and  
Planning

**Valentín Almansa de Lara**

General Director of Health of the Agricultural Production of  
MAGRAMA



**Reyes Pla Soler**  
Dean of the Veterinary Faculty of UAB

**Antoni Mateu Serra**

Secretary for Public Health of DSLT

## BOARD MEMBERS DESIGNATED BY THE IRTA

**Carles Rosell i Rufat**  
Business Development of IRTA

**Joaquim Xifra Triadú**  
General Subdirector for Livestock of  
DAAM

**Ramón Jové i Miró**  
Director of CESAC

**UAB:** Universitat Autònoma de Barcelona; **IRTA:** Institut de Recerca i Tecnologia Agroalimentàries; **DAAM:** Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural; **CESAC:** Centre de Sanitat Avícola de Catalunya; **DECO:** Departament d'Economia i Coneixement; **ICERCA:** Institució CERCA (Centres de Recerca de Catalunya); **DSLT:** Departament de Salut; **MAGRAMA:** Ministerio de Agricultura, Alimentación y Medio Ambiente

# Scientific advisory board

## Members

The Scientific Advisory Board (SABC) of the CReSA was created in 2009 as a consultative body providing advice to the Board of Trustees and to the Direction of the CReSA in all those aspects related to the scientific activities of the center.

During 2012, the CReSA staff worked on the recommendations made in the first SABC report (2010).

Currently, the SABC is comprised of 5 members:

### Dr Philippe Vannier

France

CHAIRMAN

Expert in different European organizations (DG Research, EFSA). Director of Animal Health and Welfare in the French Agency for Food, Environmental and Occupational Health & Safety, Anses (retired 2011)



**Dr Jürgen Dämmgen**  
Germany  
Research and Development, Boehringer Ingelheim Animal Health GmbH (retired 2008)



**Dr Esteban Domingo**  
Spain  
Centro de Biología Molecular “Severo Ochoa” (CBMSO)



*Currently, the Scientific Advisory Board is comprised of 5 members from the European Union.*

**Dr Marion Koopmans**  
The Netherlands  
National Public Health Laboratory (RIVM)



**Dr Luis Ortega Mora**  
Spain  
Universidad Complutense de Madrid (UCM)



# Facilities and biosafety

## The level 2 biosafety laboratories

The CReSA building, which opened in 2005, consists of highly-specialised equipment and technologically advanced facilities that enable studies to be performed in the fields of microbiology, immunology, molecular biology, entomology and prions.

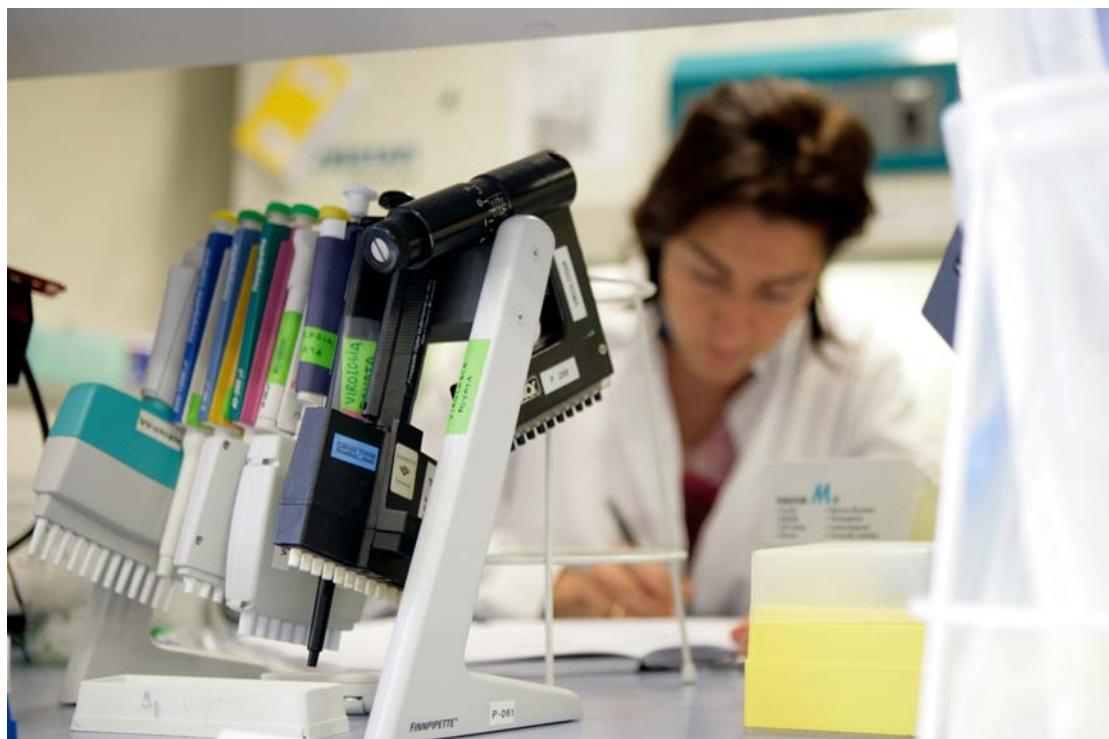
The CReSA has technologi-

cally advanced facilities for such studies, with two clearly differentiated areas:

- level 2 biosafety laboratories
- level 3 biocontainment unit.

The laboratory zone, of biosafety level 2, occupies 717 m<sup>2</sup>.

The area consists of eleven laboratories and equipment rooms in which specific activities are carried out: bacteriology, virology, immunology, molecular biology, pathological anatomy, cell culture, termocyclers, PCR sample extraction, electrophoresis, entomology, ultra-freezing, equipment, preparation of reagents, etc.



## The level 3 biocontainment unit

The centre has a Biocontainment Unit with biosecurity level 3, which has several laboratories and stables that mainly house food supply animals (pigs, poultry, cattle, sheep, goats and rabbits), as well as wild animals

(chamois, deer, quails, partridges, falcons, ferrets) and laboratory animals (rats, mice, guinea pigs).

This Biocontainment Unit, of a total surface area of 4500 m<sup>2</sup> distributed over three

floors, is equipped with strict access control measures and biocontainment barriers that prevent the pathogens from getting outside, and which are studied using hermetic isolation systems.

## The level 3 biocontainment unit

This unit enables the research team to carry out research into pathogenic agents listed as diseases notifiable to the World Organization for Animal Health (OIE).

All laboratories have independent ventilation systems, with negative pressure gradient with regard to the corridors and HEPA filters for air on entry and exit.

The boxes have strict control and containment measures, in addition to having nega-

tive pressure with respect to the corridors. All air entering and exiting the boxes is filtered through absolute HEPA filters. Waste coming from this zone, such as stools and waste water, is subjected to a chemical decontamination process before it leaves the building. Personnel entering the boxes must change clothes and take a shower before leaving. Animals are on conventional livestock slats, with standard feeding and drinking troughs, living in a

controlled atmosphere. All pathological clinical variables are thoroughly supervised. A video-surveillance system records images 24 hours a day, allowing control of the animals inside the boxes at all times. In order to maintain these strict conditions of biocontainment and biosecurity, there is a complex centralised management system that allows direct and quick control of all elements and parameters that directly influence the performance of the facilities.



### Biocontainment systems, barriers and protocols

- Secure management of high-risk infectious agents
- Hermetic isolation systems
- Negative pressure gradients
- Absolute air filtration
- Treatment of liquids and solids wastes
- Mandatory showers on leaving the biocontainment unit
- 6 high security laboratories: virology, bacteriology, cell culture, equipment, molecular biology and prions
- 12 high security boxes for experimental inoculations to house pigs, poultry, cattle, sheep, goats and rabbits, among others
- Climatic chamber for entomological studies



# Human resources

## Director

Segalés Coma, Joaquim

## Researchers

Accensi Alemany, Francesc  
Alba Casals, Ana  
Allepuz Palau, Alberto  
Almeria de la Merced, Sonia  
Aragón Fernández, Virginia  
Badiola Saiz, Ignacio  
Bensaid, Albert  
Busquets Martí, Núria  
Casal i Fàbrega, Jordi  
Cerdà Cuellar, Marta  
Darji, Ayub  
Darwich Soliva, Laila  
Díaz Luque Ivan  
Dolz Pascual, Roser  
Domingo Alvarez, Mariano  
Ganges Espinosa, Llilianne  
Kekarainen, Tuija  
López Soria, Sergio  
Majó Ferrer, Natàlia  
Martín Castillo, Margarita  
Martínez Martínez, Jorge  
Mateu de Antonio, Enric  
Migura García, Lourdes  
Montoya González, María  
Napp Avelli, Sebastián  
Nofrarías Espadamala, Miquel  
Nuñez Garrote, Jose Ignacio  
Pagès Martínez, Nonito  
Pérez de Rozas Ruiz de Gauna, Ana  
Pérez de Val, Bernat  
Pina Pedrero, Sonia  
Pujols Romeu, Joan  
Ramis Salvà, Antonio José  
Rodríguez González, Fernando  
Rosell Bellsola, Rosa  
Sibila Vidal, Marina  
Talavera Forcades, Sandra  
Vidal Barba, Enric

## Technicians

Aloy Escudero, Núria  
Ayats Murillo, Teresa  
Cano Carrasco, Esmeralda  
Cervera Muñoz, Zoraida  
Córdoba Muñoz, Lorena  
Espinhar Guardeño, Sierra

Galofré Milà, Núria

González Oliver, Judit  
Huerta Medina, Eva  
Llorens Segalés, Anna  
López Jiménez, Rosa Mª  
Martín Fernández, Maite  
Muñoz Calvo, Iván  
Muñoz Campanya, Marta  
Navarro Toro, Nuria  
Navas Sanchez, Maria Jesus  
Oliver Ferrando, Salvador  
Pérez Maillo, Mónica  
Pérez Rodríguez, Diego  
Pérez Simó, Marta  
Pujol Lucas, Nuria  
Riquelme Guerrero, Cristina  
Rivas Adán, Raquel  
Valle García, Rosa Mª  
Valle González, Marta  
Verdún Castelló, Marta

## Technical services

Solanes Foz, David (Director of Services)

## Department of administration and accounting

Pratsavall Badillo, Sílvia  
(Responsible for administration, accounting and human resources)  
Gutiérrez Cabello, Marta  
(Accounting and economic project management)  
Pastó López, Montse (Assistant director; management of projects, contracts and human resources)  
Menéndez Cabrera, Isabel  
(Reception and accounting support)  
Lozano Padilla, Carme  
(Accounting support and administrative support to DAAM)

## Technical services and facilities support

Solanes Foz, David  
(responsible for Level 3 Biocontainment Unit, BSL3)

Abad Morejón de Girón,  
Francesc Xavier  
(responsible for Level 2 and  
Level 3 biosafety laboratories,  
BSL2 and BSL3)  
Mora Salvatierra, Mercedes  
(coordinator for technicians)

## Laboratory technicians

Ivars Espuñes, Josep Maria  
(BSL2)  
Maeso García, Raquel (BSL3)  
Alberch Raurell, Monica (BSL3)

Cordón Morales, Iván (BSL3  
animal housing technical coordinator)

## Animal care-takers technicians

Osuna Marín, M. Àngels  
Pereira Sanchez, Claudia  
Prieto Martin, Juan Carlos  
Rosell Bellsolà, Valentí  
Torras Sales, Concepció

## Cleaning team

Carrero Torres, Mercedes  
Castillo Alcalá, Manuela  
Muñoz Aguilar, Rosario

## Department of Computer Services

Cordón Morales, Rubén  
(Information Technology Manager)  
Grau Borrull, Oscar  
(Information Technology)

## Quality Assurance Unit (QAU)

Ordóñez Ordóñez, Montse  
(Responsible for QAU)  
López Jodra, Marta (QAU administrative support)

## Communication Unit

Rodríguez González, Elisabet  
(Head of Communication)

## PhD students

Antillés Silva, Noelia  
Baratelli, Massimiliano  
Bello Ortí, Bernardo  
Brustolin, Marco  
Cameron, Karla  
Cantero Portillo, Juan Guillermo  
Feng, Hua  
Fernandez Aguilar, Xavier  
Garcia Sáenz, Ariadna  
Gibert Rebull, Elisa  
González Zabala, Julia del Pilar  
Jiménez Melsió, Alexandra  
López Monteagudo, Paula  
Manrique Ramírez, Paula

Martínez Orellana, Pamela  
Nieto Blanco, David  
Núñez Hernández, Fernando  
Santamaría Domínguez, Cristina  
Solà Ginés, Marc  
Urdaneta Vargas, Saulo  
Vidaña Mateo, Beatriz

## Visitors / collaborators

Calderón, Celmira  
Ciprián Carrasco, Jose Abel  
Oliver Ferrando, Salvador  
Pérez Rodríguez, Lola

## Master students

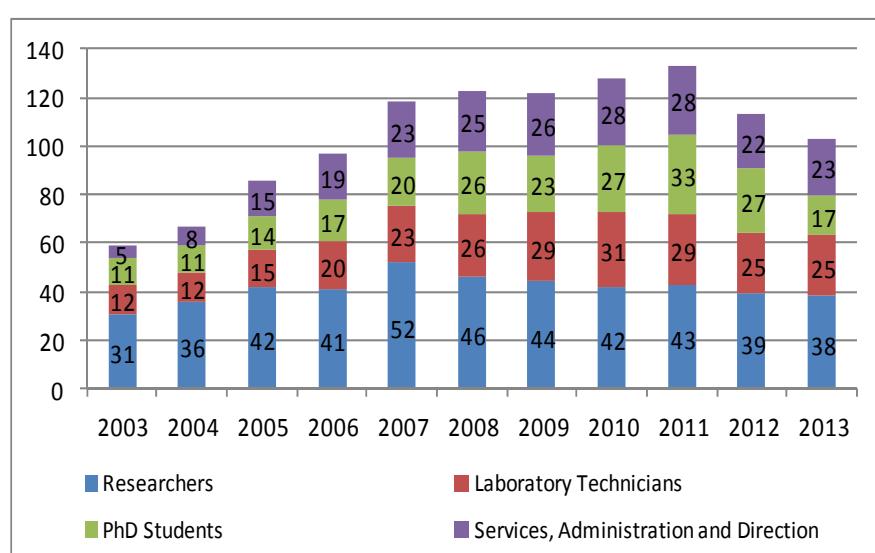
García Morante, Beatriz  
Vázquez Iglesias, Lucía

## Internship students

Auladell Martin, Adrià  
Béjar Tafall, David  
Blanch Lázaro, Berta  
Epaminondas de Fontes, Alice  
López Fernández, Elisabet  
Ramírez Hernandez, Alejandro



Evolution of the CReSA staff (2003-2013)





Summary of the activity

02

# Relevant facts 2013

## Research and development

- 9 research projects in ongoing funded by the Ministry of Science and Innovation as part of the National Plan.
- Participation in 10 European projects and net-works: 7 projects of the VII European Framework Program and 3 COST actions.
- One research project (Sergio López-Soria) was awarded by the seventh edition of the European PCV2 Research Award sponsored by Boehringer Ingelheim.
- 61 peer reviewed papers (ISI Citation Index) published and 91 communications at congresses.
- 4 books or monographs and 3 book chapters published.
- Funding from ongoing competitive projects: €924.000.
- 7 doctoral theses and 7 Master research studies.



## Technology transfer and services

- 51 new contracts with private companies plus other agreements for a total income of 3.494.142€.
- 10 service contracts for the departments of the Generalitat de Catalunya involving animal and human health.
- Over 100 health professionals attended the Second Conference on zoonoses and emerging diseases organized by CReSA.
- A CReSA project (Support Service for Slaughterhouse, SESC) wins the third prize in the Generating Ideas Programme organized by the UAB Research Park (PRUAB).
- 1 national conference (XV Jornades de Porcí de la UAB), 1 technical seminar for the PATT Plan of the DAAM and 25 technical seminars organized.
- 17 journalists and scientific communicators visited the CReSA on the occasion of the 10th anniversary of the inauguration of the high biological security building.
- Two new editions of the journal for scientific dissemination were launched (CReSAPIENS).
- 11,256 analyses for the diagnosis of viral notifiable diseases of swine and ruminants carried out.
- The PRIOCAT laboratory analyzed 11,741 samples for the diagnosis of Transmissible Spongiform Encephalopathies in Catalonia.
- The Servei de Suport a Escorxadors (SESC) managed a total of 141 consultations.
- 330 students from 15 secondary schools in Catalonia visited the center for education activities.
- 670 subscribers to the CReSADIGITAL online bulletin.
- 3 new social media of CReSA (Facebook, Twitter, Pinterest) were launched.

# Economic information

## Total income (monetary contribution)

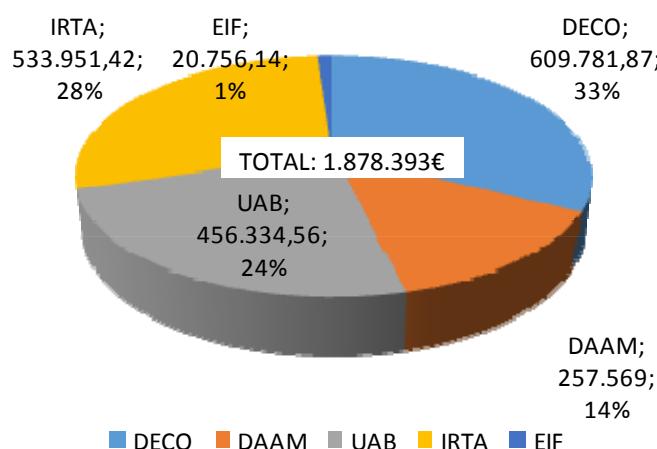
| 2013 income                                     | Amount           | %           |
|---|------------------|-------------|
| Private contracts plus other agreements         | 3,163,308        | 51%         |
| Public sources (trustees and competitive funds) | 2,816,794        | 46%         |
| Extraordinary income                            | 37,214           | 1%          |
| Capital grant (investments)                     | 149,993          | 2%          |
| <b>Total</b>                                    | <b>6,167,309</b> | <b>100%</b> |

## Competitive income

| BODY         | PROJECTS       | SUBVENTIONS FOR STAFF | STAGES        | TOTAL            |
|--------------|----------------|-----------------------|---------------|------------------|
| INIA         | 129.685        |                       |               | 129.685          |
| MINECO       | 275.617        | 109.291               | 15.100        | 400.008          |
| EU           | 418.644        |                       |               | 418.644          |
| ISCIII       | 27.904         |                       |               | 27.904           |
| AWARD        | 25.000         |                       |               | 25.000           |
| RECERCAIXA   | 32.398         |                       |               | 32.398           |
| AGAUR        | 5.069          | 70.730                |               | 75.799           |
| MECD         | 0              | 500                   | 10.250        | 10.750           |
| MSSI         | 3.900          |                       |               | 3.900            |
| <b>TOTAL</b> | <b>918.218</b> | <b>180.521</b>        | <b>25.350</b> | <b>1.124.089</b> |

INIA: Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria; MINECO: Ministerio de Economía y Competitividad; EU: European Union; ISCIII: Instituto de Salud Carlos III; MECD: Ministerio de Educación, Ciencia e Innovación; MSSI: Ministerio de Sanidad, Servicios Sociales e Igualdad.

