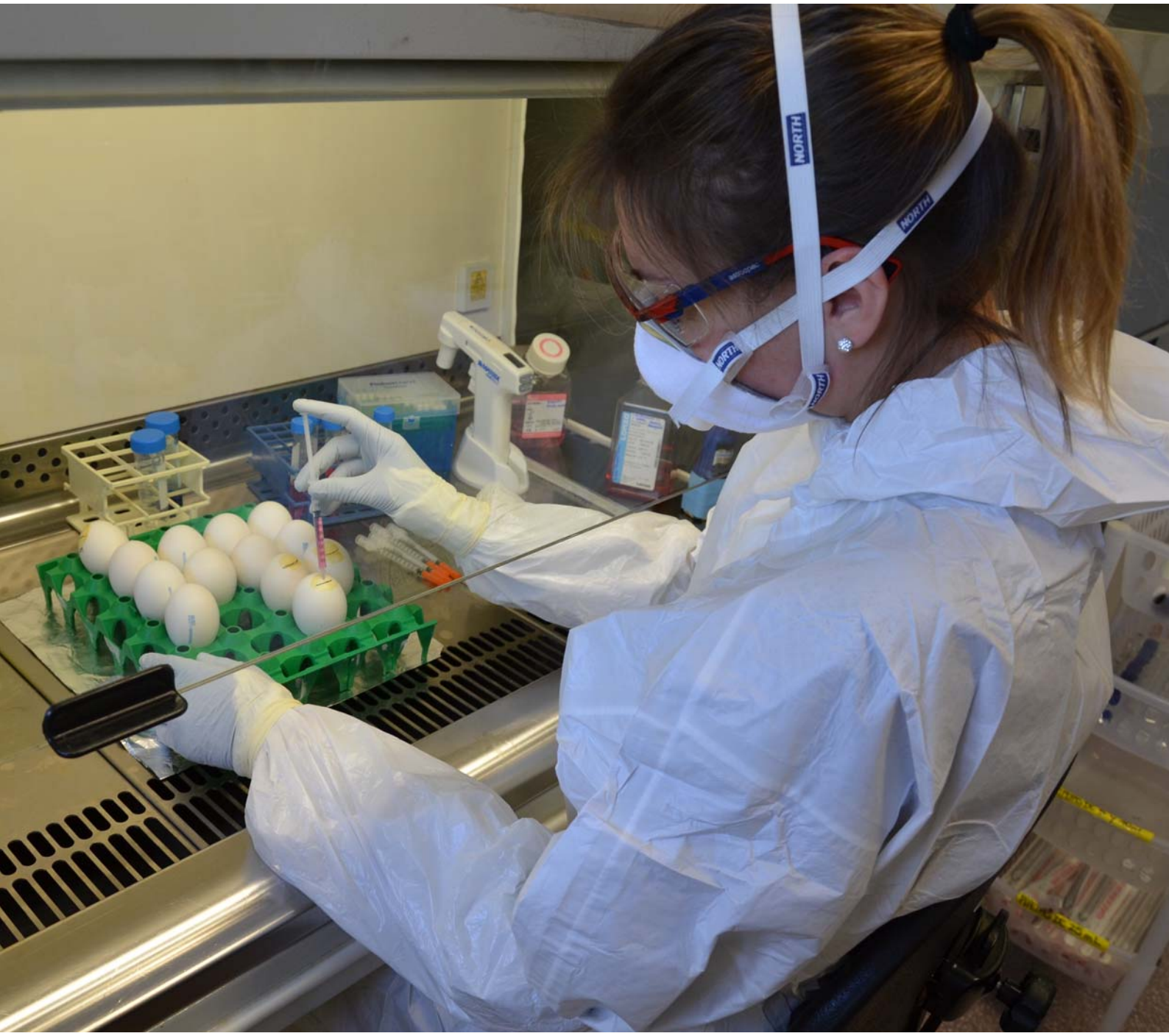


2012

Annual Report

CReSA

Centre de Recerca en Sanitat Animal

CONTENTS

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.

Objectives

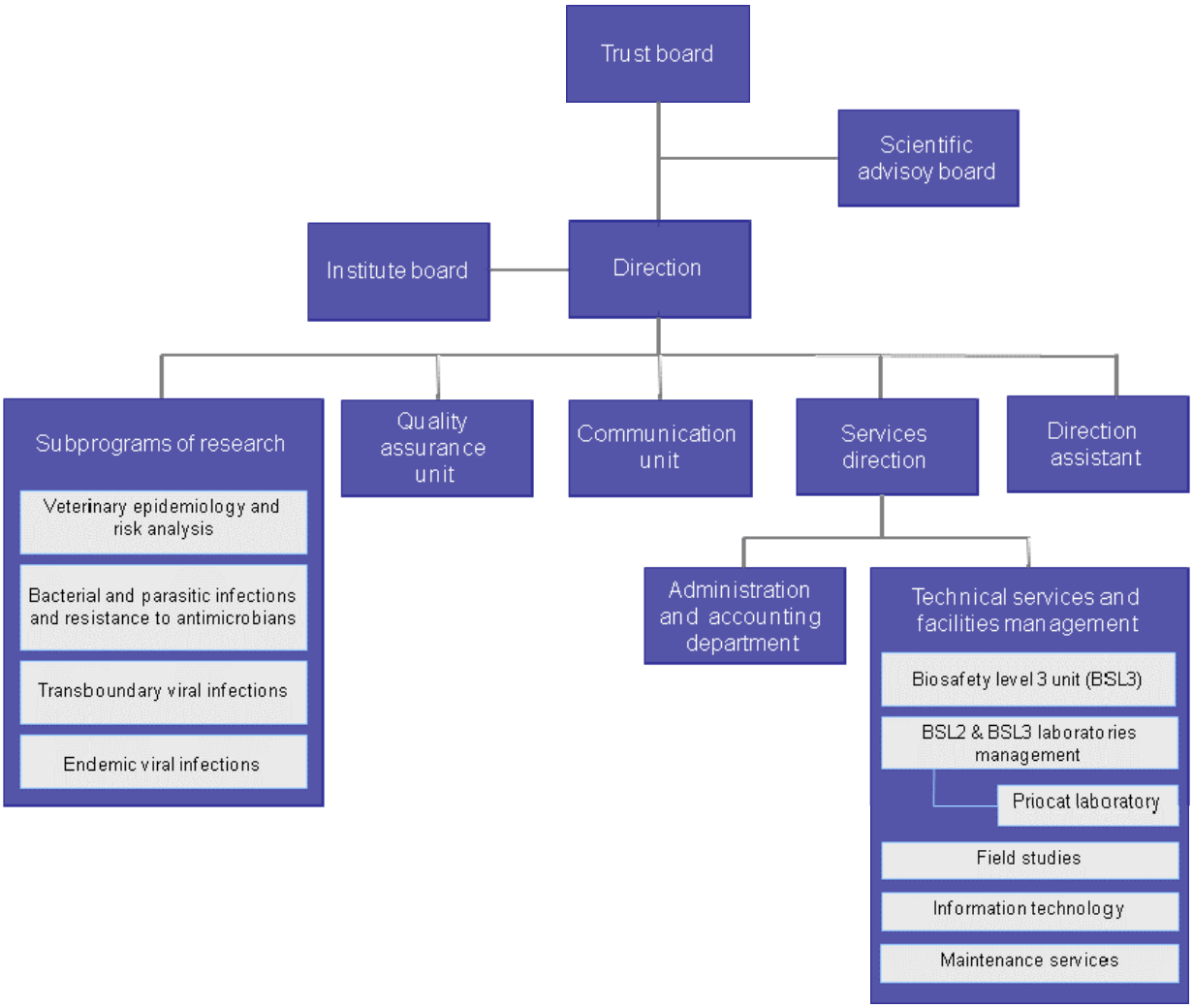
In general terms, the objectives of the CReSA are: research and technological development, and all aspects of studies and education in the field of animal health. The projects are carried out in collaboration with the UAB, IRTA, other institutions, and the private sector.