## Non-specific contribution from UAB, IRTA and Generalitat de Catalunya



\*UAB: Universitat Autònoma de Barcelona; IRTA: Institut de Recerca i Tecnologia Agroalimentàries; DAAM: Departament d'Agricultura, Ramaderia, Pesta, Alimentació i Medi Natural; DECO: Departament d'Economia i Coneixement; EIF: Economia i Finances

\*\*NOTE: UAB, IRTA and DAAM also includes assigned staff.

# Summary of the scientific activity

## Summary of scientific activity 2001-2013

|   | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Peer reviewed papers (ISI citation index)                   | 19   | 27   | 17   | 39   | 35   | 58   | 68   | 48   | 72   | 60   | 76   | 92   | 61   |
| Technical articles  | 8    | 13   | 8    | 8    | 10   | 15   | 20   | 20   | 16   | 6    | 5    | 17   | 19   |
| Reviews (among above-cited figures)                         | 4    | 6    | 2    | 6    | 4    | 6    | 3    | 9    | 7    | 7    | 4    | 3    |      |
| Books or monographs   | 0    | 2    | 0    | 0    | 1    | 1    | 2    | 0    | 0    | 0    | 1    | 2    | 4    |
| Book chapters   | 3    | 5    | 0    | 1    | 2    | 3    | 7    | 0    | 1    | 7    | 2    | 6    | 3    |
| Patents and utility models applications                     | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 1    |
| Doctoral theses   | 0    | 1    | 0    | 5    | 4    | 5    | 12   | 9    | 5    | 3    | 4    | 10   | 7    |
| Master Research studies                                     | 0    | 0    | 0    | 3    | 10   | 9    | 15   | 12   | 9    | 7    | 5    | 10   | 7    |
| Presentations at congresses                                 | 36   | 67   | 36   | 71   | 40   | 50   | 79   | 139  | 122  | 78   | 103  | 120  | 91   |
| Presentations at international congresses (among the above) | 13   | 42   | 18   | 46   | 20   | 40   | 57   | 115  | 83   | 60   | 88   | 109  | 66   |

# Projects

## National Research Plan

**Caracterización de los mecanismos inmunológicos implicados en protección frente al virus de la peste porcina africana (VPPA) y desarrollo de vacunas contra el virus**  
AGL 2010-22229-C03-01  
PI: Fernando Rodríguez  
Duration: 3 years  
Start: 01/01/2011  
End: 31/12/2013

**Epidemiología espacial de la Tuberculosis Bovina en animales domésticos en España: estudio de la persistencia y de nuevas infecciones. Evaluación de la vigilancia**  
AGL 2010-21098  
PI: Alberto Allepuz  
Duration: 3 years  
Start: 01/01/2011  
End: 31/12/2013

**MicroRNAs en infecciones víricas del cerdo: análisis funcional e implicaciones en patogenia viral**  
AGL 2010-22358-C02-02  
PI: José Ignacio Núñez  
Duration: 3 years  
Start: 01/01/2011  
End: 31/12/2013

**Caracterización de la respuesta inmune inducida por cepas del virus de la gripe porcina circulante en España. Desarrollo de vacunas basadas en VLPs químéricas**  
AGL 2010- 22200-C02-01  
PI: María Montoya  
Duration: 3 years.  
Start: 01/01/2011  
End: 31/12/2013

**Selección de candidatos vacunales para bloquear los pasos Iniciales de la infección por *Haemophilus parasuis***  
AGL-2010-15232  
PI: Virginia Aragón  
Duration: 3 years  
Start: 01/01/2011  
End: 31/12/2013

**Evaluación de consumos de antimicrobianos como factores de riesgo relacionados con la aparición de resistencia a cefalosporinas en animales destinados al consumo**  
AGL2011-28836  
PI: Lourdes Migura  
Duration: 3 years  
Start: 01/01/2012  
End: 31/12/2014

**Estudios de inmunopatogenicidad frente al virus de la peste porcina clásica (VPPC): implicaciones para el desarrollo de nuevas vacunas y herramientas diagnósticas**

AGL2012-38343  
PI: Lilianne Ganges  
Duration: 3 years  
Start: 01/02/2013  
End: 31/01/2016

**Neosporosis bovina: Interacciones materno-fetal y mecanismos asociados con la protección frente al aborto en gestaciones de razas cruzadas en condiciones experimentales**

AGL2012-39830-C02-02  
PI: Sonia Almería  
Duration: 3 years  
Start: 01/02/2013  
End: 31/01/2016

**Diagnóstico de la tuberculosis caprina: evaluación de las técnicas disponibles. Desarrollo de métodos *in vitro* sin utilización de animales**

AGL2012-36171  
PI: Bernat Pérez  
Duration: 3 years  
Start: 01/02/2013  
End: 31/01/2016



Most of the research projects in course at the CReSA during 2013 were funded by the National Research Plan (MICINN).



## Seventh Framework Programme (7FP) projects

### Improving Campylobacter control measures in primary production of poultry (CamCon)

FP7-KBBE-2009-3-244547

Contract Type: SMS focused research project

PI CReSA: Marta Cerdà

Start: 01/01/2010

Duration: 4 years + 1 year

### Biology and control of vector-borne infections in Europe. Emerging Diseases in a changing European Environment-Next (EDENext)

FP7-HEALTH-2010.2.3.3-1

PI CReSA: Nonito Pagès

Start: 01/01/2011

Duration: 4 years

### Porcine reproductive and respiratory syndrome (PRRS): new generation, efficient and safe vaccine, new control strategies (Porrscon)

FP7-KBBE-2009-3-245141

PI CReSA: Enric Mateu

Contract Type: Small or medium-scale focused research project.

Start: 01/05/2010

Duration: 4 years

### ARTROPOVIR-SANCO-SCHMALLEMBERG VIRUS-NP

2012/349/EU 2.2b

PI CReSA: Nonito Pages

Start: 01/04/2012

Duration: 2 years

### A whole systems approach to optimizing feed efficiency and reducing the ecological footprint of monogastrics (ECO-FCE)

FP7-KBBE-2012-6 Proposal №

311794-ECO-FCE

PI CReSA: Ignacio Badiola

Start: 01/02/2013

Duration: 4 years

### Emerging viral vector borne diseases (Vmerge)

FP7-KBBE-2013-7

PI CReSA: Albert Bensaid

Start: 2013

Duration: 3 years



CReSA participated in 7 7FP projects of the European Union in 2013.

### The Network of Animal Infectiology Facilities (NADIR)

FP7-INFRASTRUCTURES-2008-1, 228394

PI CReSA: Albert Bensaid

Start: 01/05/2009

Duration: 4 years

## COST Actions

### EuroPRRSnet: A European Network for Understanding and Combating porcine reproductive and respiratory syndrome in Europe

COST EuroPRRSnet

PI CReSA: Enric Mateu

Awarded: 2009

### European Network on Taeniosis/Cysticercosis

PI CReSA: Alberto Allepuz

Awarded: 2013

End: 2017

### Towards control of avian coronaviruses: strategies for diagnosis, surveillance and vaccination

COST Action FA 1207

PI CReSA: Roser Dolz

Awarded: 2013

End: 2017



CReSA participated in 3 COST actions, allowing the European collaboration in Science and technology.

## SGR Research Groups

### Immunología veterinaria

SGR2009-EM042412 (funded)

PI: Enric Mateu

### Patogènia d'infeccions víriques

SGR2009-JS042702 (funded)

PI: Joaquim Segalés

### Patogènia d'infeccions bacterianes

SGR2009-1486 (non-funded)

PI: Virginia Aragón

## INIA projects

**Nuevas formulaciones vacunales para prevenir la influenza aviar y porcina. Desarrollo de una potencial vacuna universal producida a bajo coste**  
RTA 2010-00084-C02-01  
PI: Ayub Darji  
Awarded: 2010  
Duration: 3 years  
End: 14/12/2013

**Evaluación de la aplicabilidad de las estrategias de vacunación en masa para para el control del síndrome reproductivo y respiratorio porcino. Establecimiento de un modelo de evaluación basado en la transmisión por contacto**  
RTA 2011-00119-00-0  
PI: Enric Mateu  
Awarded: 2011  
Duration: 3 years  
End: 23/11/2014

**Epidemiología de *Campylobacter* en granjas de pollos de engorde en España: prevalencia, subtipos existentes, factores de riesgo y dinámica de la infección en granjas**  
RTA 2009-00117  
IP CReSA: Marta Cerdà  
Awarded: 2009  
Duration: 3 years + 1 year  
End: 19/10/2013

**Efecto del extrusionado sobre la digestión de diferentes materias primas, la microbiota intestinal y la resistencia a patologías entéricas microbianas en aves y cerdos**  
RTA 2010-0088-C02-02  
PI: Ignacio Badiola  
Awarded: 2010  
Duration: 3 years  
End: 02/12/2013

**Dinámica viral en diferentes especies aviares: mecanismos moleculares de transmisión y patogenidad**  
RTA 2011-00111-C03-01  
PI: Natàlia Majó  
Awarded: 2011  
Duration: 3 years  
End: 23/22/2014



## Projects of the ISCIII

**Dengue y Chikungunya en Europa y otras enfermedades víricas transmitidas por vector reservoirio**  
FIS2010-PI10/01923  
PI CReSA: Nonito Pagès  
Duration: 3 years  
End: 31/12/2013

**ISCIII special call for pandemic H1N1:  
Nuevos procedimientos para el diagnóstico y caracterización del virus A (H1N1)v pandémico, esenciales para mejorar la capacidad de la red RE-LEG, a desarrollar en el laboratorio coordinador de la misma**  
MICINN-Instituto Carlos III  
GR09/0040  
PI CReSA: Maria Montoya  
Duration: 3 years  
End: 31/10/2012

**Ánalisis de la virulencia del virus gripe A(H1N1)v pandémico**  
MICINN-Instituto Carlos III  
GR09/0023  
PI CReSA: Maria Montoya  
Duration: 3 years  
End: 31/10/2012

**Estudio comparativo de la respuesta inmune frente al virus gripe pandémico A(H1N1)v en enfermos graves y leves (Inmunoflu)**  
MICINN-Instituto Carlos III  
GR09/0021  
PI CReSA: Maria Montoya  
Duration: 3 years  
End: 31/10/2012

**Antigenicidad y resistencia a fármacos del nuevo virus de la gripe tipo A (H1N1)v: caracterización y evolución a nivel molecular**  
MICINN-Instituto Carlos III  
GR09/0039  
PI CReSA: Maria Montoya  
Duration: 3 years  
End: 31/10/2012



## Other projects

**Red iberoamericana para el control de los riesgos sanitarios del cerdo criado a nivel intensivo y extensivo. Implicaciones para el consumidor**  
CYTED-P108AC0462  
PI CReSA: Joaquim Segalés  
2010-2013

**Mejora del bienestar en lechones mediante el control de la sanidad**  
20130020000796  
PI: Enric Mateu  
12/2013- 12/2015

**Els mosquits autòctons i el mosquit tigre poden transmetre noves malalties emergents a Catalunya? El cas del Chikungunya i la febre del Nil Occidental**

RECERCAIXA-NP074572  
PI: Nonito Pages  
Duration: 2 years  
Start: 17/01/2012  
End: 16/01/2014

**Elaboración e implantación de plan de igualdad**  
MSSSI-Pdl-13-0191  
Coordinació: Montse Pastó, Maria Montoya  
12/2013-12/2014

## Services for the Dept. Agriculture, Livestock, Fisheries, Food and Natural Environment

**Pla de vigilància del virus del Nil Occidental a zones considerades de risc**  
CReSA 13017  
PI: Sebastian Napp, Núria Busquets

**Vigilància d'influència avíaria i malaltia de Newcastle en aus silvestres a Catalunya**  
CReSA 13030  
PI Anna Alba, Núria Busquets

**Vigilància entomològica de la Llengua Blava**  
CReSA 13016  
PI: Nitu Pagès

**Assessorament en el control de tuberculosi en el boví i el cabram**  
CReSA 13011  
PI: Bernat Pérez, Sebastian Napp

**Prestació de Serveis d'anàlisis virològics**  
CReSA 13032  
PI: Rosa Rosell

**Plans d'emergència**  
CReSA 08009  
PI: Ana Alba

**Acreditació ENAC**  
CReSA 09016  
PI: Montserrat Ordóñez

**Anàlisis PCR llengua blava**  
CReSA 11023  
PI: Rosa Rosell

**Estudi problemes patològics en granges (reaccions adverses vacunes Llengua Blava)**  
CReSA 09015  
PI: Joan Pujols

**PRIOCAT/DAAM**  
CReSA 13009  
PI: Enric Vidal



In 2013, CReSA executed 10 different kinds of services for the Departament of Agriculture, Livestock, Fisheries, Food and Natural Environment (DAAM) of Generalitat de Catalunya.



## Collaboration with the government departments of the *Generalitat de Catalunya*

In parallel to scientific interest, CReSA researchers perform studies that have important implications for consumers, producers and regulatory institutions. For this reason, the CReSA carries out different initiatives for the government departments of the *Generalitat de Catalunya* with competencies in animal and public health, participating in the creation and execution of health programmes.

# Publications

## 61 peer reviewed papers (ISI Citation Index)

Acevedo AM, Perera CL, Vega A, Ríos L, Coronado L, Relova D, Frías MT, Ganges L, Núñez JI, Pérez LJ. A duplex SYBR Green I-based real-time RT-PCR assay for the simultaneous detection and differentiation of Massachusetts and non-Massachusetts serotypes of infectious bronchitis virus. *Mol Cell Probes.* 2013;27(5-6):184-92.

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Research subprograms

03

# Research subprograms

## Model based on research subprograms

The Cooperative Agro-Alimentary Research System of Catalonia is the instrument for the design, coordination, and development of research policy in Catalonia in Agro-Food, and is headed by IRTA, a public company of the Government of Catalonia with research centers in different fields, either independently, or in collaboration with Universities and other Research Bodies (CSIC) and Administrations. CReSA is one of these mixed centers, depending on the IRTA and UAB, with

the mandate of developing research activities in the field of Animal Health. The Cooperative Agro-Alimentary Research System of Catalonia is structured around five large areas: Vegetal Production, Global Change and Environment, Alimentary Enterprises, Agro-Alimentary Economy and Animal Production.

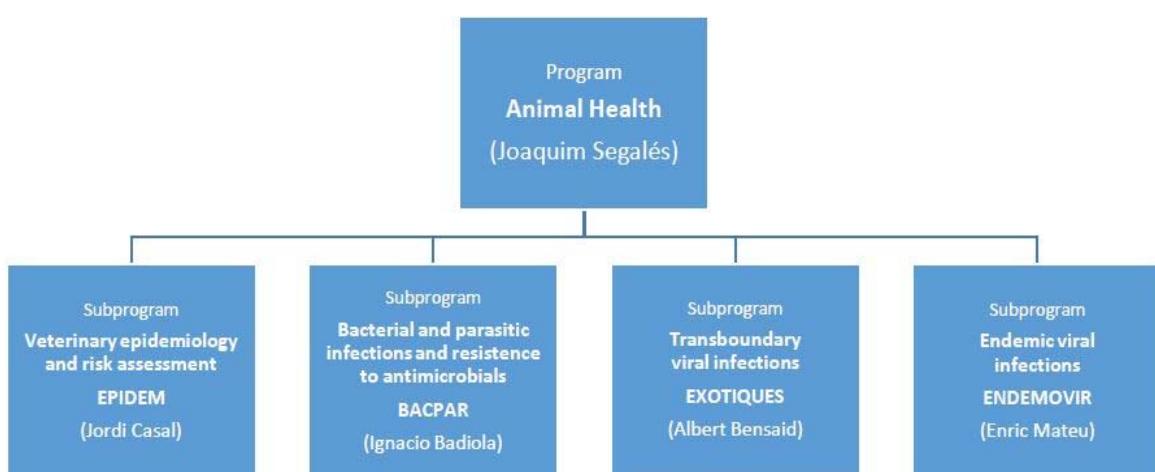
Within the Area of Animal Production, four programs have been established:

- Genetics and improvement

- Animal nutrition, health and welfare
- Aquaculture
- Animal Health

The CReSA is responsible for the design and execution of the Animal Health Program, under the scientific direction of the scientific direction team, composed by the direction team members and the subprogram heads.

The classification of the research activities and subprograms carried out by the CReSA was recently reorganised.



# Veterinary epidemiology and risk assessment

Coordinator: Jordi Casal Fàbrega  
[jordi.casal@cresa.uab.cat](mailto:jordi.casal@cresa.uab.cat)

## Objectives

The veterinary epidemiology and risk analysis subprogram deals with epidemiological studies (both descriptive and analytical), modelling and risk analysis, as well as scientific advice in the design, implementation and evaluation of surveillance and con-

trol programs for several diseases. The objective is contributing to scientific advances in the study of epidemics and disease control, through basic research projects and field studies, modelling and risk analysis of introduction of diseases in ani-

mal populations, to provide support to the competent authorities in the design, implementation and evaluation of surveillance and control programs for diseases.

## Research lines

### VETERINARY EPIDEMIOLOGY AND RISK ASSESSMENT (EPIDEM)

#### Coordinator

Jordi Casal Fàbrega

Main focus areas comprise:

- Epidemiological studies of different diseases (bovine tuberculosis, swine influenza, cysticercosis ...).
- Modelling and risk analysis of several diseases (bluetongue, classical swine fever, avian influenza).
- Evaluation of surveillance of West Nile and avian influenza.

#### Responsible for research line

Jordi Casal Fàbrega

#### Researchers

Anna Alba Casals  
Alberto Allepuz Palau  
Sebastián Napp Avelli

#### PhD students

Ariadna García Sáenz  
Gerard Martín Valls  
Sintayehu Guta Debelia



# EPIDEM subprogram

## Main results

### Strategies for the eradication of bovine tuberculosis

#### **Spatial epidemiology of bovine tuberculosis in domestic animals in Spain: study of the persistence and of new infections. Evaluation of surveillance**

PI: Alberto Allepuz

In Spain, the eradication campaigns have allowed important progresses, but every year a considerable number of new positive or re-infected farms still appear and, in some zones, BTB persists in the herds without a clear knowledge about the epidemiologic circumstances that lead to the reintroduction or to the persistence of the infection. The aim of this project is to obtain an understanding of the epidemiology of BTB by the analysis

of the circumstances that make its eradication difficult. First of all, the space-time analysis of the disease will allow the identification of zones of high BTB risk by means of the analysis of the evolution of the disease in Spain. Secondly, a study of the possible causes of appearance of new positive farms and of the persistence of the positive ones will be performed. This part of the study will consist of two parts: a) analysis of epidemiologic available questionnaires of the new cases and analysis of the movements of animals by means of network analysis, b) case-control study matched by size, type of farm and zone, to determine factors related to BTB persistence

in infected farms. Within this study, a case will be defined as a farm in which BTB has persisted for a minimum period of 5 years, and a control as a farm that was temporarily affected, but managed to eliminate the infection within 1-2 years. Finally, the sensitivity of the different surveillance components and the global sensitivity with different strategies will be estimated.