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

Organization chart



Dr Joaquim Segalés was appointed Director of the CReSA by the Patronate of the centre, gathered in session on 17th of April, 2012. In May 1st, 2012 he substituted Dr Mariano Domingo Álvarez who directed the center since it was created 12 years ago.

Board of trustees

Members

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

Composition on December, 12, 2012

PRESIDENT
Ferran Sancho Pifarré
UAB Rector

VICEPRESIDENT
Josep Maria Monfort i Bolívar
General Director of IRTA

BOARD MEMBERS DESIGNATED BY THE UAB

Pilar Dellunde Clavé
Vice-rector for Research

Lluís Tort Bardolet
Vice-rector for Strategic Projects and Planning

Reyes Pla Soler
Dean of the Veterinary Faculty of UAB

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

BOARD MEMBERS DESIGNATED BY THE IRTA AND UAB
Josep Maria Martorell Rodón
General Director for Research of DECO

Miquels Molins Elizalde
General Director for Agriculture and Livestock of DAAM

Lluís Rovira Pato
ICERCA Program

Valentín Almansa de Lara
General Director of Health of the Agricultural Production of MAGRAMA

Composition on May 24, 2012

PRESIDENT
Ana Ripoll i Aracil
(UAB Rector)

VICEPRESIDENT
Josep Maria Monfort i Bolívar
(General Director of IRTA)

BOARD MEMBERS DESIGNATED BY THE UAB
Carles Jaime Cardiel
Vice-rector for Strategic Projects and Planning

Jordi Marquet i Cortés
Commissioned by the Rector for the UAB Research Park

Reyes Pla Soler
Dean of the Veterinary Faculty of UAB

BOARD MEMBERS DESIGNATED BY THE IRTA
Carles Rosell i Rufat
Business Development of IRTA

Dolors Vidal Calvet
General Subdirector for Livestock of DAAM

Ramón Jové i Miró
Territorial Delegate of the Health Protection Agency in Lleida

BOARD MEMBERS DESIGNATED BY THE IRTA AND UAB
Josep Maria Martorell Rodón
General Director for Research of DECO

Miquels Molins Elizalde
General Director for Agriculture and Livestock of DAAM

Lluís Rovira Pato
ICERCA Program

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).

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
PRESIDENT
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 Marion Koopmans
The Netherlands
National Public Health Laboratory (RIVM)

Dr Esteban Domingo
Spain
Centro de Biología Molecular "Severo Ochoa" (CBMSO)

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

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

Biosafety

The level 2 biosafety laboratories

The CReSA building, which opened in 2003, 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 technologically 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^2.

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, ultrafreezing, equipment, preparation of reagents, etc.

The level 3 biocontainment unit

Biocontaintment 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 boxre for experimental inoculations to house pigs, poultry, cattle, sheep, goats and rabbits, among others
- Climatic chamber for entomology studies

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 m2 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 negative 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 excrement 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 permits direct and quick control of all elements and parameters that directly influence the running of the facilities.

BSL2 and BSL3 laboratories staff.

BSL3 animal housing staff.

Human resources

Direction

Director

Dr Mariano Domingo Álvarez, substituted by Dr Joaquim Segalés on 1st May, 2012.

Direction of 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)

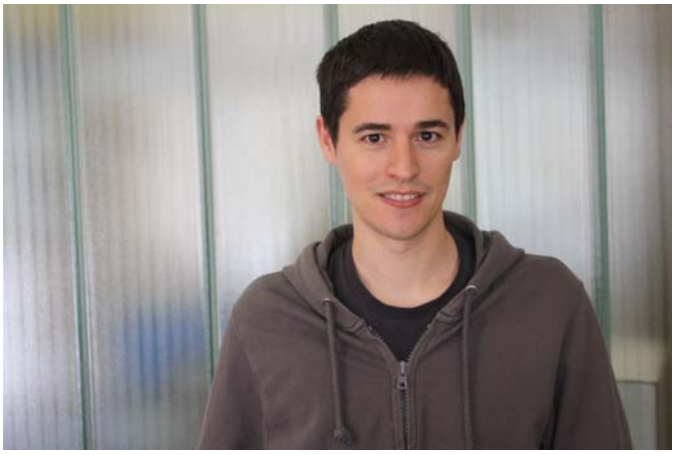
Department of Computer Sciences
Cordón Morales, Rubén
(Information Technology Manager)

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 a*nimal housing technical coordinator)

Animal care-takers technicians
Osuna Marín, M. Àngels
Pereira Sanchez, Claudia
Prieto Martin, Juan Carlos
Rosell Bellsolà, Valentí
Torras Sales, Concepció



Information Technology Manager. Department of Computer Sciences.