### Understanding of taeniosis/cysticercosis

#### **European network on taeniosis/cysticercosis**

PI CReSA: Alberto Allepuz

*Taenia solium* (pork tapeworm) and *T. saginata* (beef tapeworm) cysticercosis (CC)/taeniosis are zoonoses of public health importance, with significant economic impacts on the health and meat (pork and beef) sectors within and outside the EU. Despite increased research efforts, an important number of gaps remain. For more than one third of the member states, data on occurrence of porcine/bovine/

human CC and taeniosis are missing. Many questions remain on transmission dynamics, infection development/course and clinical manifestations. An improved knowledge on host-parasite interactions will create opportunities for new diagnostic targets, and vaccine candidates.

The main objective of this Action is to build a strong, extensive, multi-disciplinary scientific network to induce sustainable collaborations with the aim to advance knowledge and understanding of these zoonotic disease complexes. Specific objec-

tives include the development of innovative diagnostic and cost-efficient control tools, assessments of disease burden and economic impact, as well as the development of harmonized reporting and management procedures. Intra-European collaboration is essential to stop the development of these diseases within the EU. The Action is aimed at both European economical/societal needs and scientific/technological advances.

## Strategies for the eradication of bovine tuberculosis

### Regional training in animal and human health epidemiology in South Asia: phase 2

PI CReSA: Alberto Allepuz

Massey University is implementing a two-phase Regional Training Program to strengthen epidemiology and biosecurity capacity within a 'One Health' framework in seven countries in South Asia, funded by the European Commission under the Avian and Human Influenza Trust Fund administered by the World Bank (Grant No. TF098536). The beneficiary countries are: Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka.

The design, implementation and subsequent reporting of applied Collaborative Investigation Projects ("CIP's) in the beneficiary countries is a key component of Phase-2 of this programme. The CIPs involve the application and further development of practical skills and training in epidemiological investiga-

on of zoonotic diseases involving both the human and animal health sectors in each country through the practice of collaborative design, physical implementation, scientific reporting and policy development. The CIPs are focused on zoonotic disease priorities in each country that address critical needs and key constraints to achieving a coordinated One Health approach to surveillance and biosecurity, identified through prior consultation by Massey with governments and regional stakeholders.

The CIPs also provide an important vehicle and opportunity for further building national expertise through the provision of international expert assistance and specialised training. Through the CIPs, national personnel will become experienced in undertaking joint investigations of endemic zoonoses of importance in each country. A broader aim is to build relationships between national experts within the seven

countries and a range of experts and leading epidemiological institutions from around the world working as trainers and mentors.

In this regard, Massey has organised a series of training workshops, at both the country and regional levels, with a view to providing access to specialised training and mentoring for the CIP participants as they analyse and interpret their CIP data, as well as including other technical personnel and representatives of the national institutions as appropriate. The objectives and intended outcomes of each workshop have been developed such that the training provided addresses the critical needs and key constraints that were identified through a process of in-country consultations conducted by Massey in 2011.



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**UNIVERSITY OF NEW ZEALAND**

# Bacterial and parasitic infections and resistance to antimicrobials

Coordinator: Ignacio Badiola Sáiz

[Ignacio.badiola@cresa.uab.cat](mailto:Ignacio.badiola@cresa.uab.cat)

## Objectives

The goals of this subprogram are the study of bacteria-host interaction under pathological and physiological conditions, with special interest on virulence markers of bacteria, the immune response after natural infection or vaccination, the development of bacterial vaccines and antigen delivery/presentation, mainly by mucosal route, the intestinal microbiota and its role on gut health, the study of bacteria transmitted from do-

mestic or wild animals to humans and the surveillance of antimicrobial resistances. Furthermore, this Subprogramme includes the study of endoparasitic diseases.

The main objective is to generate knowledge on host/microbe interactions to develop methods to improve the health of animals and the economical balance of farms, and the safety of consumers. Main focus areas comprise:

- Intestinal and respiratory bacterial diseases of porcine,

fowl and rabbit.

- Bacterial zoonoses and endoparasitic diseases.
- To define the intestinal microbiota composition under normal and pathological conditions.
- Innovation in probiotics and prebiotics.
- Studies of the activity of antimicrobials on bacterial disorders.
- Monitoring of antimicrobial resistance mechanisms against the principal products used at field level.

## Research lines

### MICROBIOTA AND INTESTINAL HEALTH (BACTEDIGES)

#### Coordinator

Ignacio Badiola Sáiz

The goal of this line is the study of the intestinal microbiota components related to health/disease of the digestive system and the study of the major bacterial disorders at the intestinal level of pig, poultry and rabbit. The ban of the antimicrobial growth promoters has made necessary to improve the knowledge of the intestinal microbiota components in order to assess properly the positive effects of different feed raw materials and the addition of prebiotics, probiotics or antimicrobials at therapeutic doses on the health of animals. A better knowledge of the intestinal micro-

biota could allow us designing new probiotics, which can serve to reduce the risk of digestive disorders at different critical phases (ie. At weaning, avoiding the colonization of different pathogens or returning to normal situations after intestinal dysbiosis). The stimulation of the immune system associated to the intestinal mucosa is another objective of this line.

#### Responsible for research line

Badiola Sáiz, Ignacio

#### Researchers

Pérez de Rozas Ruiz de Gauna, Ana

#### Laboratory technicians

Aloy Escudero, Núria

González Oliver, Judit



## RESPIRATORY BACTERIAL INFECTIONS (BACTERESP)

### Coordinator

Virginia Aragón Fernández

This research line focuses on the pathogenesis of respiratory diseases caused by bacteria and their epidemiology in farming systems. The final goal of this research is the understanding of respiratory infections in order to develop new tools for diagnosis, molecular epidemiology and control of these bacterial pathogens. Interactions between the pathogens and the host are also a main interest of this line.

This research line includes basic research activities and services to the industry within the field of porcine respiratory pathogens; specifically, in epidemiological aspects, infection models, pathology and control of the diseases. In the last 4 years,

activities have been focused on *Haemophilus parasuis*, *Mycoplasma hyopneumoniae*, *Pasteurella multocida*, *Actinobacillus pleuropneumoniae* and *Streptococcus suis*, important porcine pathogens.

### Responsible for research line

Aragón Fernández, Virginia

### Researchers

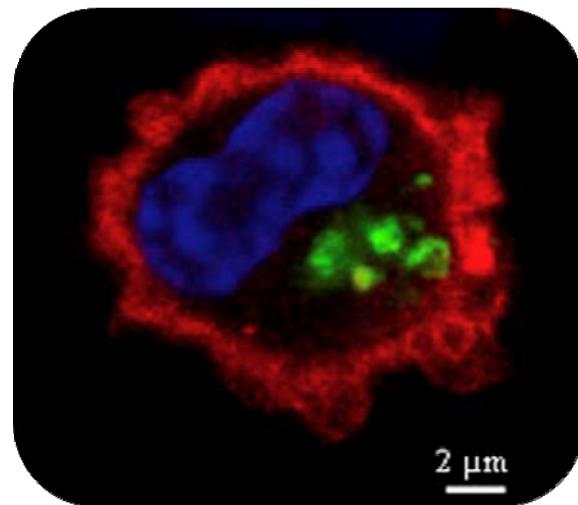
Bensaid, Albert  
Pina Pedrero, Sonia  
Sibila i Vidal, Marina

### Laboratory technicians

Galofré Milà, Nuria  
Huerta Medina, Eva

### PhD students

Bello Ortí, Bernardo  
Manrique Ramírez, Paula



## ENDOPARASITIC INFECTIONS (ENDOPAR)

### Coordinator

Sonia Almería de la Merced

This research line studies protozoa parasitic infections, with special emphasis on *Neospora caninum* and *Toxoplasma gondii*, as cause of reproductive failure and abortion in domestic and wildlife animals. The analysis of epidemiological, immunological and pathogenesis aspects of the diseases, together with the subsequent control measures applied at farm and individual level,

especially in bovine neosporosis to reduce the economical losses related to these parasites, are the main goals of this research line. Since, toxoplasmosis is also a zoonotic food borne infection, the analysis of the role of the different species that could be reservoirs for human infection has been a main focus of the research line on this parasite.

The study of the role of wildlife species in the sylvatic cycle of both parasites is also a main aspect of the research line, since in Spain few studies have focused on wild

animals as reservoirs of these pathogens. Improve the control and diagnosis of *T. gondii* and *N. caninum* infection in domestic and wildlife species, through the analysis of the epidemiology, immunology and pathogenesis of both protozoa are the principal objectives of this line.

### Researcher

Almería de la Merced, Sonia

**ZOONOTIC BACTERIAL INFECTIONS AND ANTIMICROBIAL RESISTANCE (BACTEZOON)**

**Coordinator**

Marta Cerdà Cuéllar

This research line is focused on the study of bacteria and antimicrobial resistance transmitted from livestock, domestic and wild animals to humans. In order to prevent zoonotic diseases from occurring, it is important to identify which animals and foodstuffs are the main sources of the infections. Also, it is important to identify and monitor the trends of antimicrobial resistance in zoonotic and indicator bacteria.

The overall generated knowledge will allow improving control measures in the food production chain and to protect human health. Hence, in this research line

the studies are focused on important zoonotic bacteria which cause acute bacterial enteritis in humans: *Campylobacter* and *Salmonella*. Additionally, studies analysing different farm management practices (consumption of antimicrobials, biosecurity) to identify risk factors, and elaborate risk assessments to reduce the burden of pathogens and antimicrobial resistance genes in the primary production line are being performed. Also, in Spain very few research has focused on wild animals as reservoirs of these enteropathogens. Thus, part of the research is also focused in wild birds as reservoirs of *Campylobacter*, *Salmonella* and of antimicrobial resistance.

Another zoonosis of veterinary and public health importance is tuberculosis. At CReSA, a research program and

Generalitat's diagnostic service is being conducted, developing systems to monitor, control and eradicate tuberculosis in cattle, goats and wild reservoirs.

**Responsible for research line**

Cerdà Cuellar, Marta

**Researchers**

Migura García, Lourdes  
Pérez de Val, Bernat

**Laboratory technicians**

Ayats Murillo, María Teresa  
Martín Fernández, Maite

**PhD students**

Antillés Silva, Noelia  
Cameron, Karla  
Cantero Portillo, Guillermo  
Solà Ginés, Marc  
Urdaneta Vargas, Saulo



# BACPAR subprogram

## Main results

### Vaccine candidates against *Haemophilus parasuis*

#### Selección de candidatos vacunales para bloquear los pasos iniciales de la infección por *Haemophilus parasuis*

PI: Virginia Aragón

*Haemophilus parasuis* is a colonizer of the upper respiratory tract of pigs, but also a respiratory pathogen, since some strains can spread to the lung or invade systemic sites to produce Glässer's disease.

To determine differences in the first steps of infection between virulent and non-

virulent strains, we performed an experimental infection and studied the bacterial localization at different time points. We observed wide colonization of the trachea by virulent strains, while non-virulent strains were scarcely seen at this location. Colonization of trachea by virulent strains seemed to be in the form of biofilm. However, in the laboratory, virulent strains produced lower biofilms than non-virulent strains. The transcriptomic analysis of the non-virulent strain F9 grown under biofilm conditions identified several

upregulated membrane-related genes, and common signatures with previous *Actinobacillus pleuropneumoniae* published works. This form of growth could be involved in colonization, but more studies are needed to determine the role of biofilm in in vivo infection. The transcriptome of the virulent strain Nagasaki after incubation within lung is also being analyzed to identify the genes expressed during lung infection.

### Ceftiofur on the emergence of *Escherichia coli* resistant to cephalosporins in a pig farm

#### Assessment of risk factors in relation with antimicrobial consumption associated to the emergence of cephalosporin resistance in food animals

PI: Lourdes Migura

This study was carried out in four farms belonging to a large farm integration system in Spain. In each farm, a total of 70 seven-day-old piglets were divided in two groups; control (n=30) and group treated (n=40) with ceftiofur (Naxcel®, Zoetis). Animals were fed under a standard nutritional program set by the company that included the use of amoxicillin, apramycin, tiamulin and oxytetracycline in a prophylactic way during the nursery period (21-70

days of age). Fecal swabs were taken from piglets before treatment with ceftiofur (aprox. 7 days-old), 48 hours and 7 days post-treatment. A final sample was performed before the animals departed to the slaughterhouse (180 days of life). Samples were plated in MacConkey agar supplemented with ceftriaxone (1mg/ml). The occurrence of CR E. coli before treatment with ceftiofur was extremely variable between farms. Furthermore, they could not be recovered in two of the four farms. The highest percentage of samples positive for CR E. coli was obtained 48 hours post-treatment within the treated group. This value was approximately 8 per cent higher than the pre-treatment

value. By the finishing time, all animals were negative for CR E. coli in three out of the four farms. The ceftiofur treatment provided a window for detecting the presence of CR E. coli during the course of treatment; however, the use of ceftiofur did not pose enough selective pressure to select for long-term resistant organisms. The occurrence of CR E. coli decreased with the age of the animals in all the studied farms. In any case, the presence of CR E. coli in slaughtered pigs was only observed in one out of the four studied farms. These results suggest that control measures to reduce the prevalence of CR E. coli should be applied in a case by case situation.

## Immune responses against Neosporoses

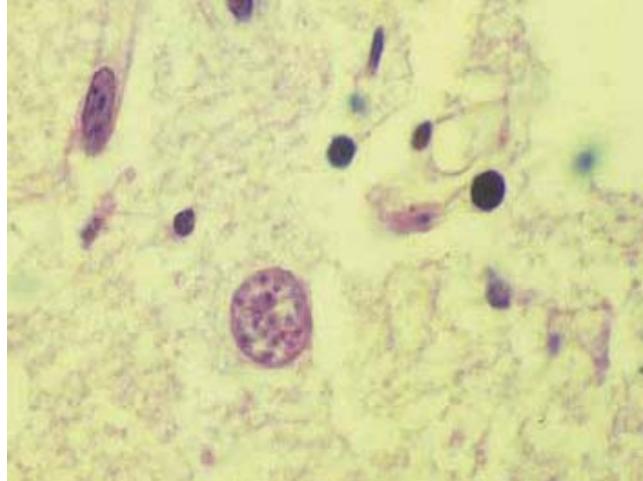
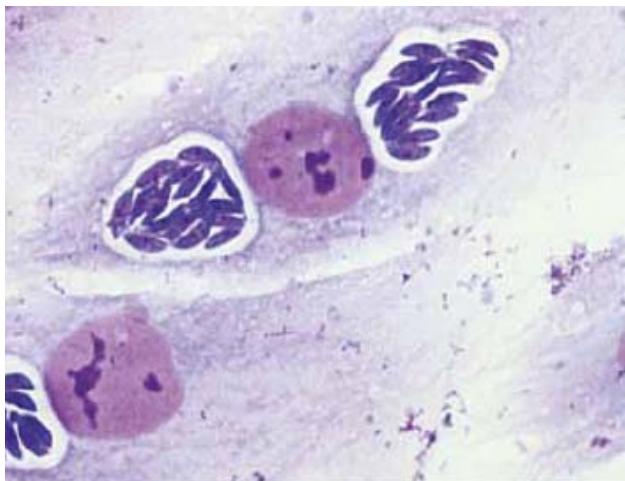
### **Neosporosis bovina: interacciones materno-fetal y mecanismos asociados con la protección frente al aborto en gestaciones de razas cruzadas en condiciones experimentales**

PI: Sonia Almería

The main objective of this grant is to characterize the pathogenesis and immune mechanisms associated with the different susceptibility to

abortion related to *Neospora caninum* in pregnant dairy cattle comparing pure and breed gestations. In the first year we performed an experimental infection in pure (Friesian-Friesian) dairy cattle and in cross breed cattle (Friesian-Limousin) at 110 days of gestation with 107 tachyzoites of NC-1 strain and started the analyses of presence of parasite, lesions, immune responses (antibody

and cytokine gene expression) at dam and foetal level in both experimental groups. The parasite was not detected in the placenta or the foetuses and therefore the experimental protocol did not seem to be able to transmit the parasite to the foetuses in any of the two groups.



### **Regional Catalonian Grant for Consolidated Group of Research in Catalonia (SGR-816). Study group for fertility and maintenance of dairy cattle gestation**

PI CReSA: Sonia Almería

The research group analyzed the main problems on cattle reproduction, including synchronization protocols and diseases of importance in pregnancy losses such as coxiellosis and neosporosis. In particular, in neosporosis the main objective was to

characterize the main risk factors affecting infection, transmission and abortion in dairy cattle. The results obtained during these years have been very useful in the establishment of control measures in dairy cattle farms which significantly reduce the economic impact of the disease.

## Improving *Campylobacter* control in poultry

### **CamCon. Improving *Campylobacter* control measures in primary production of poultry**

PI CReSA: Marta Cerdà

Domestic poultry and their products contaminated with *Campylobacter* spp. are the main source of human enteric infections and it is well known that poultry farms have a high prevalence of this enteric bacteria. There is a need to reduce levels of *Campylobacter* in broilers. However, in order to apply suitable and effective control measures, there is a need for a better understanding of the epidemiology of *Campylobacter* in broilers.

Some of the ongoing studies in this project include: (i) To determine the *Campylobacter* prevalence and associated risk factors in broilers. *Campylobacter* status on all flocks from 20 farms slaughtered over a two-year period has been determined. To identify risk factors for flock colonization a questionnaire has been prepared for these 20 farms. Data collected is under analysis. (ii) To study in detail the infection dynamics of *Campylobacter* in 5 farms, including the assessment on how the environment inside and outside the houses can affect the colonization of birds. (iii) To study the vector potential of flies for *Campylobacter* spp. spreading in broiler farms. It

has been evaluated in 5 Spanish farms in a longitudinal field study and the role of flies as vectors of *Campylobacter* has been demonstrated. (iv) The implementation of biosecurity measures in broiler houses to reduce *Campylobacter* flock prevalence.



## Diagnosis of caprine tuberculosis

### Diagnóstico de la tuberculosis caprina: evaluación de las técnicas disponibles.

#### Desarrollo de métodos in vitro sin utilización de animales

PI CReSA: Bernat Pérez

Caprine tuberculosis is a chronic disease with a significant impact on public and animal health. In spite of that, tuberculosis in goats is not yet included in the OIE list. However, in recent years, control and eradication of this disease in goats is being a major concern and some Spanish regions have already implemented control campaigns.

The main objective of this project is to optimize the performance of the available tuberculosis diagnostic techniques in goats that could be

implemented in control programs. The specific objectives of this project are:

1. To evaluate the potency of bovine tuberculins in goats using in vivo methodology.
2. To develop an alternative in vitro test to the current in vivo potency testing that requires animal experiments.
3. To evaluate and compare by the in vivo and in vitro methodology the results obtained in both *Mycobacterium bovis* and *M. caprae* infections and in sensitized instead of infected animals.
4. To validate a serological assay for the diagnosis of caprine tuberculosis as a possible alternative to the skin test in the eradication campaigns.
5. To study the interference caused by pseudotuberculosis infection and tuberculosis and paratuberculosis vacci-

nation in the diagnosis of caprine tuberculosis using skin test, gamma-interferon assay and serology for detection of specific antibodies. The effectiveness of the tuberculosis vaccination for the control of the disease in a high prevalence situation will be also evaluated.



# EXOTIQUES subprogram

# Transboundary viral infections

Coordinator: Albert Bensaid  
[albert.bensaid@cresa.uab.cat](mailto:albert.bensaid@cresa.uab.cat)

## Objectives

Transboundary (exotic) diseases are under international regulatory control and either do not exist in some countries (Spain in particular) or affect these countries sporadically.

The subprogram is inscribed in a regional, national and international geopolitical context (including the EU and the Mediterranean basin) where it acts not only with national/regional public agencies but also with the private sector. Most of the diseases studied within this subprogram are those subjected to compulsory declaration to the World Organization for Animal Health (OIE).

The subprogram is justified by a potential risk of (re) introduction of several viral-borne diseases to EU Member States and surrounding countries. The risk of these diseases becoming endemic in Catalonia is a concern for the local government. Socio economic impacts will not only affect local livestock but also public health in general and in particular the tourism industry (West Nile Fever, Rift Valley Fever, Chikungunya and some pathogenic Avian Influenza Virus).

The CReSA possesses a unique BSL3 facility, which ensures: rapid processing of field samples for serological, molecular diagnosis and virus isolation; speciation of mos-

quitoes and experiments with viral competence and transmission; experimental reproduction of diseases in rodents, birds and large animals (pigs and ruminants); and monitoring of host immune responses.

The research core of the subprogram is mainly focused on understanding pathogenicity, improving diagnoses and vaccines of viral infections and investigating the biology and molecular genetic of vectors. In addition, scientists on the subprogram participate in regional or national surveys.



## Lines of research

### ARBOVIRUSES AND VECTORS (ARTROPOVIR)

#### Coordinator

Nonito Pagès Martínez

Arthropod-borne viruses (arboviruses) are the causative agents of some of the most important emerging and re-emerging infectious diseases and are responsible for significant global veterinary and public health problems. Zoonotic and non-zoonotic arboviral diseases have expanded their geographical distribution on recent decades threatening the European region.

ArtropoVir research line is focussed on an integrated and multidisciplinary research on arthropod vectors and the arboviruses they transmit, engaging entomologists, molecular biologists, virologists and immunologists. This line is involved in both research and surveillance activities dealing with different arboviral

diseases as Bluetongue, West Nile, Rift Valley or Chikungunya. Current surveillance activities are based on virological and entomological surveillance programs for arboviruses performed in Catalonia (NE Spain). Currently funded research projects includes national (FIS, AGL, INIA) and international (FP7) competitive research projects and networks, focused on: i) the establishment of animal models and vector competence to deeply understand the interactions between vector-pathogen-host in arboviral diseases, ii) development and validation of viral diagnostics, including detection of new circulating arboviruses, iii) arthropod genetic studies, typing and genomics, and iv) development of new vaccines, although the group is also performing safety and efficacy tests for the European register of vaccines targeting arboviruses as Bluetongue virus.

Overall, the studies performed shed new data to improve our preparedness against arthropod borne viral diseases. Moreover, it is also intended to know whether autochthonous and recently introduced exotic arthropods pose a threat to transmission of arbovirus that are likely to be introduced in our country.

#### Responsible for research line

Pages Martínez, Nonito

#### Researchers

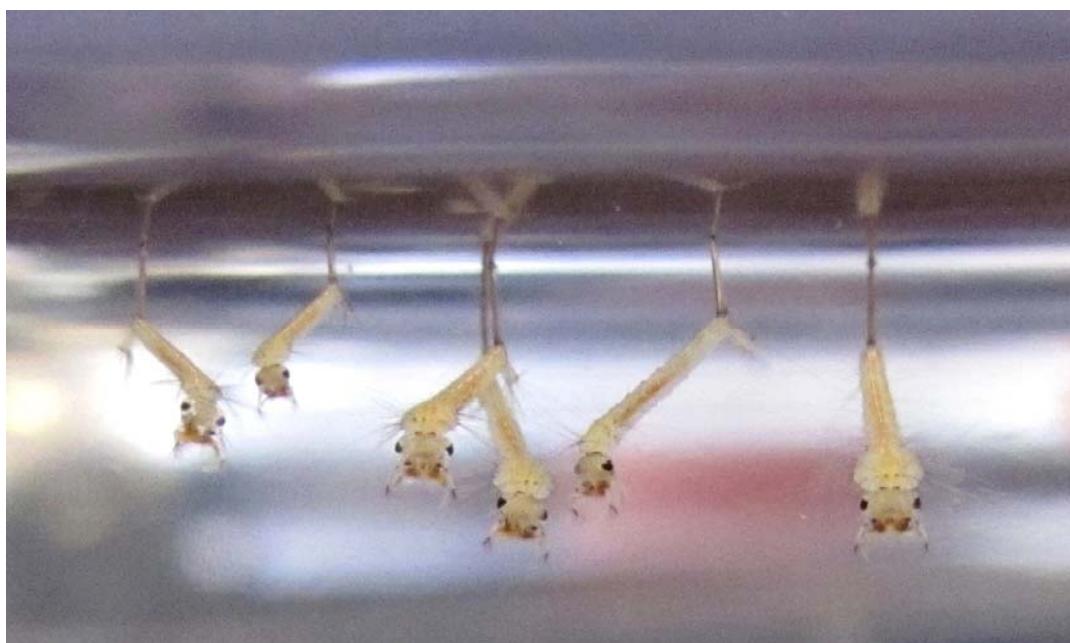
Bensaid, Albert  
Busquets Martí, Nuria  
Pujols i Romeu, Joan  
Talavera Forcades, Sandra

#### Laboratory technicians

Navarro Toro, Nuria  
Rivas Adán, Raquel  
Verdún Castelló, Marta

#### PhD students

Brustolin, Marco  
Santamaría Domínguez, Cristina



## **PATHOGENESIS AND PRO-FYLAXIS OF ASFAVIRUS INFECTIONS (ASFAVIRUS)**

### **Coordinator**

Fernando Rodríguez González

African swine fever (ASF) is a highly infectious disease affecting domestic pigs, which has to be immediately reported to the OIE. ASF virus (ASFV) remains endemic in Sardinia and in many Sub-Saharan countries, where it causes tremendous economical losses. The recent reintroduction of the virus in Georgia from Eastern Africa and its spreading toward Russian countries has opened new concerns about the risk of ASFV re-entrance to Europe and Asian countries, including China, the major swine producer and consumer in the world. The situation becomes aggravated by the fact there is no vaccine available against ASFV, therefore limiting the control measures to an efficient and rapid diagnosis of the disease and

culling of the infected animals.

The general objective of this research was to understand the immune response against ASFV and to develop DNA vaccines to protect pigs against the disease. Large part of results are still to be published, and there is a patent submitted, based on some immunological properties of ASFV antigens. The main objectives in future projects:

- i) The exhaustive characterization of ASFV antigens aiming to optimize the final vaccine antigenic composition.
- ii) To characterize the immunological mechanisms involved in protection against ASFV.

Finally, and thanks to international cooperation programs such as EPIZONE, NADIR or EMIDA, this line of research is ready to start a new and exciting scientific moment in collaboration with multidisciplinary teams from many different countries.

### **Responsible for research line**

Rodríguez González, Fernando

### **Researchers**

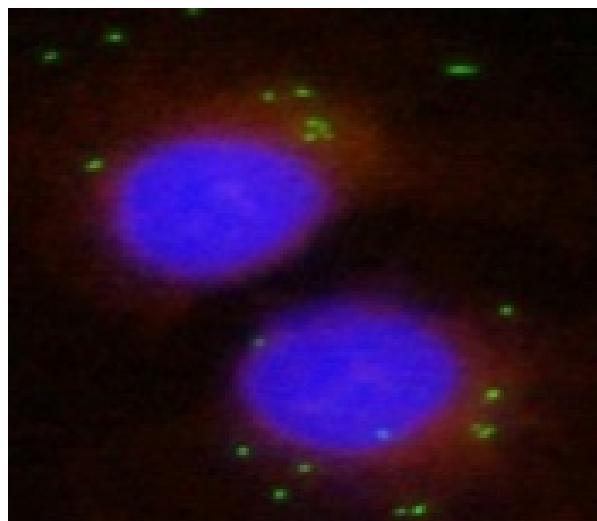
Accensi Alemany, Francesc  
Bensaid, Albert  
Pina Pedrero, Sonia

### **Laboratory technicians**

Pérez Simó, Marta

### **PhD students**

López Monteagudo, Paula



## **PATHOGENESIS, DIAGNO-SIS, EPIDEMIOLOGY AND CONTROL OF AVIAN VIRAL INFECTIONS (VIRUSAVIDAR)**

### **Coordinator**

Natàlia Majó Masferrer

The main objective of this line is to investigate different aspects of some of the most important viral infections of poultry, including avian influenza, infectious bursal disease, avian infectious bronchitis, etc. Regarding avian influenza virus infection, evaluation of the host innate immunity in the protection and pathogenesis of this infection, as well as the molecular factors that

are relevant for the transmission and pathogenicity of AI in birds are objectives of this research line. Moreover, this research line works on the pathogenesis, epidemiology and control of endemic avian viral infections, such infectious bursal disease or infectious bronchitis. Its activity is characterized by a deep contact with the poultry productive sector, trying to help facing major pathological problems.

Therefore, besides basic research, this research line is aimed at the development and transfer of diagnostic techniques on the subject as well as epidemiological moni-

torization of the major viral diseases affecting flocks.

### **Responsible for research line**

Majó Masferrer, Natàlia  
Dolz Pascual, Roser

### **Researchers**

Busquets Martí, Núria  
Dolz Pascual, Roser  
Darij, Ayub  
Ramis Salvà, Antonio José

### **Laboratory technicians**

Oliver Ferrando, Salvador  
Rivas Adán, Raquel

### **PhD students**

Bertran Dols, Kateri  
González Zabala, Juliana  
Vidaña Mateo, Beatriz

## **PATHOGENESIS AND PROFILE OF PESTIVIRUS INFECTIONS (PESTIVIRUS)**

### **Coordinator**

Lilianne Ganges Espinosa

Classical swine fever (CSF) is a highly infectious viral disease included in the list of diseases notifiable to the OIE ([www.oie.int](http://www.oie.int)). It affects domestic and wild pigs and is considered to be one of the most devastating diseases for the pig industry. Its etiological agent, classical swine fever virus (CSFV), is included into the genus Pestivirus along with bovine diarrhea virus and border disease virus all closely related at both genomic and antigenic levels. There are no recognized serotypes among CSFV strains, which display high (80-99%) levels of genomic homology.

The disease is endemic in Asia and is prevalent in countries from East Europe, Central and South America. Several outbreaks have been reported in Caribbean countries in recent years. Little is known about the situation in Africa, where CSF has been reported in Madagascar, and in South Africa. While CSF was eradicated from North America several decades ago, a progressive eradication programme has been implemented in the European Union (EU) since the early 1990s. This program is based on a non-vaccination policy, the culling of infected animals and of those in herds close to infected herds or having contact with them (stamping out), and the restriction of animal movements and of their products. However, in spite of control programmes, the virus has

been introduced periodically into the EU via wild pigs or foreign imports, as occurred during the 1990s in Belgium, Germany, The Netherlands, Spain and Italy and, since 2000, in the UK, Spain and Germany. The slaughter of non-infected animals in infected control zones has caused major economic losses in affected countries in the EU, and has raised ethical concerns in the public. Therefore, the policy of stamping out may not be sustainable in future outbreaks, and there is a need of improvement of the emergency vaccination policies. Clearly, new strategies have to be implemented to control CSF, avoiding the sacrifice of large numbers of pigs if an outbreak occurs within EU borders.

The main objective of this research line is focused on:  
-Design of multimeric peptide constructs integrating B and T epitopes candidates of CSFV. Dendrimeric peptide constructs will be used for

studying the role of epitopes mapping into E2 protein to induce immune responses against CSFV.

-Study of mechanisms involved in the immunopathogenesis of the different forms of CSF disease (acute, chronic and persistent). As well as, studies of CSFV evolution over 20 years in endemic situation.

-Development of new DNA and peptide immunization strategies against CSFV. Characterization of the immune response induced and the protection conferred by the CSFV candidate vaccines constructed.

- Development of powerful diagnostic tools for CSFV detection and differentiation of Pestivirus.

### **Responsible for research line**

Ganges Espinosa, Lilianne

### **Researchers**

Domingo Alvarez, Mariano  
Rosell Bellsola, Rosa

### **Laboratory technicians**

Muñoz Campanya, Marta  
Pérez Simó, Marta



# Main results

## Biology and control of vector borne infection in Europe

### Biology and control of vector borne infection in Europe (EDENext)

PI CReSA: Nonito Pagès

To address the call for proposals 'Biology and control of vector-borne infections in Europe' launched by the European Commission, we want to investigate the biological, ecological and epidemiological components of vector-borne diseases (VBD) introduction, emergence and spread, and to propose innovative tools for controlling them, building on the basis of acquired knowledge. We have selected the main

groups of arthropod vectors involved in the transmission of vector-borne diseases in Europe: ticks, mosquitoes, sandflies, and biting midges (Culicoides). We have also selected the main diseases of actual or possible importance in human and veterinary public health. Rodents, insectivores and rodent-borne diseases have also been considered, both for their direct importance in public health, and for the major role of rodents and insectivores as reservoir hosts of many pathogens. We have put a strong focus on vector- and disease-quantitative model-

ling. The resulting predictive models will be used to assess climate or environmental change scenarios, as well as vector or disease control strategies. Finally, the set of innovative research methods, tools and results obtained during the project will be a step forward a generic approach of VBD in terms of disease monitoring and early warning systems, and will reinforce the general framework for an integrated pest and disease management system.



### Emerging viral vector borne diseases: participation on the work package about surveillance, control methods and strategies of Rift Valley Fever (VMERGE)

PI CReSA: Albert Bensaid

The project intends to address the risk of emerging viral vector borne diseases in two main categories of arthropods known to transmit important animal and zoonotic diseases: mosquitoes (Aedes and Culex), and Culicoides biting midges. A research proposal targeting potential emerging viral disease risks related to these vectors will be carried out through original and integrated multidisciplinary approaches including:

- Study of virus and microbial communities by next-generation sequencing (NGS) methods;
- Characterization of vector competence mechanisms in selected vector-virus couples, including mosquitoes / Rift Valley fever virus (RVFV) and Culicoides / Schmallenberg virus (SBV) and Orbiviruses;
- Development of vector distribution and disease transmission models;
- Development of better maps of high-risk areas for vector presence, as well as disease emergence and spread;
- Design of new surveillance frameworks accounting for these new diagnostic methods, new knowledge and risk



## Implicating vectors of Schmallenberg virus in Europe

### Implicating vectors of Schmallenberg virus in Europe (DG-SANCO)

PI CReSA: Nonito Pagès

The vector(s) of Schmallenberg virus (SBV) in Europe have not been characterised, however other closely related viruses placed within the Simbu serogroup have been isolated both from mosquitoes and *Culicoides*. The aims of this project are to perform an experimental

assessment of the rates of infection, dissemination and probable transmission in each arthropod vector group. Moreover, in areas where the disease has been declared a retrospective and contemporary screening will be performed to detect chicha vectors are disseminating SBV in the field. The outcomes will help to clarify the epidemiological role played by the most common midge and mosquito species in

transmitting SBV in the susceptible hosts.

During the year 2013 different trials of vector competence for SBV in *Culicoides* of the species *C. nubeculosus*, *C. imicola*, *C. obscurus* and *C. scoticus* were performed. In addition a retrospective and contemporary screening of field *Culicoides* was realized and some *C. obscurus* individuals were positive to SBV.

## Mosquitoes and new emerging diseases in Catalonia

### Els mosquits autòctons i el mosquit tigre poden transmetre noves malalties emergents a Catalunya? El cas del Chikungunya i la febre del Nil Occidental

PI: Nonito Pagès

The project pursues three objectives: the first one is a study of genetic variability and determine the structure of the Catalan mosquito populations: *Cx. pipiens* (vector potential of West Nile virus) and *Ae. albopictus* (vector potential Chikungunya virus). This objective is particularly important because the component genetic population of mosquitoes can modulate their ability to be infected with a pathogen (vector competence) and resistance to insecticides. It is also important to know the origin of the populations of *Ae. albopictus* and determine if in recent years we have suffered more than an introduction tiger mosquito with

different origins. The second objective is to perform bioassays with insecticides to determine the resistance presented by the Catalan mosquito population of these two mosquito species. So we will know in advance whether the resistance can be associated with certain populations and genetic strains. In addition we will know what is the most appropriate insecticide to combat a population of a given area in the event declare an outbreak. The third objective is to study the virus vector competence West Nile (WNV), and Chikungunya (VCHIK) with populations of mosquitoes in Catalonia conditions biosafety level 3 (BSL3).

During the year 2013 the population genetics study for *Aedes albopictus* species was completed, genetic analysis based on the fragments analyzed, indicating there is no nucleotide and haplotype diversity and indicating one

single introduction in Catalonia. In addition, the study of resistance to insecticides *A. albopictus* populations was performed using three different pyrethroids: deltamethrin, lambda-cyhalothrin and permethrin. The current results showed total sensitivity of the tested population vs the three different insecticides. Moreover, trial of vector competence for WNV in mosquitoes of the species *C. pipiens* and *A. albopictus* was performed. Specifically two distinct populations of *C. pipiens* (Empuriabrava and Gavà) and *A. albopictus* (Sant Cugat del Vallés) were infected.

recerCaixa

## Dengue and Chikungunya in Europe

### Dengue y Chikungunya en Europa y otras enfermedades víricas transmitidas por vector y reservorio

PI CReSA: Nonito Pagès

The overall objective of this research project is to generate knowledge and tools to improve the preparation of Spain and other European countries to the eventual reintroduction diseases dengue and Chikungunya virus in Europe. The project divided into two subprojects

(virus-human interactions and virus-vector interactions). The subproject virus-vector interactions carried out at CReSA is based on the following specific objectives: (1) Develop and standardize transmission viral model based on the use of *Aedes* spp. and mouse to analyze the competition and vectorial capacity of mosquitoes compared different arbovirus and (2) Rehearse the risk of transmission of different strains of

Chikungunya virus by the population of *Aedes albopictus* in Spain simulating different scenarios of viral strains, viremias and environmental conditions. The first results indicate that *Aedes albopictus* population in Spain is able to support virus replication and dissemination at high viral loads in warm conditions and high host viremias of two genetically different Chikungunya virus strains.