The administrative staff are responsible for administration, accounting and human resources.

Quality Assurance Unit (QAU)

Ordóñez Ordóñez, Montse
Responsible for QAU)

López Jodra, Marta
(QAU administrative support)

The Quality Assurance Unit is responsible for the implementation of quality in the activities carried out in the center.

Communication Unit

Rodríguez González, Elisabet
(Responsible for Communication)

The Communication Unit is responsible for the design and coordination of the promotion, scientific divulgation and innovation activities addressed at the agrifood sector and general public.

Researchers

Researchers

Accensi Alemany, Francesc
Acevedo García, Pelayo
Alba Casals, Ana
Allepuz Palau, Alberto
Almeria de la Merced, Sonia
Aragón Fernández, Virginia
Badiola Saiz, Ignacio
Bensaid, Albert
Busquets Martí, Nuria
Casal i Fàbrega, Jordi
Cerdà Cuéllar, Marta
Darji, Ayub
Darwich Soliva, Laila
Diaz Luque, Ivan
De la Torre Martinez, Maria Eugenia
Dolz Pascual, Roser
Domingo Alvarez, Mariano
Fraile Sauce, Lorenzo José
Ganges Espinosa, Llilianne
Kekarainen, Tuija
López Soria, Sergio
Majó Ferrer, Natàlia
Martín Castillo, Margarita
Mateu de Antonio, Enric
Migura Garcia, Lourdes
Montoya González, Maria
Napp Avelli, Sebastián
Nofrarias Espadamala, Miquel
Nuñez Garrote, Jose Ignacio
Pagès Martínez, Nonito
Pérez de Rozas Ruiz de Gauna, Anna
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
Crisci, Elisa
Espinar Guardeño, Sierra
Galofré Milà, Núria
González Oliver, Judit
Huerta Medina, Eva
Llorens Segalés, Anna
López Jiménez, Rosa Mª
Martín Fernández, Maite
Muñoz Calvo, Ivan
Muñoz Campanya, Marta
Navarro Toro, Nuria
Navas Sánchez, Maria Jesús
Pérez Maillo, Mónica
Pérez Rodriguez, Diego
Pérez Simó, Marta
Pujol Lucas, Nuria
Riquelme Guerrero, Cristina
Rivas Adán, Raquel
Valle García, Rosa Mª
Valle González, Marta
Verdún Castelló, Marta

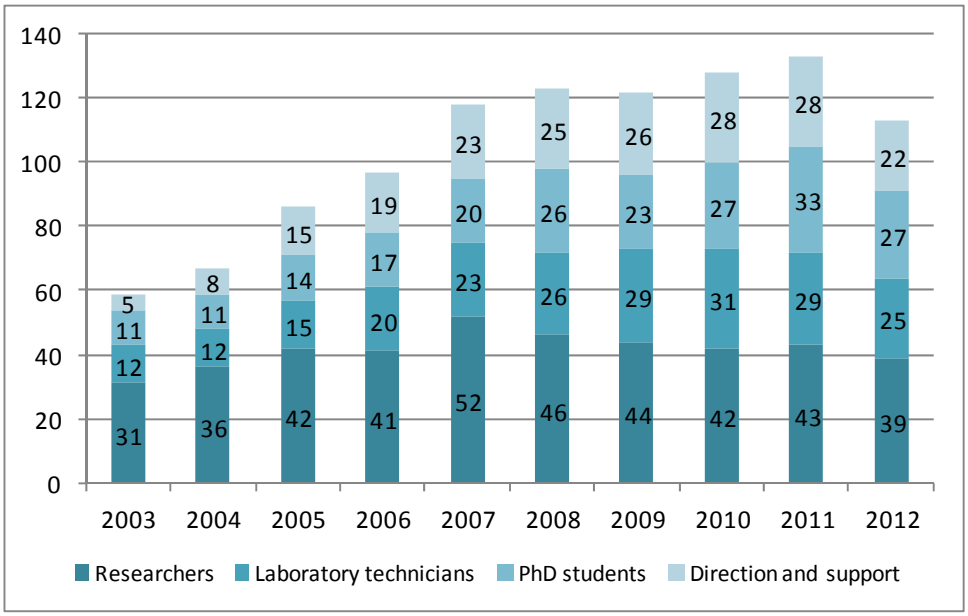
PhD Students

Antillés Silva, Noelia
Aramouni, Mario
Baratelli, Massimiliano
Bello Orti, Bernardo
Bertran Dols, Kateri
Brustolin, Marco
Ciprián Arratia, Adriana
Costa Hurtado, Mar
Garcia Saenz, Ariadna
Gonzalez Zabala, Juliana
Hua, Feng
Jimenez Melsió, Alexandra
Lacasta Marin, Anna
López Monteagudo, Paula
Lorca Oro, Cristina
Manrique Ramírez, Paula
Marco Salazar, Paola
Martin Valls, Gerard Eduard
Martinez Orellana, Pamela
Mussà, Tufária
Núñez Hernández, Fernando
Pileri, Emanuela
Santamaría Domínguez, Cristina
Urdaneta Vargas, Saulo Hely
Vergara Alert, Júlia
Vidaña Mateo, Beatriz

Master

Grau Reixach, Agnes
Muñoz Carneado, Laia
Wang, Yaqing

Evolution of the CReSA staff (2003-2012)



The total number of collaborators that worked at CReSA throughout 2012 (vs 2011) decreased.

Summary of the activity 02

Relevant facts 2012

Research and development

• **7 research projects in ongoing funded by the Ministry of Science and Innovation** as part of the National Plan.

• **Participation in 6 European projects and networks**: 5 projects of the VII European Framework Program and 1 COST action.

• **One research project (Dr Marina Sibila and Dr Joaquim Segalés) was awarded** by the sixth edition of the European PCV2 Research Award sponsored by Boehringer Ingelheim.