## Control of avian coronaviruses

### Towards control of avian coronaviruses: strategies for diagnosis, surveillance and vaccination

PI CReSA: Roser Dolz

For several decades, poultry production worldwide has been struggling with severe diseases and huge economic losses caused by Avian Coronavirus (AvCoV) infections. Control of the disease is hampered by the variations within this virus family. As a

result of its variability, the nomenclature as well as detection methods and classification of the virus strains are not consistent. Constant surveillance of flocks and vaccination programmes against these viruses are the major tools for control of AvCoV.

This COST Action aims to increase knowledge on diseases caused by Avian Coronaviruses. The main objective is to promote exchange of

knowledge and technology in the field of diagnosis, molecular virology, serology, immunology, vaccination, pathogenesis and epidemiology in relation to these viruses. COST network is considered the most appropriate way to stimulate cooperation between researchers to facilitate regulation, standardization and harmonization of diagnostic methods, nomenclature, classification and surveillance in Europe.

## Classical swine fever: new vaccines and diagnostic tools

### Estudios de inmunopatogenicidad frente al virus de la peste porcina clásica (VPPC): implicaciones para el desarrollo de nuevas vacunas y herramientas diagnósticas

PI: Llilianne Ganges

During the first year of the project we have shown several mechanisms related to CSFV-host interaction. The results achieved explain the high incidence and prevalence of this disease in countries

that are currently endemic and why is it so difficult to eradicate this disease. This results have been published in early 2014 and others that are still under development and publication. In addition, new vaccine strategies based on dendrimers peptides have been designed. Finally, international collaborations with partners from CSFV reference and OIE collaborating centres from OIE as CENSA, Cuba and IVI, Switzerland were consolidated.



## Avian influenza: pathogen, host and ecosystem

### La influenza aviar y la relación entre el patógeno, el hospedador y el ecosistema

PI: Natàlia Majó

Avian influenza (AI) still is one of the most important diseases both for public health and for poultry production, emerging from the wildlife reservoir. Circulation of subtype H5N1 highly pathogenic AI virus, (HPAIV) still poses a considerable risk, as well as the emergence of new HPAIV outbreaks, the most recent one caused by HPAIV H7N7 in Spain.

Despite recent information on the process of adaptation and pathotype changes in AIV viruses, the mechanisms of selective pressure of the host that leads to transformation of LPAIV into HPAIV still are unknown. Also, while anatids are recognised as primary host for AIV, information on the role of single species such as for

example the white stork (*Ciconia ciconia*) in the epidemiology of AIV is lacking. Finally, although large surveillance schemes are in place throughout the world, information on the local circulation, persistence and dispersion of AIV in Spanish wetlands is still scarce.

The present project continues the previous project FAU2006-019-C00, and intends to further investigate aspects of the relation between pathogen, host and ecosystem with view to ameliorate diagnosis, control and prevention of this viral infection that affects both animals and humans. The primary objectives of the project are:

1. To study the role of different species of poultry, game birds and colonial avian species in the evolution of LPAIV precursors for HPAIV and in the adaptation of AIV to other species.
2. To study the role of White storks in the epidemiology of AIV, integrating data on host

ecology, AIV epidemiology and the host-pathogen relationship.

3. To study the ecology of AIV in a small periurban wetland model in which continuous circulation of AIV has previously been demonstrated, with the aim of, by closely monitoring aquatic bird species and AIV prevalence together obtain detailed information on AIV introduction, persistence and dispersal.

The cited objectives represent new approaches in that for the first time the effect of specific host factors on AIV evolution is studied. Using the white stork as a model for the first time prevalence data, host ecology and information on the host-pathogen relationship are analysed jointly. Similarly the close monitoring of bird movements and abundance and AIV prevalence will almost certainly generate interesting results.



# ENDEMOVIR subprogram

## Endemic viral infections

Coordinator: Enric Mateu de Antonio  
enric.mateu@cresa.uab.cat

### Objectives

The subprogram on endemic viral infections (ENDEMOVIR) comprises activities on research and technology transfer in relation to viral diseases and infections found endemically

in herds (excluding the zoonotic ones). Their importance relies on the economical losses associated to their infection. The concept of endemics implies a long-standing presence of the disease (i.e,

blue tongue, even it can persist in a territory for a number of years, is still considered an exotic disease).

### Lines of research

#### **PATHOGENESIS, EPIDEMIOLOGY AND CONTROL OF INFECTIONS CAUSED BY SSDNA VIRUSES (SSDNAVIRUS)**

##### **Coordinator**

Tuija Kekarainen

In this research line studies on the molecular, epidemiological and pathological aspects of swine infecting Torque teno sus virus (TTSuV) are tackled. We have shown that one TTSuV species viral loads are higher in animals whose immune system is compromised due to other viral infections. However, vaccination against porcine circovirus type 2, is not affecting the viral loads of any known TTSuV. TTSuVs were shown to be present all over the world and live pig trading is linked to the genetic structure of these viruses. Furthermore, a novel TTSuV species was identified, genetically characterized and its prevalence studied in different scenarios.

The main research topics of PCV2 research are related with the epidemiology, pathogenesis, diagnosis and control of this ssDNA virus. As for example, PCV2 eradication by means of mass vaccination has been explored. Related with this topic, PCV2 viral evolution under different vaccination scenarios is in the process of being analyzed. On the other hand, different serologic tests to assess the levels of antibodies against this virus have been compared. Finally, PCV2 vaccine efficacy has been assessed under experimental as well as field conditions.

##### **Responsible for research line**

Kekarainen, Tuija

##### **Researchers**

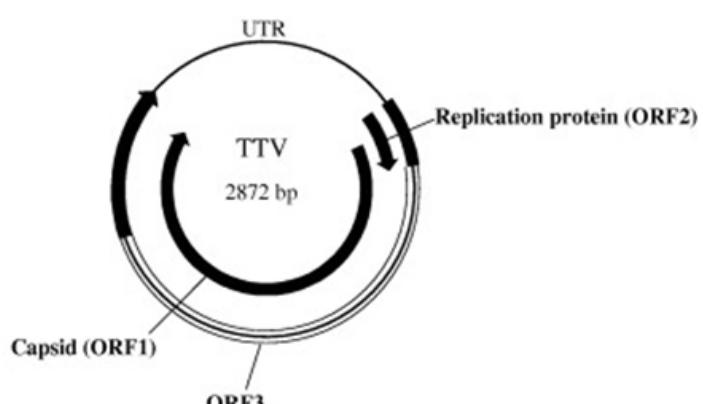
Segalés Coma, Joaquim  
Sibila i Vidal, Marina

##### **Laboratory technicians**

Huerta Medina, Eva  
Llorens Segalés, Anna

##### **PhD students**

Ciprian Arratia, Adriana  
Feng Hua  
Jimenez Melsió, Alexandra  
Nieto Blanco, David



**Immunopathogenesis and protection against PRRSV (INMUNOPRRS)**

**Coordinator**

Enric Mateu de Antonio

This research line is aimed to identify the major factors involved in the immunopathogenesis of porcine reproductive and respiratory syndrome virus (PRRSV) infection development as well as to determine the relevant immunological correlates with protection against this virus. The long-term objective is to gain knowledge for the rationale development of new and better vaccines against PRRSV.

**Responsible for research line**

Mateu de Antonio, Enric

**Researchers**

Darwich Soliva, Laila

Díaz Luque, Iván

Martín Castillo, Margarita

**Laboratory technicians**

Cano Carrasco, Esmeralda

Navarro Toro, Nuria

**PhD students**

Pileri, Emanuela



**ROLE OF MICRO-RNAs ON VIRAL INFECTIONS OF PIGS (MICRO-RNA)**

**Coordinator**

José Ignacio Núñez Garrote

MicroRNAs (miRNAs) are a new class of small non-coding RNAs that regulate gene expression post-transcriptionally in animals, plants and viruses. The role of miRNAs in the interaction host-pathogen is growing, but up today only few reports have described viral miRNAs in farm animals. With the aim of understanding miRNA roles during the Aujeszky's disease virus (ADV) infection, the expression profiles of host and viral miRNAs were determined through deep sequencing in

ADV infected porcine cell line (PK-15) and in an animal experimental ADV infection with virulent (NIA-3) and attenuated (Begonia) strains. In the in vivo approach four miRNAs presented differential expression between virus strains infection. Functional analysis of all these over expressed miRNAs during the infection revealed their association in pathways related to viral infection processes and immune response. Furthermore, 8 viral miRNAs were detected by miR-specific quantitative RT-PCR with DNA primers, presenting a gene regulatory network affecting 59 viral genes. Most described viral miRNAs were related to Large Latency Transcript (LLT) and to

viral transcription activators EPO and IE180, and also to regulatory genes regarding their important roles in the host-pathogen interaction during viral infection.

On the other hand, the characterization of the miRNAs produced in tonsil and mediastinal lymph node of experimentally infected pigs with PCV2 has been carried out.

**Responsible for research line**

Núñez Garrote, José Ignacio

**PhD students**

Núñez Hernández, Fernando

**Technicians**

Muñoz Campanya, Marta

## **IMMUNOLOGY AND DEVELOPMENT OF VACCINES TO CONTROL SWINE INFLUENZA VIRUS (INFLUPORCINA)**

### **Coordinator**

María Montoya González

The main goal of this line is to study the pig immune mechanisms in front of viral infections and more specifically infection with swine influenza virus. It is also aimed at the development of new vaccine vectors that could be used to control this particular infection. Swine influenza virus (SIV) causes a relevant respiratory disease in swine which has often been neglected due to the impact of other porcine pathogens, until the emergence of the novel swine-origin Influenza A (H1N1) virus in 2009.

The fact that porcine influenza is considered a zoonosis, as SIV can infect

humans, and importantly, that swine may act as an intermediate reservoir for avian influenza to colonize humans illustrates its relevance and the need to develop efficient tools to control this disease. Influenza virus has been extensively used as a model in basic immunology studies, and a great deal is known about the immune factors involved in the development of protective immune responses against influenza virus in mouse and in humans. However, the understanding of the immune response against the virus in pigs is very limited. Additionally, the emergence of the pandemic Influenza A (H1N1) virus in 2009 gave us the opportunity to collaborate in the research of human influenza virus in the ferret model. Finally, development of new vaccine strategies against porcine infectious diseases is a very important

field of research for livestock industry. There is a real need to generate new cost-effective, safe vaccines able to serologically differentiate vaccinated animals from infected ones (the so called DIVA vaccines).

Therefore, this line of research has two specific objectives:

- To investigate the mechanisms of protective immunity to viral infections, e.g. swine influenza virus.
- To develop new vaccines against swine influenza virus.

### **Responsible for research line**

Montoya González, María

### **Laboratory technicians**

Córdoba Muñoz, Lorena

### **PhD students**

Baratelli, Massimiliano

Martínez Orellana, Pamela



# Main results

## Study of viral microRNA in pigs

### Identificación y caracterización de microRNAs víricos que afectan al porcino

PI: Jose Ignacio Núñez

MicroRNAs (miRNAs) are emerging as key regulators of almost all kind of biological events. These small nucleic acids (21-25 nucleotides in length) exert their regulatory effects by specifically targeting homologous sequences in a given mRNA. The recent demonstration of the existence of viral-encoded miRNAs has opened a new research avenue that has allowed, so far,

demonstrating their potential role as regulators of the interaction between the virus and the infected cell. In this project, and during the last year, we have carried out the first study on miRNA gene expression in pigs infected with porcine circovirus type 2 (PCV2) using a deep sequencing approach. Several porcine candidate miRNAs that can be differentially expressed in response to infection with PCV2 have been identified. On the other hand, massive sequencing has failed to identify any miRNA encoded by PCV2. In order to identify

the role of miRNAs in African swine fever virus (ASFV) infection, we have used a similar deep sequencing approach. We have conducted an experimental infection for identifying different pattern of expression of miRNAs in spleen and submandibular lymph node of pigs infected and non infected with two strains (attenuated and virulent) of ASFV. Besides, ASFV is a candidate to explore if expresses miRNAs.

## Towards a new vaccine against swine influenza

### Immunological characterization of swine influenza virus (SIV) circulating in Spain:

### Towards a new vaccine against SIV based on chimeric virus-like particles

PI: María Montoya

Swine influenza virus (SIV) causes a relevant respiratory disease in swine which has often been neglected due to the impact of other porcine pathogens, until the emergence of the novel swine-origin Influenza A (H1N1) virus. The fact that porcine influenza is considered a zoonosis, as SIV can infect humans, and importantly, that swine may act as an intermediate reservoir for avian influenza to colonize humans illustrates its rele-

vance and the need to develop efficient tools to control this disease.

Development of new vaccine strategies against porcine infectious diseases is a very important field of research for livestock industry. There is a real need to generate new cost-effective, safe vaccines able to serologically differentiate vaccinated animals from infected ones (DIVA vaccines). In the past years new antigens have been described which are potentially protective against different livestock relevant pathogens.

Results obtained during the last years as part of previous coordinated projects have shown that VLPs derived from the calicivirus rabbit

haemorrhagic disease virus RHDV constitute an excellent vaccine delivery system, capable of inducing protective anti-viral immunity against inserted immunogenic model epitopes in the absence of adjuvant. Eventually, RHDV VLP-based vaccines could act as efficient DIVA vaccines for SIV, as well as other livestock pathogens. However, work in this project is required to achieve the development of new strategies to control SIV.



**Services for Administration and  
private companies**

**04**

# Services for Administration

In parallel to scientific interest, CReSA researchers perform studies that have important implications for consumers, producers and regulatory institutions. For this reason, CReSA carries out different initiatives for the government departments of the Generalitat de Catalunya with competencies in animal and public health. From 2001 until the present, CReSA has been working closely with different public institutions to improve animal and public health on a regional and national level. This collaboration takes the form of annual services or research activities contracts,

or occasional contracts for specific activities.

At the regional level, CReSA has an annual contract with the Department of Agriculture, Livestock, Fisheries, Food and Natural Environment (Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural, DAAM) and the Department of Health (Departament de Salut, DS) of the Catalonian Government. There are also some occasional collaborations with the Catalan Food Safety Agency (ACSA), ascribed to the DS, for some specific activities. On the national level, the CReSA has

started a collaboration with the Ministry of Environmental, Rural and Marine Affairs (Ministerio de Agricultura, Alimentación y Medio Ambiente, MAGRAMA) and has conducted some studies for other regional governments, such as those of Andalusia and Galicia.



## Virological analyses

### Prestació de serveis d'anàlisis virològiques

PI: Rosa Rosell

The service of virological analysis has as main objective to provide diagnosis of the main viral diseases of domestic animals subjected to official control programs by the Servei de Sanitat Animal (animal health service) of the DAAM.

The diseases subjected to diagnosis are: classical swine fever (CSF) and other pestiviruses, swine vesicular disease (SVD), bluetongue (BTV) and Schmallenberg (SBV):

· CSF is a contagious viral disease of pigs, the causative virus is a member of the genus Pestivirus of the family Flaviviridae, and is closely related both antigenically

and structurally to the viruses of bovine viral diarrhea (BVD) and Border disease (BD).

· SVD is a contagious swine disease, caused by an enterovirus; the main importance of SVD is that it is clinically indistinguishable from foot and mouth disease (FMD), and any outbreaks of vesicular disease in pigs must be assumed to be FMD until investigated by laboratory tests and proven otherwise.

· BTV infection involves domestic as a sheep, goats, cattle and wild ruminants, BTV is a member of the Orbivirus genus of the family Reoviridae. The BTV species, or serogroup, contains 24 recognized serotypes.

· SBV belongs to the Bunyaviridae family, within the Orthobunyavirus genus. The SBV is related to the Simbu sero-

group viruses. SBV affects domestic ruminants as sheep, goats, cattle and wild ruminants.

In the 2013 period, 11.256 samples were analysed. These samples came from Laboratori de Sanitat Ramadera, Seccions Territorial de Ramaderia i Sanitat Animal and Serveis Veterinaris Officials de les Oficines Comarcals of DAAM. The diagnosis techniques used for the official control and surveillance were: virus neutralization (VN) for the antibody detection and RT-PCR and virus isolation (VI) for the virus detection for all diseases. All the laboratory techniques were carried out under international quality standards (UNE-EN ISO/IEC 17025).

## Surveillance for avian influenza and Newcastle disease in wild birds in Catalonia

### Programa de vigilància d'influença aviària i Newcastle en aus salvatges a Catalunya

PI: Sebastian Napp, Núria Busquets

The surveillance of avian influenza (AI) in wild birds carried out in Catalonia in 2013 falls within the surveillance of AI being undertaken by the European Union. This program is coordinated with the rest of Autonomous Communities as part of the AI surveillance program in

Spain, 2013. The main objective of the program in wild birds was the early detection of highly pathogenic avian influenza viruses of the H5N1 subtype by means of passive surveillance (i.e. by detection of diseased or dead birds). The implementation of these programs involves the participation of the DAAM, CReSA, the Algete Central Veterinary Laboratory (LNR) and the Ministry of Agriculture, Food and Environment (MAGRAMA). In addition, taking advantage of the network to collect samples from

avian wildlife for AI, a monitoring program for Newcastle disease (ND) was carried out, mainly in columbiform birds found dead as differential diagnostic of AI. None of the samples from the 32 sick or dead birds collected tested positive for AI, whereas, 15 birds of the 48 birds analysed for ND virus tested positive for highly pathogenic ND virus, being *Streptopelia decaocto*, *Columba livia* and *Bubulcus ibis* the species involved in the outbreaks.

## Surveillance for West Nile virus in Catalonia

### Programa de vigilància del virus del Nil occidental a zones considerades de risc

PI: Ana Alba, Núria Busquets

The current surveillance for West Nile virus in wild birds and equines has been carried out in Catalonia since 2006. The aim of this program is the monitoring of the West Nile virus (WNV) in Catalonia in the main reservoirs (wild birds) and the early detection in domestic animal hosts (equines). In this program participates the following institutions: DAAM, CReSA, Mosquito Control Services,

the Wildlife Recovery Centres, equine veterinary clinics, the Algete Central Veterinary Laboratory (LNR) and the Ministry of Agriculture, Food and Environment. The avian and equine samples are collected from active and passive surveillance components. During 2013, in total 68 equines and 122 wild birds were sampled. Positive sera against viruses belonging to Japanese encephalitis complex were detected in both horses and migratory wild birds. Five equine sera resulted positive by competitive ELISA, being 1 of them positive by seroneu-

tralization test (SNT) with low titers (<1/20)). Regarding the results from avian sera, 17 samples have resulted positive by ELISA, although only 3 samples have been positive by SNT with low titers (1/15-1/40) belonging to *Ciconia ciconia* and *Circaetus gallicus* species. These results indicate that migratory bird species are involved in the enzootic cycle of WNV-like. Moreover, none bird or horse sample from passive surveillance have resulted positive for WNV.