• **92 peer reviewed papers (ISI Citation Index) published and 120 communications** at congresses.

• **2 books and 6 book chapters** published.

• Funding from **ongoing competitive projects: €1.269.279**

• **10 doctoral theses** and 10 research studies (Master).

Technology transfer and services

• **62 new contracts with private companies** plus other agreements for a total income of **2,623,738.27€**.

• **8 service contracts for the departments of the Generalitat de Catalunya** involving animal and human health.

• **More than 100 secondary school teachers atended the "1st update workshop for science teachers" organized** by CReSA.

• **1 national conference** (XIV Jornades de Porcí de la UAB), **3 technical seminars for the PATT Plan of the DAAM and 27 technical seminars** organized.

• Two new editions of the **journal for scientific dissemination** were launched (CReSAPIENS).

• **11,238 analyses for the diagnosis of viral notifiable diseases** of swine and ruminants carried out.

• The **PRIOCAT laboratory analyzed 18,602 samples** for the diagnosis of Transmissible Spongiform Encephalopaties in Catalonia.

• The *Servei de Suport a Escorxadors* (SESC) **managed a total of 151 consultations.**

• **346 students from 17 secondary schools** in Catalonia visited the center for education activities.

• **More than 500 subscribers to the CReSADIGITAL** online bulletin.

• **CReSA & the city,** a new blog for the general public was launched.

Economic information

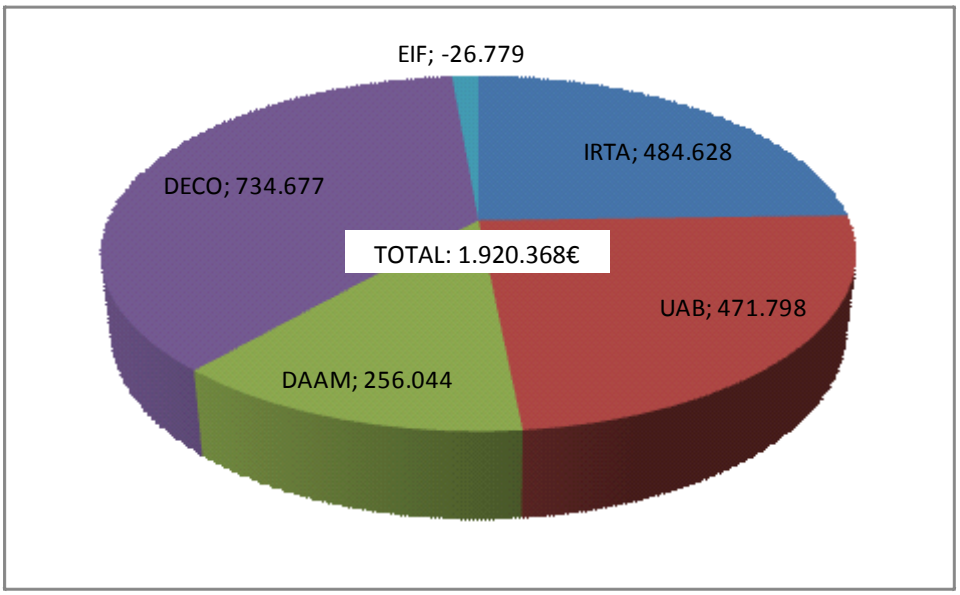
Total income (monetary contribution)

2012 income	Amount	%
Private contracts plus other agreements	2.468.821	42%
Public sources (trustees and competitive funds)	2.984.310	51%
Extraordinary income	55.040	1%
Capital grant (investments)	396.642	7%
Total	**5.904.813**	**100%**

Competitive income

BODY	PROJECTS	SUBVENTIONS FOR STAFF	STAGES	TOTAL
INIA	337.818	0	0	337.818
MINECO	312.925	105.649	13.540	432.114
UE	269.124	0	0	269.124
CARLOS III	27.017	0	0	27.017
AWARD	25.000	0	0	25.000
RECERCAIXA	19.742	0	0	19.742
FECYT	10.000	0	0	10.000
AGAUR	2.931	108.317	0	111.248
MECD	0	37.217	0	37.217
TOTAL	**1.004.557**	**251.183**	**13.540**	**1.269.279**

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, Pesca, 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 2001-2012

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

Summary of peer reviewed papers 2012

PEER REVIEWED	TOTAL	EPIDEM	BACPAR	EXOTIQUES	ENDEMOVIR	OTHER
Number of publications	92	15	27	16	29	5
Average impact index	2,666	2,959	2,103	3,166	2,454	4,472
Publications in Quartile 1	71% (64/90)	93% (14/15)	67% (18/27)	75% (12/16)	61% (17/28)	80% (4/5)

Projects

National Research Plan

Selección de candidatos vacunales para bloquear los pasos iniciales de la infección por *Haemophilus parasuis*
AGL-2010-15232
IP CReSA: Virginia Aragón
Awarded: 2009
Duration: 3 years
Start: 01/01/2011
End: 31/12/2013

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
IP CReSA: Fernando Rodríguez
Awarded: 2009
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
IP CReSA: José Ignacio Núñez
Awarded: 2009
Duration: 3 years
Start: 01/01/2011
End: 31/12/2013

Estudio de los determinantes de la barrera de transmisión en *Oryctolagus, Canus* y *Gallus* mediante modelos de replicación de priones *in vitro* e *in vivo*
AGL2008-05296-C02
IP CReSA: Enric Vidal
Awarded: 2008
Duration: 3 years + extension
End: 31/12/2012

Caracterización de la respuesta inmune inducida por cepas del virus de la gripe porcina circulantes en España. Desarrollo de vacunas basadas en VLPs quiméricas
AGL 2010- 22200-C02-01
IP CReSA: Maria Montoya
Awarded: 2009
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
IP CReSA: Alberto Allepuz
Awarded: 2009
Duration: 3 years
Start: 01/01/2011
End: 31/12/2013

Neosporosis bovina: interaciones materno-fetal y mecanismos asociados con la proteccion frente al aborto en gestaciones de razas cruzadas en condiciones experimentales
AGL2012-39830-C02-02
IP CReSA: Sonia Almería
Awarded: 2012
Duration: 3 years
Start:01/02/2013
End: 31/01/2016

Evaluacion de consumos de antimicrobianos como factores de riesgo relacionados con la aparicion de resistencia a cefalosporinas en animales destinados al consumo
AGL2011-28836
IP: Lourdes Migura
Awarded: 2011
Duration: 3 years
Start: 01/01/2011
End: 31/12/2013

Estudios de inmunopatogenicidad frente al virus de la peste procina clasica (VPPC): Implicaciones para el desarrollo de nuevas vacunas y herramientas diagnosticas
AGL2012-38343
IP CReSA: Llilianne Ganges
Awarded: 2012
Duration: 3 years
Start:01/02/2013
End: 31/01/2016

MINISTERIO DE CIENCIA E INNOVACIÓN

Most of the research projects in course at the CReSA during 2011 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
IP CReSA: Marta Cerdà
Start: 01/01/2010
Duration: 4 years

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
IP CReSA: Nonito Pagès
Start: 01/01/2011
Duration: 4 years

The Network of Animal Infectiology Facilities (NADIR)
FP7-INFRASTRUCTURES-2008-1, 228394
IP CReSA: Albert Bensaid
Start: 1/05/2009
Duration: 4 years

Porcine reproductive and respiratory syndrome (PRRS): new generation, efficient and safe vaccine, new control strategies (Porrscon)
FP7-KBBE-2009-3-245141
IP CReSA: Enric Mateu
Contract Type: Small or medium-scale focused research project.
Start: 01/05/2010
Duration: 4 years

New tools and approaches to control Porcine Reproductive and Respiratory Syndrome (PRRS) in the EU and Asia
FP7-KBBE-2009-3-PoRRS
IP CReSA: Enric Mateu
Start: 01/01/2010
Duration: 4 years + 6 months

CReSA participated in 5 7FP projects of the European Union in 2012.

COST Actions

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

COST EuroPRRSnet
IP CReSA: Enric Mateu
Awarded: 2009

CReSA participated in 1 COST action, allowing the European collaboration in Science and technology.

Recercaixa

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

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

SGR Research Groups

Immunologia veterinària
SGR2009-EM042412 (funded)
IP: Enric Mateu

Patogènia d'infeccions víriques
SGR2009-JS042702 (funded)
IP: Joaquim Segalés

Patogènia d'infeccions bacterianes
SGR 2009-VA042377 (non-funded)
IP: Virginia Aragón

Factors affecting fertility and gestation maintenance in dairy cattle
SGR 816
IP (UdL): Fernando López-Gatius
IP CReSA: Sonia Almería

INIA projects

Epidemiologia de *Salmonella* y *Campylobacter* en granjas avícolas de cría al aire libre en relación con la proximidad de colonias de gaviotas
FAU2008-00012-C02-01
IP CReSA: Marta Cerdà
Awarded: 2008
Duration: 3 years + extention
End: 14/12/2012

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
End: 19/10/2012

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
IP CReSA: Ayub Darji
Awarded: 2010
Duration: 3 years
End: 14/12/2013

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
IP CReSA: Ignacio Badiola
Awarded: 2010
Duration: 3 years
End 02/12/2013

Dinámica viral en diferentes especies aviares: mecanismos moleculares de transmisión y patogenicidad
RTA 2011-00111-C03-01
IP CReSA: Natàlia Majó
Awarded: 2011
Duration: 3 years

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
IP: Enric Mateu
Awarded: 2011
Duration: 3 years

Projects of the ISCIII

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

ISCIII special call for pandemic H1N1:

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

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

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

Other projects

Divulgació de la recerca en sanitat animal que es fa a Catalunya
2012ACDC00143
IP CReSA: Elisabet Rodríguez
Awarded: 2012
Duration: 2 months
End:31/01/2013

II Jornades sobre zoonosis i malalties emergents. Malalties virals transmeses per mosquits
2012 ARCS00331
IP CReSA: Fernando Rodríguez
Awarded: 2012
Duration: 7 months
End:24/05/2013

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

ARTROPOVIR-SANCO-SCHMALLENBERG VIRUS-NP
2012/349/EU 2.2b
IP CReSA: Nonito Pagès
Duration: 1 year
End: 31/03/2013

CReSA partipates in projects coordinated with other institutions; and also in projects of transfer of technology and knowledge.

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
IP CReSA: Anna Alba, Núria Busquets

Vigilància d'influença aviaria i malaltia de Newcastle en aus silvestres a Catalunya
CReSA 13030
IP CReSA: Anna Alba, Núria Busquets

Assessorament en el control de tuberculosi en el boví i el cabrum
CReSA 13011
IP CReSA: Bernat Pérez

Vigilància entomològica de la Llengua Blava
CReSA 13016
IP CReSA: Nitu Pagès

Prestació de Serveis d'and'anàlisis virològics
CReSA 13032
IP CReSA: Rosa Rosell

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

Plans d'emergència
CReSA 08009
IP CReSA: Anna Alba

Acreditació ENAC
CReSA 09016
IP CReSA: Montserrat Ordóñez

In 2012, CReSA executed 8 differents 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.

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.

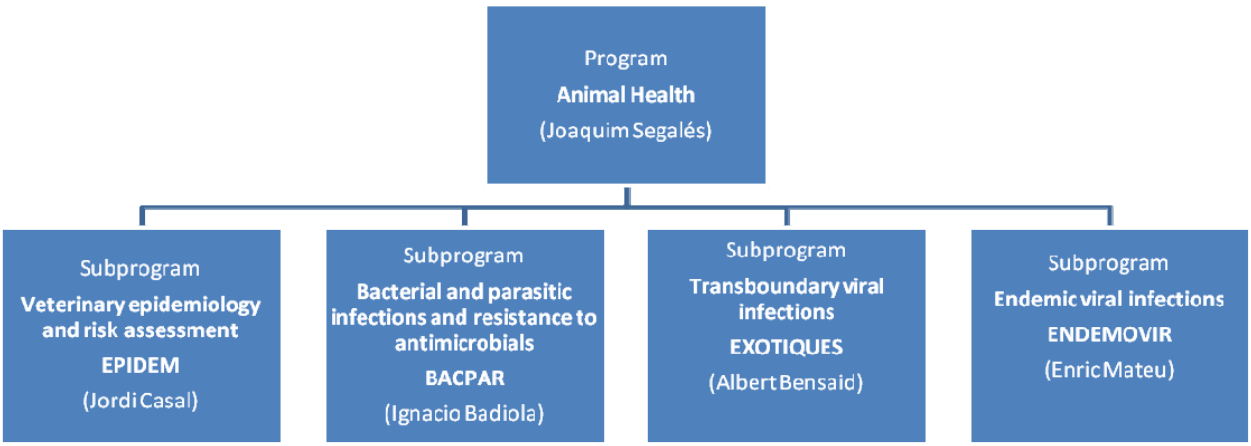
The Cooperative Agro-Alimentary Research System of Catalonia is structured around five large areas: Vegetal Production, Global Change and Environment, Alimentary Enterprises, Agro-Alimentary Economy and Animal Production.