## Control of tuberculosis in livestock and wildlife

### Assessorament i diagnòstic per al control i eradicació de la tuberculosi bovina

PI: Sebastián Napp, Bernat Pérez

Tuberculosis (TB) is a zoonotic disease caused mainly by *Mycobacterium bovis* and *M. caprae*, which affects a wide range of domestic and wild animals. In Catalonia, TB in cattle is subjected to an eradication programme, while there are different initiatives to control TB in goats. For wildlife there is a disease surveillance program which includes TB. By commission of the DAAM, CReSA conducts the diagnosis of TB in cattle, goats and the wild reservoirs (such as wild boar, deer or badgers), the epidemiological follow-up of bovine positive herds, and provides expert guidance.

In 2013, the annual preva-

lence of bovine TB in Catalonia was less than 0.1% for the first time, which posed a significant reduction compared to 2012 (0.25%). Seroprevalence studies performed in wildlife revealed that the wild boar may be the main reservoir of TB in Catalonia with approximately 5% of seropositive animals, although most of them were from an endemic area in the Baix Ebre County (where seroprevalence was higher than 30%).

The TB diagnosis laboratory of CReSA performed a total of 1109 analyses by the Interferon- $\gamma$  assay, 1482 by the antibody detection ELISA test, 261 anatomopathological evaluations, 225 mycobacterial cultures and 214 PCRs. The laboratory techniques were carried out under international quality standards (UNE-EN ISO/IEC 17025).



## Entomological surveillance for bluetongue

### Entomological surveillance program for Bluetongue disease

PI: Nonito Pagès

Bluetongue (BT) is a viral infectious, noncontagious disease affecting ruminants. The transmission of the virus among susceptible hosts is through the bite of hematophagous midges of the genus *Culicoides*. Worldwide there are over 1400 species of *Culicoides* and only few of them can transmit arboviruses such as Bluetongue virus (BTV), Schmallenberg virus (SBV) or African horse sickness virus (AHSV) among others as well as many other parasites.

Since the year 2003, CReSA has designed and implemented the Entomological Surveillance Program for BT, as a service for the administration. The objectives of the Entomological Surveillance Program are: i) to monitor the recent introduction and expansion *Culicoides imicola* in Catalonia (the main Afroasiatic vector for BTV), ii) perform the monitoring of other autochthonous species that are either confirmed or suspected BTV vectors, some of them being even more abundant than *C. imicola*, and iii) to improve the knowledge of the seasonal activity and the ecological requirements determining the presence of specific *Culicoides* thro-

ughout the year. These data is expected to be of importance in order to predict transmission risk periods according to the seasonal distribution and abundance of vectors.

During the year 2012, a total of 14.820 Ceratopogonid dipterans have been diagnosed, being 12.295 species to be reported to the Government for being potential vectors of BTV. According to the results obtained, data analyzed suggested the presence of two periods of high risk for BTV transmission, late spring (May-June) and early autumn (September-October).

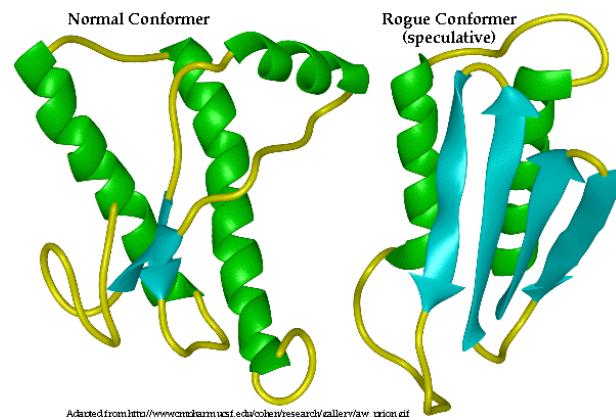
## Surveillance plan of the animal transmissible spongiform encephalopathies

### Diagnostic for the surveillance programme of animal transmissible spongiform encephalopathies in fallen stock

PI: Enric Vidal

Central nervous system samples from fallen stock population (both cattle and small ruminants) are analysed as part of the active Transmissible Spongiform Encephalopathies (TSE) surveillance programme. Apart from routine tests, in cases with an initially positive result from rapid tests, confirmation tests are conducted. In 2013, 5.786 samples were analysed and no cases of TSE were

diagnosed. The brain samples are analysed under ISO 17025 quality control standards.



## Scientific advice for National Government (MAGRAMA)

### Scientific advice for National Government (MAGRAMA)

PI: Jordi Casal

The purpose of this contract has included a consultancy of different animal health issues related to veterinary epidemiology: i) A risk analysis of *Trichinella* in order to assess the risk of holdings and regions in the case of a reduction in the inspection at the slaughterhouse; ii) a report of the trends and sources of zoonoses and zoonotic agents in Spain iii) An evaluation of the sensitivity of surveillance developed in Spain against two swine diseases: Classical Swine Fever (CSF) and African Swine Fever (ASF).

The epidemiological data and the diagnostic results were assessed and discussed in monthly workshops by a commission constituted by CReSA's researchers and official veterinarians of DAAM, and specific measures to be taken in relation to bovine TB were recommended.



## Transmissible spongiform encephalopathies

### Diagnostic for the surveillance programme of animal transmissible spongiform encephalopathies in ruminants destined for human consumption

PI: Enric Vidal Barba

The PRIOCAT laboratory performs, by commission of the Catalan Public Health Agency (Agència de Salut Pública de Catalunya, ASPCAT) belonging to the Health Department, an active Transmissible Spongiform Encephalopathies (TSE) surveillance programme, whereby it specifically analyses samples from all of Catalonia of the central nervous system of a sample of bovines and small ruminants destined for human consumption in order to determine the

presence of prion diseases. The brain samples are analyzed under ISO 17025 quality control standards.

Apart from routine analysis, in cases with an initially positive result from rapid tests, confirmation techniques are conducted. In 2013, 5955 samples were analyzed and no cases of TSE were diagnosed. The laboratory is also involved in a research line funded by national and European research projects regarding the study of different aspects of TSEs, such as the determinants of the transmission barrier of animal prion strains (BSE and Scrapie) and the characterization of the transmissibility of atypical variants of Scrapie to other livestock species and humans.



Laboratori de Referència  
en Malalties Pròniques Animals  
de Catalunya

## Support for slaughterhouse veterinarians

### Slaughterhouse Veterinary Support Service

PI: Enric Vidal Barba

In 2013, the Slaughterhouse Veterinary Support Service (Servei de Suport a Escorxadors, SESC) managed a total of 147 queries by official vets conducting inspections of slaughterhouses in Catalonia. Of these, 23 were telematic queries and the other 124 corresponded to requests for sample labora-

torial analysis. Among the queries received there was a prominence of lesions of suspected bovine tuberculosis, followed by cattle muscle lesions to rule out bovine cysticercosis and Marek's disease in poultry.

A total of 33 posts were published in the SESC Case Archive website: a specialised blog on slaughterhouse veterinary pathology ([www.cresa.cat/blogs/sesc](http://www.cresa.cat/blogs/sesc)) which provides continuing

education to meat inspectors and other related animal health professionals. The blog has had 29.010 visits with a total of 63.869 pageviews. Diffusion through social media (Twitter, Facebook and LinkedIn) has also been implemented.



# Services for companies

In 2013, 51 new contracts with private companies and public institutions were signed, with a total income of €3.494.142€.

The different types of study are shown below:

- Studies of antimicrobial sensitivity
- Studies of pathogenesis, replication, excretion and transmission of vaccine strains.
- Studies of duration of immunity of vaccines
- Development of experimental challenges in pigs, ruminants and poultry
- Collection of bacterial strains
- Immunological studies (immunological response of vaccines, efficacy of adjuvants, etc)
- Trials with vaccines (safety and efficacy)
- Challenge models
- Proof-of-concept studies to investigate the efficacy of vaccines
- Studies of diagnosis and detection of pathogens
- Assessment and consultancy for companies (Scientific assessment, conferences, meetings, trainings, colloquia, monographs, etc)

## **The field trials service of CReSA**

CReSA has the resources and expertise to design and execute pre-clinical and clinical trials as well as epidemiological studies of interest for the agrifood sector companies focusing on livestock animal health. Specifically, CReSA has the field trials team with expertise on developing efficacy and tolerance studies under laboratory and field conditions to test pharmacological, biological and nutraceutical products following GLP or GCP. These studies are usually motivated by requirements of national or European authorities for the registration of veterinary products or for supporting marketing strategies. Furthermore, one of the main tasks of this group is to provide support to the field phase of research projects, contracts with private com-

panies as well as services for the administration from different research lines from CReSA.

As a result of the activity in 2013, this group has conducted 19 studies for the private industry, has given support to 23 studies for companies led by other CReSA researchers and has collaborated in 22 studies related to research projects.

### **Responsible for the Field Trials Unit**

López Soria, Sergio

### **Researchers**

Nofrarías Espadamala, Miguel

### **Technicians**

López Jiménez, Rosa  
Navas Sánchez, Mª Jesús  
Pérez Rodríguez, Diego



**Knowledge transfer and training**

**05**

# Doctoral thesis and Master research studies

## Doctoral thesis

### **Nuevos avances en el desarrollo de vacunas frente a la peste porcina africana**

Anna Lacasta

Directors: Fernando Rodríguez, Francesc Accensi

Date: 20 February 2013

### **Proteínas de fase aguda como biomarcadores en medicina y producción porcina**

Yolanda Saco

Directors: Joaquim Segalés, Anna Bassols, Lorenzo Fraile

Date: 16 July 2013

### **Identification and partial characterization of acid phosphatases from *Haemophilus parasuis***

Paula Constanza Manrique

Director: Virginia Aragón

Date: 18 November 2013

### **Morbidity and mortality causes of raptor admission at a wildlife rehabilitation centre of Spain during 1995 to 2005. Risk factors associated to prognosis**

Rafael A. Molina-Lopez

Directors Laila Darwich, Jordi Casal

Date: 26 April 2013

### **Epidemiological investigation of bovine tuberculosis causes of herd breakdowns and persistence in Spain**

Sintayehu Guta

Directors: Alberto Allepuz, Jordi Casal

Date: 16 September 2013

### **Avian influenza infection dynamics in minor avian species**

Kateri Bertran Dols

Directors: Roser Dolz, Natàlia Majó

Date: 10 May 2013

### **Noves estratègies vacunals i diagnòstiques per al control de la tuberculosi. El model caprí**

Bernat Pérez de Val

Director: Mariano Domingo

Date: 1 October 2013

## Master research studies

### **Identificació preliminar de zones de risc a Catalunya per la circulació del virus del Nil Occidental i altres Flavivirus**

David Basanta Pons

Director: Ana Alba

Date: June 2013

### **Epidemiología molecular de *C. jejuni* y *C. coli* aislados de aves de cría al aire libre en España**

Elisabet Moré

Director: Marta Cerdà

Date: September 2013

### **Respuesta inmunológica frente al PRRSV en nulíparas vacunadas intradérmica e intramuscularmente con UNISTRAIN® PRRS**

Joel Miranda Álvarez

Directors: Iván Díaz, Enric Mateu

Date: December 2013

### **Characterization of PqiB from *Haemophilus parasuis*: a novel factor with function in the early steps of infection in swine**

Marta Sisteré

Director: Virginia Aragón

Date: September 2013

### **Distribución y prevalencia de *Salmonella* y *Campylobacter* en aves paseriformes migratorias**

Samanta Cazorla

Director: Marta Cerdà

Date: September 2013

### **Influenza virus infection in quail (*Coturnix coturnix*): characterization of the humoral immune response**

Beatriu Garcia Morante

Directors: Natàlia Majó, Núria Busquets

Date: September 2013

### ***Salmonella* and *Campylobacter* occurrence and antimicrobial susceptibility in wild and domestic birds in Falkland Is.**

Sara Muñoz

Director: Marta Cerdà

Date: September 2013

# Conferences organized

**II Jornadas sobre zoonosis y enfermedades emergentes: enfermedades virales transmitidas por mosquitos**  
23-24 May 2013  
CosmoCaixa Barcelona  
112 attendees



# Technical seminars

## Campylobacter: de la granja a la taula. Situació actual i perspectives de futur

Technical seminars of the PATT Plan (DAAM)

07/11/2013

82 attendees

## CReSA technicals seminars

In 2013, 24 seminars were organized at CReSA. Since 2007, Dr Maria Montoya has been in charge of the coordination of technical seminars with guest speakers from different institutions.

Later, Dr. Montoya was substituted by Dr. Ayub Darji.



## XV jornadas de porcino de la UAB

30 January– 1 February 2013  
120 attendants



**Campylobacter: de la granja a la taula**  
Situació actual i perspectives de futur

Jornada tècnica  
BELLATERRA, dijous 7 de novembre de 2013

**Presentació**

La campylobacterosis, entretalls deguda a campylobacter, és una de les zoonosis més important a la UE, superant en importància la salmonel·losi. Es calcula que probablement causen haverells 10-20 milions de casos cada any a la UE. La carn de pollastre és el principal font d'infecció per *Campylobacter* en humans. La contaminació es produeix per aquest agent en granja i se pol·luesta els productes. L'IBSA estimava la taxa d'afectació en la granja de campylobacterosis es trobar els nivells de 40-60% en la producció de pollastre de producció primària. No obstant, cal prendre mesures en tota la cadena alimentària.

L'objectiu d'aquest seminar és donar una visió global de la situació actual i les perspectives de futur d'aquesta zoonosi.

**Programa**

10.00 h Benvenuda i Presentació de la Jornada  
Dr. Ignacio Badiola Saz, investigador de l'IRTA-CReSA

10.10 h Epidemiologia i control de *Campylobacter* en granjas de pol·lastres  
Dra. Marta Cerdà Cerdà, investigadora de l'IRTA-CReSA

10.45 h *Campylobacter* en la cadena de processat en escurrador  
Sra. Laura Latorre Arce, investigadora d'Iowa Food Research Center

11.15 h Vigilància de *Campylobacter* en els aliments  
Sra. Anna Palou Solà, Agència Catalana de Seguretat Alimentària

11.45 h Pausa

12.15 h Epidemiologia i càrrega assistencial de les gastroenteritis agudes per *Campylobacter*  
Sra. Ma Rosa Sala Ferrer, responsable de la Unitat de Vigilància d'Infectius de l'Institut d'Estudis Vallencs (ASPCAT)

12.45 h Estratègia de reducció de *Campylobacter* en pollastres d'engraixat al Regne Unit  
Sr. Francisco Javier Domínguez Cordero, Deputy Veterinary Director and Head of Scientific Food Standards Agency (Sofsa)

13.15 h Taula rodona

13.45 h Cloenda de la Jornada

**Organització**

**CReSA**  
Centre de Recerca en Alimentació

**Colaboració**

**UAB** Universitat Autònoma de Barcelona  
**IRTA** Institut d'Investigacions en Recursos, Agro-forestals i Medi Natural

**Twitter** @catalcaat

**Lloc de realització**

Sala d'Actes de la Facultat de Veterinaria  
bât. V. Campus 98 08193 BELLATERRA (CERDANYOLA DEL VALLS)

**Inscripcions**

S'ofereix la inscripció gratuïta als participants que preveuen a través del Servei d'Innovació Agrària i Ramadera (Tel. 93 204 67 29 - Av. sra. saler@gen.cat) i també us podeu inscriure a través del servei de transcripció a jorones del PATT del portal RurCat: [www.rurcat.net/preinscripcions/](http://www.rurcat.net/preinscripcions/)

**PLAANUAL 2013**  
de transferència, tecnologia, 1119/2.00

# Awards

## Awarded a porcine circovirus research project from CReSA

Since 2007, Boehringer Ingelheim Animal Health has supported 20 research projects with 25,000 euro each. In 2013 the independent review board had to choose between eleven high-quality projects. In the 7th edition of the PCV2 awards they selected the following projects to be awarded:

- PCV2 vaccination of sows at different stages of the production cycle: Effects on the reproductive parameters and transfer of maternal antibodies. (Sergio López Soria, Spain)
- Prevention of initial replication of PCV2 by vaccination with CircoFLEX. (Prof. Dirk Werling, UK)

- The effect of dam PCV2a vaccination on subsequent challenge with a variant PCV2b strain during late gestation and the effect of exposure of piglets from vaccinated and unvaccinated dams to porcine parvovirus type 1 (PPV1) at weaning. (Prof. Tanja Opriessnig, UK)

The PCV2 research award celebration was held at the University of Barcelona in

Cerdanyola de Vallès, Barcelona, Spain. The 2013 awards were presented to the winning researchers by the head of the review board, Prof. Maurice Pensaert, former head of the Laboratory of Virology of Ghent University in Belgium, and Dr Petra Maaß, Global Senior Technical Manager for Swine Biologicals at Boehringer Ingelheim Animal Health.



# Masters

Researchers of CReSA participated as lecturers in two Masters:

### Master in virology

The objective of the Master (open to graduates from Life Sciences, Health Sciences, Experimental Sciences and Agro food Sciences) is to gain a clearly specialized perspective in order to work in research laboratories, hospitals and biotech companies. The Master is coordinated by the Universidad Complutense de Madrid (UCM) and benefits from the collaboration of the Sociedad Española de Virología (SEV), the total participation

of the UCM and the Universidad Politécnica de Madrid (UPM) and the active participation of specialized professors from other universities and research institutions in Spain: CReSA; UCM; UPM; Sociedad Española de Virología; Instituto de Salud Carlos III ; Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria ; Centro de Biología Molecular Severo Ochoa ; Centro de Investigaciones Biológicas ; Centro Nacional de Biotecnología.

### Master in pig health and production

The objective of the Master

(open to graduates from Veterinary Sciences, Agro food Sciences and technicians) is to train technicians to contribute to the swine production chain, based on an efficient production system (at technical and economic level), and using production techniques that respect the environment and animal welfare. The students obtain a qualification by prestigious universities in Spain: Universidad Complutense de Madrid; Universidad de Zaragoza; Universidad Autónoma de Barcelona; Universidad de Lleida.