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.



EPIDEM subprogram

Veterinary epidemiology and risk assessment

Coordinator: Jordi Casal Fàbrega
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 control 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 animal 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.

Researchers
Jordi Casal Fàbrega
Anna Alba Casals
Alberto Allepuz Palau
Pelayo Acevedo García
Sebastián Napp Avelli

PhD students
Ariadna García Sáenz
Gerard Martín Valls
Sintayehu Guta Debela

Researchers and PhD students of the EPIDEM research line.

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

IP CReSA: Alberto Allepuz

During this year of the project we applied a Bayesian spatio-temporal Poisson model to Bovine tuberculosis (bTB) data aggregated at county level, in order to analyze the space-time evolution of the bTB eradication campaign in Spain between 2006 and 2011. The results of the model showed that the risk of a herd being infected was higher in counties located in central and southern Spain. There were no significant changes in the risk of infection between years in Spain as a whole, but at county level, significant variations of the risk were detected. A high number of movements from counties with an incidence higher than 1% or the presence of bullfighting herds in the county increased the risk of infection.

We also studied the most likely source of Bovine Tuberculosis (bTB) infection in herd breakdowns occurred in northeastern Spain. A decision tree was developed for each of the potential sources of infection, and the likelihood of that source was evaluated using a qualitative approach in which different risk categories were considered. Between 2010 and 2011, 27 cattle herds were confirmed as bTB new positive farms. The analysis identified a probable source of infection in 15 farms; interaction at common pastures in 8 of them, residual infection in 5 and two cases linked to the introduction of an infected animal. In the other 12 outbreaks only possible sources of infection were identified, in the majority of cases linked to sharing of pastures or interaction with wildlife reservoirs. No cases were related to the presence of goats at farm, neighborhood infection, human contact, or remained unknown. The developed method is being applied to breakdowns occurred in other parts of Spain.

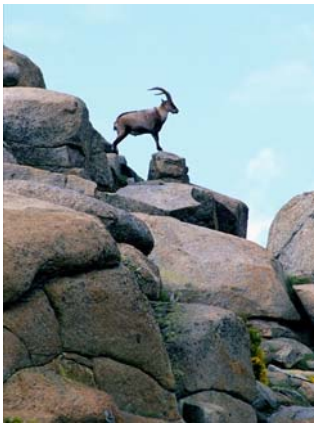
Epidemiology of bluetongue in Spain

Epidemiologia, control i aspectes entomològics de la llengua blava (VLA) en remugants a Espanya

IP CReSA: Jordi Casal

The objectives of the project are: 1) to determine the level of relation between the domestic and wild cycles of Bluetongue virus (BTV) infection in Spain; 2) to evaluate the efficiency of inactivated commercial vaccines on different species of wild ungulate: red deer, mouflon, fallow deer and wild goat; 3) to determine the pathogenesis of BTV-1 and BTV-8 infection on different species of wild ungulate: red deer, mouflon, and wild goat; 4) to develop and validate sensitive, specific and economic diagnosis methods for the study of the seroprevalence against BTV in will ruminants in Spain; 5) to establish the general lines for producing an integral programme against BTV in wild ungulate populations in Spain. 6) to make a seroepidemiologic study of epizootic hemorrhagic disease in the population of wild ruminants in Spain (in order to disprove its existence) and determine the risk of epizootic hemorrhagic disease and exotic serotypes of bluetongue being introduced to Spain from Morocco.

In this second year, culicoides have been captured in the different study zones, blood and spleen samples have been taken from wild animals and experimental infections have been made using serotypes 1 to 8 in wild goats.



EPIDEM subprogram

Publications

Peer reviewed papers (ISI Citation Index)

Acevedo P, Melo-Ferreira J, Real R, Alves PC. Past, Present and Future Distributions of an Iberian Endemic, Lepus granatensis: Ecological and Evolutionary Clues from Species Distribution Models. PLoS One. 2012;7 (12):e51529.

Acevedo P, Real R. Favourability: concept, distinctive characteristics and potential usefulness. Naturwissenschaften. 2012 Jul;99(7):515-22.

Alba A, Bicout DJ, Vidal F, Curcó A, Allepuz A, Napp S, García-Bocanegra I, Costa T, Casal J. Model to track wild birds for avian influenza by means of population dynamics and surveillance information. PLoS One. 2012;7 (8):e44354.

Allepuz A, Gabriël S, Dorny P, Napp S, Jansen F, Vilar MJ, Vives L, Picart L, Ortuño A, Gutiérrez J, Casal J. Comparison of bovine cysticercosis prevalence detected by antigen ELISA and visual inspection in the North East of Spain. Res Vet Sci. 2012 Jun;92(3):393-5.

Alonso-Padilla J., Pignatelli J, Simon-Grifé M., Plazuelo S., Casal J., Rodríguez D. Seroprevalence of Porcine torovirus (PToV) in Spanish farms. BMC Research Notes 2012, 5:675.

García-Bocanegra I, Arenas-Montes A, Jaén-Téllez JA, Napp S, Fernández-Morente M, Arenas A. Use of sentinel serosurveillance of mules and donkeys in the monitoring of West Nile virus infection. Vet J. 2012 Nov;194(2):262-4.