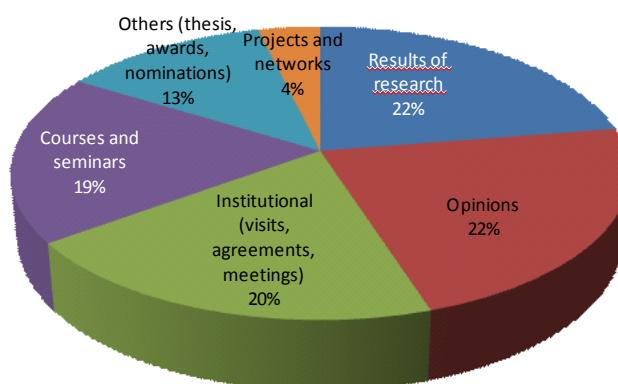
**Science and society**

**06**

# Website and press releases

## Website users: a general view

|                         | WEB     | BLOG  |
|-------------------------|---------|-------|
| Visits                  | 69.212  | 4.909 |
| Unique visitors         | 22.157  | 3.539 |
| Number of visited pages | 127.009 | 9.513 |
| Pages/visit             | 1,84    | 1,94  |
| % of new visits         | 35%     | 70%   |



Typology of the news at the CReSA website in 2013

## Social media



353 followers  
90 posts



740 followers  
1035 tuits



171 followers  
57 posts



24 subscribers  
12 videoclips  
18.282 views

## Press releases

40 new stories about the research and activities carried out by the CReSA were written and disseminated in 2013:

20-12-2013

### **A partnership framework agreement signed by CReSA and CESAC**

The agreement establishes a partnership in the scientific and technological fields of common interest and includes the joint participation in R&D projects, both at regionally level and at a national or international level.

19-12-2013

### **Sequencing of the genes responsible for the capsule production in *Haemophilus parasuis***

A study published in the Journal of Bacteriology, with the participation of Dr. Virginia Aragón (CReSA researcher), opens new possibilities in assisting the diagnosis and monitoring of Glässer's disease.

12-12-2013

### **XVI swine conference at the Universitat Autònoma de Barcelona**

Will be held the days 29, 30 and 31 January, 2014 at the Faculty of Veterinary of the UAB, Bellaterra, organized by the UAB and the Catalan Association of Swine Veterinarians (AVPCAT).

12-12-2013

### **A CReSA project wins the third prize in the Generating Ideas Programme organized by the PRUAB**

Enric Vidal, researcher from CReSA, and Ferran Sala, researcher from the Pharmacy

Service of the Germans Trias i Pujol Hospital, won the third prize in the Ideas Generating Programme of the UAB Research Park (PRUAB) for the presentation of the CReSA project called SESC (Support Service for Slaughterhouses).

11-12-2013

### **Guadeloupe: paving the way for a centre of excellence on vector-borne and emerging diseases**

EPGENESIS—a new European project coordinated by the French Agricultural Research Centre for International Development (CIRAD), with CReSA as a partner, was just launched in Guadeloupe on 1st September and will run for 3 years. The aim is to enhance the research potential on vector-borne and emerging diseases within the Caribbean region.

05-12-2013

### **Institutional meeting between CRESIB and CReSA**

Scientists from the Barcelona Centre for International Health Research (CRESIB) and the Centre for Research in Animal Health (CReSA) met in Bellaterra to present relevant research topics and consider possible cooperation between both institutions.

25-11-2013

### **The disconcerting lack of knowledge about *Campylobacter***

The first Thursday of November, CReSA organized a session with a group of professionals involved in the study of the campylobacteriosis, the most important zoonosis in the EU.

22-11-2013

### **333formación launches the new Campus CReSA**

333formación has launched the new Campus CReSA, an online training platform where you can learn about the latest on swine health. This campus will be managed by CReSA.

14-11-2013

### **Training on swine diseases in Colombia**

Laila Darwich and Joan Pujols, researchers of CReSA, participated as speakers at the International Seminar on Swine Reproductive and Respiratory Diseases, held last 21-25 October in Colombia.



13-11-2013

### **Advance on Glasser's disease: two phosphatases *Haemophilus parasuis* identified**

The microbiologist Paula Manrique will read her doctoral thesis next November 18, about the acid phosphatase in the Gram-negative bacterium *Haemophilus parasuis*, the etiological agent of Glasser's disease.

12-11-2013

### **CReSA becomes member of the EPIZONE European Research Group**

The goal of EPIZONE is playing a key role in research on prevention, detection and control of animal diseases of poultry, swine, fish, sheep, cattle, horses and wildlife in order to reduce both the risks and the harm to animal health in the EU and beyond.

12-11-2013

### **CReSA strengthens its relationship with the pig sector**

Representatives of the National Association of Swine Producers (ANPROGAPOR), the Catalan Association of Swine Producers (PORCAT) and the Group for Swine Sanitation of Lleida (GSP Lleida) visited the CReSA to know more about the activities of the center and search for new collaborations.

06-11-2013

### **West Nile fever and Chikungunya viruses as potential emergent viruses in Catalonia**

At the beginning of October, Dr. Nitu Pagès, researcher of CReSA, presented the first results of the study "Transmission and incidence in Catalonia of emergent diseases transmitted by mosquito".

30-08-2013

### **The natural history of porcine circovirus type 2: from an inoffensive virus to a devastating disease?**

A recently published review done by researchers from CReSA summarizes the current knowledge on the natural history of porcine circovirus type 2 (PCV2) infection and its related diseases.

29-08-2013

### **Ecological surveillance for West Nile virus in Catalonia: early alert in public health**

Epidemics caused by West Nile virus have caused serious diseases in Europe in the last years. No acute infection was detected in domestic animal populations in Catalonia during the ecological surveillance for the virus in 2007-2011. Virus was not detected in mosquitoes ei-

ther. However, local virus or other closely related flaviviruses transmission was occurring among bird populations.

13-08-2013

### **The blurred border between porcine circovirus type 2-systemic disease and porcine respiratory disease complex**

Researchers of CReSA have published a retrospective study suggesting that PCV2-lung disease is probably a negligible condition and porcine circovirus type 2 mainly contributes to porcine respiratory disease complex by means its systemic infection.

08-08-2013

### **Role of the European quail on the transmission of the avian influenza viruses**

Researchers of CReSA have demonstrated that European quail may play a major role in avian influenza epidemiology. This is the first experimental infection investigating the susceptibility of this specie to the avian influenza virus.

15-07-2013

### **Visit of the public health secretary to CReSA**

The past Wednesday, July the 10th, Antoni Mateu, Public Health Secretary of the Health Department of the Generalitat de Catalunya (Catalan Government) paid an official visit to the facilities of the Research Centre for Animal Health (CReSA), IRTA-UAB, located in Bellaterra (Cerdanyola Vallès, Barcelona).

02-07-2013

### **CReSA, member of the Technical Board of CESAC**

Natalia Majó, CReSA researcher has been named CReSA representative of the Technical Board of the Center of Bird-raising Health of Catalonia and Aragon (Centre de Sanitat Avícola de Catalunya i Aragó, CESAC).

28-06-2013

### **Risk Factors for Foot-and-Mouth Disease in Tanzania**

Foot-and-mouth disease (FMD) occurrence in Tanzania is more related to animal movement and human activity via communication networks than transboundary movements or contact with wildlife.

20-06-2013

### **Simultaneous porcine circovirus type 2 and *Mycoplasma hyopneumoniae* co-inoculation**

A study carried out by researchers of CReSA shows that simultaneous porcine circovirus type 2 (PCV2) and *Mycoplasma hyopneumoniae* (Mhyo) co-inoculation does not potentiate disease in pigs seropositive for both pathogens.

14-06-2013

### **Conclusions of the Second Conference on zoonoses and emerging diseases**

Over 100 health professionals (human and veterinary fields) discussed multiple aspects of mosquito-borne viral diseases on 23 and 24 May 2013 in Cosmocaixa Barcelona.



**Agrodigital.com**  
La web del campo

|   |   |  |
|---|---|--|
| 11-06-2013  | 07-05-2013  | 04-04-2013   |
| <b>Highly (H5N1) and low (H7N2) pathogenic avian influenza virus infection in falcons</b><br><br>Researchers of CReSA have demonstrated that gyr-saker hybrid falcons are highly susceptible to H5N1 highly pathogenic avian influenza (HPAI) virus infection, and that they may play a major role in the spreading of both HPAI and pathogenic avian influenza (LPAI) viruses.   | <b>Doctoral thesis on avian influenza virus</b><br><br>Next May 10th 2013, Kateri Bertran Dols (PhD student of CReSA) will carry out the lecture and defense of her research work entitled "Avian influenza infection dynamics in minor avian species", directed by Dr. Natàlia Majó and Dr. Roser Dolz.  | <b>Mariano Domingo has been named manager of the Deputy Directorate for Research Projects</b><br><br>Last March 1st, 2013, Mariano Domingo Álvarez assumed the position of manager of the Deputy Directorate for Research Projects of the Ministry of Economy and Competitiveness, in the area of Livestock, Aquaculture and Fishing.                        |
| 10-06-2013  | 02-05-2013  | 14-03-2013   |
| <b>Biosecurity practices in Spanish pig herds</b><br><br>Researchers of CReSA have evaluated the perceptions of farmers and veterinarians of the most important biosecurity measures. Farmers awarded significantly higher scores to their farms' level of biosecurity than the veterinarians servicing said farms.   | <b>A new method of diagnosis allows the detection and differentiation of five porcine viruses in a single run</b><br><br>Researchers of CReSA and the Centro Nacional de Sanidad Agropecuaria (CENSA) have developed a real-time PCR system for the detection and differentiation of porcine circovirus 2 (PCV-2), pseudorabies virus (PRV1), porcine parvovirus (PPV) and swine torque teno viruses 1 (TTSuV1) and 2 (TTSuV2). | <b>European project EDENext experts meeting: control of emerging disease vectors and reservoirs</b><br><br>European experts on diseases transmitted by vectors will meet from 18-22 March, 2013 in Bellaterra (Barcelona). The purpose is to discuss the most recent results of the EDENext project".  |
| 06-06-2013  | 19-04-2013  | 11-03-2013   |
| <b>CReSA joins the Global African Swine Fever Research Alliance (GARA)</b><br><br>GARA, an initiative of the United States Department of Agriculture (USDA), is created to establish and sustain global research partnerships that will generate scientific knowledge and tools to contribute to the successful prevention, control and where feasible eradication of African Swine Fever, an important transboundary animal disease. | <b>Almost opposite models of immune response to PRRSV could exist depending on the strain</b><br><br>Researchers of CReSA have demonstrated that inoculation with different porcine reproductive and respiratory syndrome virus (PRRSV) strains result in different virological and immunological outcomes and in different degrees of homologous and heterologous protection.  | <b>Assessment of the risk of a bluetongue outbreak in Europe</b><br><br>Researchers of CReSA studied the risk of a bluetongue outbreak in Europe caused by Culicoides midges introduced through intracontinental transport and trade networks.   |
| 10-05-2013  | 17-04-2013  | 22-02-2013   |
| <b>Awarded a porcine circovirus research project from CReSA</b><br><br>The project by Dr. Marina Sibila and Dr. Segalés was awarded at the 6th edition of the European PCV2 Research Award sponsored by Boehringer Ingelheim.   | <b>Journalists and scientific communicators visit the CReSA</b><br><br>On the occasion of the 10th anniversary and the inauguration of the high biological security building, the Centre for Research on Animal Health (CReSA) organized an open day for journalist and scientific communicators on 11 April.   | <b>Identified two virulence factors of <i>Haemophilus parasuis</i></b><br><br>Researchers of the CReSA have demonstrated that two trimeric autotransporters of <i>H. parasuis</i> are surface-exposed proteins that are involved in resistance to phagocytosis. These properties make these proteins promising vaccine candidates against Glässer's disease. |

|  |  |   |
|--|--|---|
| 20-02-2013   | 11-02-2013   | security level-3 (BSL3) conditions and a cytometry service in Biosecurity level-2 (BSL2) laboratories   |
| <b>Demonstrated correlation between TTSuV2 and classical swine fever</b>   | <b>Workshop on epidemiology organized by the FAO and CReSA</b>   |   |
| Researchers of CReSA have demonstrated that viral load and prevalence of Torque teno sus virus 2 are increased in pigs experimentally infected with classical swine fever virus.   | The workshop 'Analysis and representation of surveillance data' by the FAO and CReSA took place in Barcelona from 3rd to 7th of December 2012.           |   |
| 19-02-2013   | 08-02-2013   | 24-01-2013  |
| <b>Doctoral thesis on African swine fever</b>  | <b>Biosecurity on farms</b>  | <b>CReSA takes part in the publication PRRS al dia</b>  |
| Next February 20th 2013, Anna Lacasta Marín (PhD student of the CReSA) will carry out the lecture and defense of her research work entitled "New advances in the development of vaccines against African swine fever", directed by Drs. Fernando Rodríguez and Francesc Accensi. | In November 2012, CReSA organized a technical workshop about biosecurity on farms. The presentations are already available to consult (Spanish version). | Dr. Ivan Díaz, one of CReSA's researchers, is the author of this collectable publication sponsored by Progressis®. The aim of this work is to publish the last news about the Porcine Reproductive and Respiratory Syndrome (PRRS). |
|  | 01-02-2013   |   |
|  | <b>CReSA launches a new cytometry service</b>  |   |
|  | This is the only service in Catalonia that offers a FASCARIA I (BD) cytometer in Bio-  |   |

## SINC Plataform

### Detectada la transmisión del virus del Nilo Occidental u otros Flavivirus entre aves en Cataluña

CReSA | 30 agosto 2013

El virus del Nilo Occidental es un patógeno zoonótico que mantiene su ciclo enzoótico principalmente entre aves y mosquitos. Desde 2008, algunas epidemias en el sur y el este de Europa han causado graves enfermedades neurológicas en seres humanos y equinos, e incluso algunos casos mortales. Los datos obtenidos del sistema de vigilancia ecológica de este virus en Cataluña indican que no se detectó el virus en mosquitos ni infecciones en animales, pero sí existió transmisión local entre poblaciones de aves.

### Detectada la transmisión del virus del Nilo Occidental u otros Flavivirus entre aves en Cataluña

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8.1 0 [Me gusta](#) 25 [Tweet](#) 4

El virus del Nilo Occidental es un patógeno zoonótico que mantiene su ciclo enzoótico principalmente entre aves y mosquitos. Desde 2008, algunas epidemias en el sur y el este de Europa han causado graves enfermedades neurológicas en seres humanos y equinos, e incluso algunos casos mortales. Los datos obtenidos del sistema de vigilancia ecológica de este virus en Cataluña indican que no se detectó el virus en mosquitos ni infecciones en animales, pero sí existió transmisión local entre poblaciones de aves.

Más información sobre: Virus del Nilo occidental salud pública mosquitos zoonosis CReSA

CReSA | 30 agosto 2013 13:36

Durante el período 2007-2011, investigadores del Centre de Recerca en Sanitat Animal (CReSA) analizaron muestras de 290 equinos, 1.096 aves salvajes, 100 polluelos centinelas y 39.599 mosquitos en Cataluña para conocer si había presencia de virus del Nilo Occidental (VNO).

Según sus investigaciones, no se detectó en mosquito, así como tampoco ninguna infección aguda causada por el VNO en poblaciones de animales. Sin embargo, la detección de seroconversión positiva en varias aves salvajes migratorias y autóctonas de esta región indica que existe transmisión local del VNO u otros Flavivirus estrechamente relacionados entre las poblaciones de aves.

El análisis de estos datos también proporcionó información valiosa acerca de algunas de las especies de aves que podrían actuar como posibles reservorios introductores en diversas regiones de Europa, así como la presencia abundante de flaviviruses circulantes tanto en vertebrados como en mosquitos.

#### La vigilancia del virus del Nilo Occidental

El VNO pertenece al complejo antigenético de la encefalitis japonesa (VEJ) del género Flavivirus. Es un patógeno zoonótico que mantiene su ciclo enzoótico principalmente entre aves y mosquitos ornitófilos. Varios mamíferos (principalmente équidos y seres humanos), así como anfibios y reptiles, también pueden infectarse, pero la viremia no suele ser suficiente para infectar a los mosquitos.

En Europa, en ausencia de una mortalidad de aves elevada, los signos neurológicos en caballos han sido, con frecuencia, la única indicación de presencia local de este virus.

Desde 2008, algunas epidemias en el sur y el este de Europa han causado graves enfermedades neurológicas en seres humanos y equinos, e incluso algunos casos mortales.

En 2010, la actividad del VNO también ha sido confirmada en seres humanos y caballos en el sur de España. Las seroconversiones al VNO se habían detectado previamente no solo en aves y caballos de esa zona, sino también en aves de zonas cercanas.

El sistema de vigilancia ecológica realizado en Cataluña pretendía detectar la circulación del VNO en reservorios y huéspedes animales e identificar los mosquitos que podían actuar como principales vectores en esta región.

El plan de vigilancia del virus del Nilo Occidental en Cataluña es un encargo del Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural (DÀAM) de la Generalitat de Catalunya al CReSA.

## Mass media

A screenshot of the TV3 website's video player. The video frame shows two women in a kitchen setting. One woman is at a counter, and the other is standing beside her. A play button is overlaid on the video frame. Below the video, a caption reads 'Merche Mora'. At the bottom of the video player, there is a progress bar and some text in Spanish. The background of the website features a large banner with a woman's face and text for 'Merche Mora' and 'BTVA Notícies Cap de setmana'.

A screenshot of the TV3 website. The top navigation bar includes links for 'Vídeos', 'Programació', 'Canals', 'Sessions', 'Meus TVEs', and 'Participació'. Below this, a sub-navigation bar offers links to 'Participació a programes', 'Concursos', 'Emissaries', and 'Jocs'. The main content area features a large video player showing two people in a studio setting. A large white play button is overlaid on the video. The video player has a red progress bar at the bottom. The URL in the address bar is 'http://www.tve.es/tv3/agora/Agora-23/04/2013'. The TV3 logo is in the top left corner.

# Activities for students

## Escolab 2013

From February to May 2013, CReSA offered visits within the initiative Escolab 2013. In total, 279 secondary level students from 12 different schools visited the center:

|   |   |  |
|---|---|--|
| 06/02/2013<br><b>Institut Miquel Martí i Pol</b><br>Cornellà de Llobregat<br>Cicle Formatiu Superior<br>27 students | 06/03/2013<br><b>Institut Escola Municipal de Treball</b><br>Granollers<br>Cicle Formatiu Superior<br>12 students | 26/04/2013<br><b>Institut Escola Municipal de Treball</b><br>Granollers<br>Cicle Formatiu Mitjà<br>25 students |
| 13/02/2013<br><b>IES Gorgs</b><br>Cerdanyola del Vallès<br>Batxillerat<br>19 students                               | 13/03/2013<br><b>IES Roger de Llúria</b><br>Barcelona<br>Batxillerat<br>22 students                               | 08/05/2013<br><b>INS L'Arboç</b><br>L'Arboç<br>Batxillerat<br>20 students                                      |
| 20/02/2013<br><b>Institut Miquel Martí i Pol</b><br>Cornellà de Llobregat<br>Cicle Formatiu Superior<br>31 students | 20/03/2013<br><b>Institut Banús</b><br>Cerdanyola del Vallès<br>Batxillerat<br>21 students                        | 22/05/2013<br><b>INS Terra Roja</b><br>Santa Coloma de Gramenet<br>Batxillerat<br>20 students                  |
| 27/02/2012<br><b>IES Estela Ibèrica</b><br>Sta Perpètua de Mogoda<br>Batxillerat<br>29 students                     | 03/04/2013<br><b>Escola Pia</b><br>Mataró<br>Batxillerat<br>32 students   | 17/04/2013<br><b>Institut Escola Municipal de Treball</b><br>Granollers<br>Batxillerat<br>21 students          |

## Science week 2013

On the occasion of the 18th edition of Science Week (15-24 November 2013) the CReSA received a total of 82 students:

|  |   |
|--|---|
| 18/11/2013<br><b>IES Pere Calders</b><br>Batxillerat<br>Bellaterra<br>27 students            | 27/11/2013<br><b>Esc. Sant Ignasi de Sarrià</b><br>Batxillerat<br>Barcelona<br>3 students |
| 11/12/2013<br><b>IES Gorgs</b><br>Cerdanyola del Vallès<br>Batxillerat<br>23 students        | 11/12/2013<br><b>IES Gorgs</b><br>Cerdanyola del Vallès<br>Batxillerat<br>23 students     |
| 20/11/2013<br><b>Centre Estudis Dolmen</b><br>CFGs<br>Hospitalet de Llobregat<br>29 students |   |



# Activities for journalists

## Journalists and scientific communicators visit the CReSA

On the occasion of the 10th anniversary and the inauguration of the high biological security building, the Centre for Research on Animal Health (CReSA) organized an open day for journalist and scientific communicators on 11th April. The meeting brought together a total of 17 journalists, editors and scientific communicators from journals, press offices and medias of the sector interested in knowing the sanitary surveillance actions carried out in the CReSA.

Joaquim Segalés, Director of the CReSA, reviewed the current threats to global public health, such as avian influenza, West Nile virus, Chikungunya virus and Rift Valley fever. He also explained the need to have a centre for research such as the CReSA, which serves as a public service with its level 3 Biocontainment Unit, unique in Catalonia. Jordi Casal, researcher at CReSA and Professor at the UAB, ex-

plained the surveillance programs in which CReSA is involved at the request of public administrations, such as the West Nile virus, avian influenza in wild birds, cysticercosis and tuberculosis surveillance. Finally, Merche Mora, the laboratory Technical Coordinator, offered a guided tour around the CReSA facilities. The attendants could visit some laboratories, including those of entomology, virology and bacteriology.

The Biocontainment Unit was opened for the first time to journalists and some of the attendants had the opportunity to visit it. They were guided by David Solanes, Services Director, and Francesc Xavier Abad, Laboratories Manager. During the visit, it was also possible to talk and interview the researchers about the most topical issues either in public and animal health.



# La caja fuerte de los virus

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 Ara      

## Catalunya contribueix a la lluita contra la grip aviaria

El Cresa investiga com algunes seques del virus afecten de manera diferent segons si l'au infectada és un pollastre, un ànec, un gall dindi o una guatlla

MONICA L. FERRANDO | Actualitzada el 14/04/2013 00:00

Cada any entrem i surten unes 8.000 persones de la Unitat de Biocontingències de nivell 3 que té el Centre de Recerca en Santitat Animal (Cresa). Cadascun d'aquests milers d'ingressos comporta vestir-se i desvestir-se amb una vestimenta especial completament esterilitzat i durar-se abans de sortir-ne per desbarreir fins a l'últim rac de cos. Així s'investiga amb virus que poden causar malalties greves en persones i animals, i que no tenen tractament. Aquests virus són els deïlerquents de la grip, la calausa de malalties amena del planeta, però que per la globalització i el canvi climàtic van aconseguir. Entre aquests malalties hi ha el virus de la febre del Nil occidental, el de la vall del Rift, el virus Chikungunya, el de la grip porcina i, evidentment, diferents seques del virus de la grip aviarina.

# Divulgation

## CReSAPIENS, science divulgation journal

CReSAPIENS is a science divulgation journal aimed to divulgate the knowledge and results of research generated at the CReSA. CReSA-PIENS has been created with the aim of approaching science to society, trying to make understandable issues only reserved for the scientific community until now.

### CReSAPIENS issue 4

The fourth issue of CReSA-PIENS was about diagnostics, and was funded by Boehringer Ingelheim, Novartis Animal Health, Esteve, 3tres3.com, INVESA, Circovac (Merial) Clinobs, APC ASPROCER, Biocheck and Ingenasa.

### CReSAPIENS issue 5

The fifth issue of CReSA-PIENS was about the creation and running of a center of research and was funded by Boehringer Ingelheim, Novartis Animal Health, Esteve, 3tres3.com, Invesa, Circovac (Merial), Clinobs, APC, ASPROCER, Ingenasa, Matachana and Veterquímica.



## CReSA & the city: the posts

### CReSAPIENS number 5: creation and running of a center of research

CReSAPIENS number 5 is now available. On this occasion, about the creation and running of a center of research.

### CReSA supports EscoLab and the Responsible Research and Innovation (RRI)

During the last week of November, CReSA's program was full with activities aimed at bringing science closer to society. The meeting between teachers and researchers, within the initiative EscoLab, and the Science Week are two examples.

### New doctoral thesis about the bovine tuberculosis in the herds

In mid-September, the PhD student of CReSA, Sintayehu Guta, read his doctoral thesis about the epidemiology of bovine tuberculosis.

### Different combinations, same prize

In recent months a new outbreak of a new avian influenza virus (H7N9 strain) in China, has reached humans, despite being listed as a low pathogenic virus in birds. At the time of writing this blog post will feature more than 140 infected persons, with a total of 45 dead.

### Campylobacter session

Next Thursday, November 7, CReSA is going to organize a session about "Campylobacter: from the farm to the table", where the campylobacteriosis will be the focus of the discussion: its current situation and future prospects. This disease

has become the most important one in the European Union and, in the last years, more than salmonellosis.

### New strategies to improve tuberculosis control in goats

Dr. Bernat Pérez de Val, researcher of CReSA, read his thesis titled "New vaccines and diagnostic strategies for the control of tuberculosis. The goat model", where he studies the efficacy of new vaccines and diagnostic reagents to fight against this infectious disease caused by *Mycobacterium tuberculosis* complex bacteria, which possesses high rates of mortality and morbidity worldwide.

### Reunió de treball sobre els programes de vigilància i control de malalties animals a Catalunya

This entry was only available in Català and Español.

### Fernando Rodríguez is named secretary of the Spanish Society for Virology

In the last month of September, Dr. Fernando Rodríguez, investigator in CReSA since 2004, was named secretary of the SEV in substitution of the former Secretary of the SEV, Dr. Antonio Talavera. He will be part of the new SEV Directory board under the presidency of Dr. Albert Bosch.

### New guidelines for the pathological assessment of African swine fever infections

African swine fever is still one of the major viral swine diseases for which a commercial vaccine is lacking. Researchers of CReSA have presented guidelines to integrate relevant pathological

findings of the disease with virological and immunological data.

### Alberto Allepuz, "Epidemiology doesn't focus so much in diagnosis. It's more about understanding disease"

As a profession, Veterinary; As a child, wanted to be Journalist, but "for better or for worst" it's was gone with the time; For place to stay recommends the Pyrenees, two films: *Gran Torino* and *The Godfather*, and a book: *No Word from Gurb*, from Eduardo Mendoza. Claim that the research is getting worse.

### Pandoravirus: size does matter!

Every day we learn more and understand less. This phrase comes to mind when you read a bit about Pandoravirus. Viruses are not, all, that contagium vivum fluidum (contagious living fluid) that said the Dutch scientist Martinus Beijerinck in his first description of snuff mosaic virus (late nineteenth century).

### 2012 CReSA Annual Reports

What results were obtained in CReSA in 2012? What services were offered? What outreach activities were conducted? The 2012 CReSA annual reports are now available.

### Representatives from the University of Valparaíso visit CReSA

On October 1st, 2013, a group of representatives from the University of Valparaíso (Chile) met with researchers and management staff of CReSA.

**On line course on current and future of the PRRS**  
Enric Mateu and Ivan Diaz, researchers of CReSA, are responsible for this course on Porcine Reproductive and Respiratory Syndrome (PRRS) sponsored by Boehringer Ingelheim.

**Promoting the scientific collaboration of CReSA with China and Sweden**

Last Monday, the 23rd of September of 2013, Dr Jorge Moreno López, full professor from the Swedish University of Agricultural Sciences (SLU) and Dr. Hu Shan, Dean of the Qingdao Agriculture University (QAU) from China, visited the facilities of CReSA.

**Deadline to subscribe to the Program for the generation of ideas**

This entry was only available in Català and Español.

**Caminant, no hi ha camí, es fa camí al caminar**

This entry was only available in Català and Español.

**Biocat's institutional visit to CReSA**

On September 5, 2013, Montserrat Vendrell (CEO at Biocat) and Àlex Casta (head of technology transfer and innovation at Biocat) visited the CReSA facilities in Bellaterra.

**From Bellaterra to Charlottetown...**

CReSA researcher Dr. Anna Albas's thoughts following a research visit to the Centre for Veterinary Epidemiological Research, University Prince Edward Island (UPEI), Canada.

**Scientist and resilient in Spain**

Some, perhaps many actu-

ally do not remember but there was a very famous quiz show when there was only one TV in Spain where the proceedings were presented as "so and so, friends and residents ....". In Spain, now, talking about scientists is talking about "so and so, scientists and resilient to ... and to talk about science is to talk about resilience.

**Unmarried couples in gastronomy?**

As mentioned in previous blog entry join, there are virus-food couples solidly established as "riskier" from the point of view of their ability (historically recorded) to generate food-borne viral infections. We will develop in the following paragraphs.

**CReSA and the New York City**

After three months of mini-sabbatical stay in New York it is time to return to reality; time flies! I feel like breaking up with an old girlfriend.

**CReSA on the radio**

This summer, current issues in animal health have been listened on the radio. Topics discussed are the risk of entrance of foot-and mouth disease and avian influenza in our country, and the characteristics of the high biological unit of CReSA.

**Food safety and viruses**

The World Health Organization (WHO) estimated at over 2 million people die from diarrheal diseases (2005), as a result of the ingestion of contaminated food or water. And this problem is not exclusive to poor and deprived areas, although mortality in such places, especially in childhood, is quite high.

**What is the use of animal health?**

Since the domestication and breeding of animals, man has had the need to alleviate the suffering and loss of animals (and therefore food) caused by diseases, lesions and accidents. This basic concept is the equivalent of our modern understanding of animal health, especially that related to the health of animals destined for human consumption.

**Can dog and rabbits go mad as cows do?**

When the "mad cow" crisis started the researchers studying these diseases found that prions, the agents which caused it, could affect not only cows but also people. Field cases were discovered of cats and goats infected with "mad cow" disease. In addition, experiments were conducted that showed that species such as sheep or laboratory animals such as mice, could also be infected.

**CReSAPIENS Nº 4: a diagnosis approach**

The fourth number of CReSAPIENS, our science divulgation journal, is now available. In this fourth issue of CReSAPIENS one can see how the authors explore the exciting world of animal health diagnostic techniques and what can be expected of them.

**Pigs, viral sakers**

The flu virus is still one of the greatest threats to human health, involving a wide range of animal and, amongst those pigs play an important role.

### **One can write to this coronavirus**

Coronavirus we talked about on a previous post already has who writes to it. In other words, we've given a name and know to whom and where to address the letter. It will be called MERS-CoV (derived from the English name, Middle East Respiratory Syndrome CoV) or Coronavirus (CoV) de la Síndrome Respiratoria de l'Orient Mitjà (in Catalan).

### **Barcelona TV. CReSA on television**

A report at Barcelona TV and an interview at TV3 allowed the public to know CReSA and the high biological security building located in Bellaterra.

### **Goats, domestic reservoirs of bovine tuberculosis**

Goats are thought to play a role in the epidemiology of bovine tuberculosis, but there is not much field evidence of the transmission of the bacteria from goats to cattle. We report the epidemiological investigation of an outbreak of bovine tuberculosis in a dairy cattle herd, which revealed a neighboring goat herd as the most likely source of infection.

### **Another crown from the East**

A new coronavirus (from the same viral family as the SARS) has emerged from the Middle East. Since 2012, cases of a coronavirus infection (initially in Saudi Arabia, then also in Qatar, United Arab Emirates and Jordan, although now it has been spread to Great Britain and France) with an apparently high death rate have been reported.

### **Bacterial biofilms: why should we care?**

The impact of biofilms on animal health and public health is undeniable. I am spending part of my sabbatical leave here at CReSA working on a collaborative project with Virginia Aragón on biofilm formation by *Haemophilus parasuis*, another important swine pathogen.

### **Have your say on how to continue to do research in times of austerity**

Austerity has taken its toll and disturbed research cycles across Europe. Particularly affected are scientists from Southern Europe.

### **Although investing in science is investing in the future... Who pays for it?**

It has been years since I worked for more than a year in the United States of America. I performed my professional activity in the Veterinary Diagnostic Laboratory at the University of Minnesota. In the beginning I was completely shocked to see the great number of diagnostic tests that the people working there were performing in cases that, to my humble opinion, it was not necessary.

### **Action-Reaction: Historical origins of the Good Laboratory Practice regulations**

Good Laboratory Practice (GLP) can be considered as a reaction of the Food and Drug Administration (FDA) against a scene of poor scientific practices in laboratories and Contract Research Organizations (CRO), but also in some manufacturing laboratories during the 60's and 70's. Moreover, GLP sought to move forward with the normalization in the field of toxicology assays.

### **Professionals with biosecurity training: At least a reality in Spain!**

The Universitat Autònoma de Barcelona (UAB) has made possible the 1st Post-graduate course of Biosecurity Strategies and Biological Containment in Spain. It is known for many years that the biosecurity world needed a regulated training.

### **Your voice on research in Europe**

Euroscience is a European non-profit grassroots association the mission of which is to be a voice for and to European scientists, an anchor point for all those who want to interact with a European scientific voice, and a platform for policy-makers to connect to scientists and scientific institutions at a European level.

### **Brain awareness week 2013**

The World Brain Awareness Week will take place from 11th to 15th of March 2013. The objective of the activities planned during this week is to raise society's awareness on how the brain works and how researchers are developing a better understanding in this field.

### **AEBioS. Do we associate in order to deal with biosecurity issues?**

In March 2011, a new association of professionals was set in motion in Spain. We are talking about the Asociación Española de BioSeguridad (AEBioS, by its acronym in Spanish).

## CReSA DIGITAL: 673 subscribers

One of the priorities of the CReSA is the transfer of knowledge and scientific advances to the animal health sector and the diffusion of the results of its research. CReSADIGITAL is a electronic bulletin that offers a summary of the most important news, studies, publications and activities shown on the center's website. CReSADIGITAL is aimed at professionals related to the agri-food sector and the animal health area, including veterinarians, researchers, students, producers, asso-

ciations, companies and institutions, as well as anybody interested in life sciences. 4 bulletins were published in 2012:

CReSADIGITAL 20  
February 2013

CReSADIGITAL 21  
June 2013

CReSADIGITAL 22  
September 2013

CReSADIGITAL 23  
November 2013



## CReSA TV and YouTube

To reach all audiences, the aim of the digital channel called CReSA TV is to offer content related to the activity of the CReSA in an informative and comprehensive way. Five different video clips have been recorded that seek to solve the eternal problem of understanding science: they can be understood by the general public.

3 new videoclips were launched in 2013:

### Technicians of CReSA: an essential support for the research

The important task of these specialized professionals allows CReSA to be considered a center of reference in animal health research.

### The "mad cows" and the enigma of the prions

The bovine spongiform encephalopathy, also known as "mad cow disease", is a

transmissible disease caused by prions that mainly affects cows.

### Swine diseases

The most important research in CReSA is carried out on

swine diseases. Germany and Spain are the two European powers in pig production. Inside Spain, Catalonia is the leading community.

### Year 2013

#### Technicians of CReSA: an essential support for the research



The important task of these specialized professionals allows CReSA to be considered a center of reference in animal health research.

[Watch Video](#)

#### The "mad cows" and the enigma of the prions



The bovine spongiform encephalopathy, also known as "mad cow disease", is a transmissible disease caused by prions that mainly affects cows.

[Watch Video](#)

#### Swine diseases



The most important research in CReSA is carried out on swine diseases. Germany and Spain are the two European powers in pig production. Inside Spain, Catalonia is the leading community.

[Watch Video](#)

## CReSA scientists: close to you, an exhibition

An itinerant exhibition on research in animal health was aimed at the general public and pretended to show the animal health research carried out by the CReSA investigators. Moreover, a book showing the information of this exhibition was developed. This exhibition was funded by the Spanish Foundation for the Science and Technology (FECYT). Topics include:

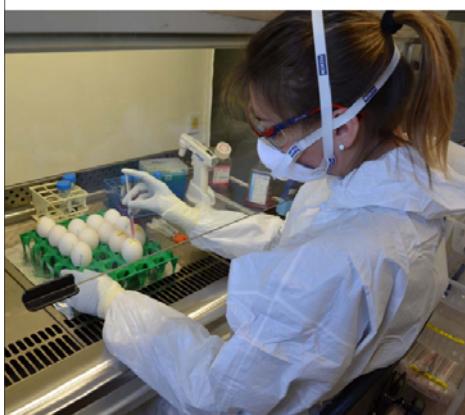
- Animals, pathogens and biosafety

- Researchers, students and technicians
- The “flu”
- Mosquito-borne diseases
- Food toxiiinfections
- “Mad cows” and the enigmatic prions
- Hemorrhagic pig diseases
- From genetic characterization to “universal” vaccine development
- Tuberculosis eradication
- Bluetongue and mosquitoes.

The exhibition was shown in 2013 in Lluïsos de Gràcia (Barcelona, Spain).



## CReSA Annual Report



**2012**  
Annual Report

**CReSA**  
Centre de Recerca en Sanitat Animal

## Escolab annual meeting

Under the EscoLab program, the Spanish Institute for Culture and the Institute of Education of the Barcelona City Council organized on the last 27th November, in the Mobile World Center of Barcelona, the annual meeting of researchers and representatives of the communication departments of various research centers and universities. This year a part of the teachers that have attended the activities was also invited. Such meeting gathered around 40 of the most important agents making up the program, which facilitated the exchange of opinions and experiences. CReSA took part in the meeting with the talk Responsible Research and Innovation (RR) and EscoLab, presented by Elisabet Rodríguez, responsible for the communication of the center. In addition to explaining the activities that CReSA organizes for schools and for the general public, she presented an analysis study of 184 articles on subjects related to the research in animal health, which were written by high school students between 2011 and 2013.

## Associations and networks

Euroscience



Consell Català de la Comunicació Científica (C4)



Associació Catalana de Comunicació Científica (ACCC)



Plataforma Vet+i



# CReSA<sup>R</sup>

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