García-Bocanegra I, Arenas-Montes A, Napp S, Jaén-Téllez JA, Fernández-Morente M, Fernández-Molera V, Arenas A. Seroprevalence and risk factors associated to West Nile virus in horses from Andalusia, Southern Spain. Vet Microbiol. 2012 Dec 7;160(3-4):341-6.

García-Bocanegra I, Cabezón O, Arenas-Montes A, Carbonero A, Dubey JP, Perea A, Almería S. Seroprevalence of Toxoplasma gondii in equids from Southern Spain. Parasitol Int. 2012 Sep;61(3):421-4.

García-Bocanegra I, Cabezón O, Pabón M, Gómez-Guillamón F, Arenas A, Alcaide E, Salas-Vega R, Dubey JP, Almería S. Prevalence of Toxoplasma gondii and Neospora caninum antibodies in Spanish ibex (Capra pyrenaica hispanica). Vet J. 2012 Feb;191(2):257-60.

García-Bocanegra I, Jaén-Téllez JA, Napp S, Arenas-Montes A, Fernández-Morente M, Fernández-Molera V, Arenas A. Monitoring of the West Nile virus epidemic in Spain between 2010 and 2011. Transbound Emerg Dis. 2012 Oct;59 (5):448-55.

García-Bocanegra I, Pérez de Val B, Arenas-Montes A, Paniagua J, Boadella M, Gortázar C, Arenas A. Seroprevalence and risk factors associated to Mycobacterium bovis in wild artiodactyl species from southern Spain, 2006-2010. PLoS One. 2012;7(4):e34908.

Lorca-Oró C, López-Olvera JR, Fernández-Sirera L, Solanes D, Navarro N, García-Bocanegra I, Lavín S, Domingo M, Pujols J. Evaluation of the efficacy of commercial vaccines against bluetongue virus serotypes 1 and 8 in experimentally infected red deer (Cervus elaphus). Vet Microbiol. 2012 Jan 27;154(3-4):240-6.

Pérez-Ramírez E, Acevedo P, Allepuz A, Gerrikagoitia X, Alba A, Busquets N, Díaz-Sánchez S, Álvarez V, Abad FX, Barral M, Majó N, Höfle U. Ecological factors driving avian influenza virus dynamics in Spanish wetland ecosystems. PLoS One. 2012;7 (11):e46418.

Rodríguez-Prieto V, Martínez-López B, Barasona JA, Acevedo P, Romero B, Rodriguez-Campos S, Gortázar C, Sánchez-Vizcaíno JM, Vicente J. A Bayesian approach to study the risk variables for tuberculosis occurrence in domestic and wild ungulates in South Central Spain. BMC Vet Res. 2012 Aug 30;8:148.

Simon-Grifé M, Martín-Valls GE, Vilar MJ, Busquets N, Mora-Salvatierra M, Bestebroer TM, Fouchier RA, Martín M, Mateu E, Casal J. Swine influenza virus infection dynamics in two pig farms; results of a longitudinal assessment. Vet Res. 2012 Mar 27;43(1):24.

BACPAR subprogram

Bacterial and parasitic infections and resistance to antimicrobians

Coordinator: Ignacio Badiola Sáiz
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 domestic 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)

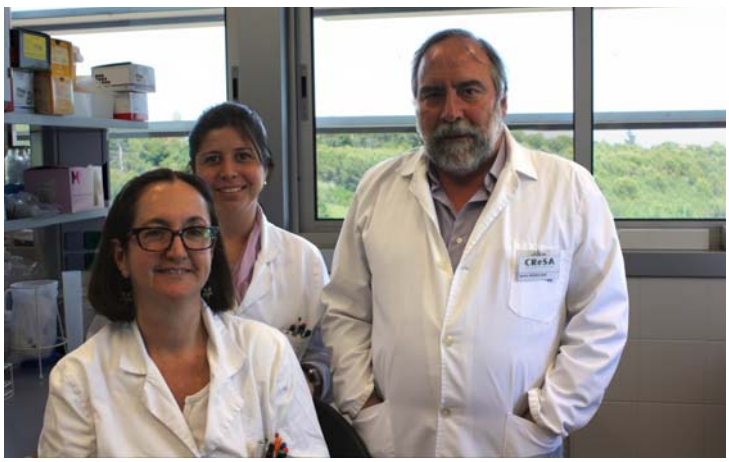
Coordinator

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 microbiota 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.

Researchers
Ignacio Badiola Sáiz
Ana Pérez de Rozas Ruiz de Gauna

Laboratory technicians
Núria Aloy Escudero
Judit González Oliver



Researchers and PhD student of the BACTEDIGES research line.

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.

Researchers
Virginia Aragón Fernández
Albert Bensaid
Marina Sibila Vidal

Laboratory technicians
Nuria Galofré Milà
Eva Huerta Medina

PhD students
Bernardo Bello Orti
Mar Costa Hurtado
Paula Manrique Ramírez

Researchers, technicians and PhD students of the BACTERESP research line.

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 neosporis 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
Sonia Almería de la Merced

Researcher of the ENDOPAR research line.

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 domestic or 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. 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 one side, on the two most important zoonotic bacteria which cause acute bacterial enteritis in humans: *Campylobacter* and *Salmonella*. Since the main suspected food borne source of these infections is poultry meat, some of the ongoing projects are focused on the avian reservoirs. Also, in Spain very few research has focused on wild animals as reservoirs of these entheropathogens. 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.

Researchers
Marta Cerdà Cuéllar
Bernat Pérez de Val
Lourdes Migura García

Laboratory technicians
Teresa Ayats Murillo
Maite Martín Fernández

PhD students
Noelia Antillés Silva
Karla Cameron
Saulo Urdaneta Vargas

Researchers, technicians and PhD students of the BACTEZOON research line.

Main results

Vaccine candidates against *Haemophilus parasuis*

Selección de candidatos vacunales para bloquear los pasos iniciales de la infección por *Haemophilus parasuis*
IP CReSA: 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 between the infection by virulent and non-virulent strains, we performed an experimental infection and studied the bacterial localization and the effect of the infection in the lung macrophages at different times. We observed wide colonization of the trachea by virulent strains, while non-virulent strains were scarcely seen at this location. Besides, non-virulent strains did not reach the lung in high numbers (probably because they are eliminated by the alveolar macrophages), while the virulent strains, after an early localization in the bronchial lumen, could be seen inside macrophages and pneumocytes. This latter localization could constitute a virulence mechanism, since it would allow avoiding the immune system and guarantee bacterial spread. In addition, the analysis of macrophage surface markers indicated that virulent strains of *H. parasuis* produced an initial repression of the activation of alveolar macrophages, which allowed bacterial multiplication and further invasion to produce disease. The systemic spread of virulent strains was accompanied by high levels of the pro-inflammatory chemokine IL-8 and soluble CD163 in serum. On the bacterial side, we identified two proteins, VtaA8 and VtaA9, from the autotransporter family, which are involved in phagocytosis resistance. These two proteins are surface exposed and are good vaccine candidates, since we demonstrated that antibodies against them can opsonize the bacteria and make them susceptible to killing by macrophages.

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

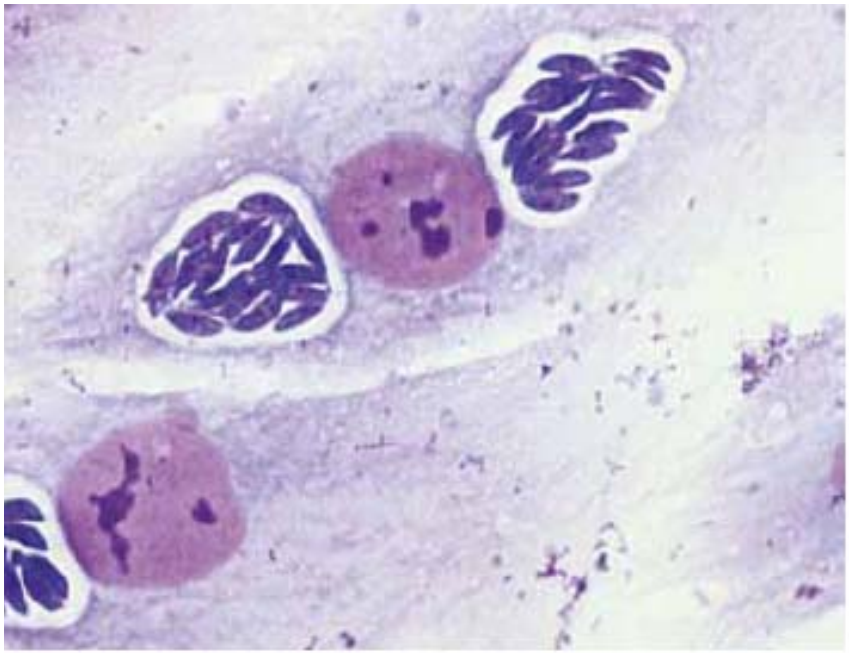
Impact of the use of ceftiofur on the emergence of *Escherichia coli* resistant to cephalosporins in a pig farm
IP CReSA: Lourdes Migura

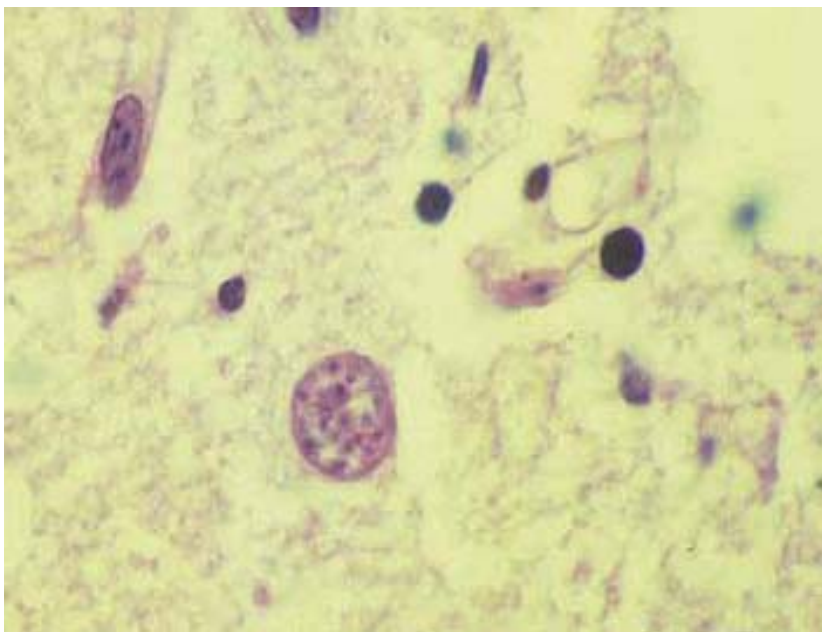
The use of ceftiofur is licensed for treatment of systemic bacterial infections in pig production. The worrisome of cephalosporin resistant (CR) *Escherichia coli* entering the food chain have raised the debate on the use of 3-4th generation cephalosporins for animal husbandry. To evaluate if the treatment with ceftiofur is a risk factor for the emergence of CR *E. coli* during the rearing period. A total of 100 seven-day old piglets were divided in two groups; control (n=50) and parenterally treated (n=50) with ceftiofur (Naxcel®, Pfizer). Faecal swabs (n=588) were taken from piglets in six occasions; before treatment and at days 2, 7, 14, 21 and 42 post-treatment. A final sampling was performed at slaughter time. Samples were plated in MacConkey agar with ceftriaxone (1mg/ml). A total of 12 (4.1%) and 23 (8%) CR *E. coli* were isolated from the control (n=288) and the treated group (n=300), respectively. The difference in the proportion of CR *E. coli* recovered in the two groups was statistically significant (p=0.04). The highest percentage of samples positive for CR *E. coli* was obtained 48 hours post-treatment within the treated group (26%), difference also statistically significant (p=0.03) when compared to the control group (10%). By the finishing time, all samples were negative for CR *E. coli*. During the course of the treatment a significant increase in the proportions of CR *E. coli* was detected. Results suggest that the treatment with ceftiofur did not pose enough selective pressure to select for long-term resistant organisms.

Immune reponses against Neosporoses

Neosporosis bovina: interacciones materno-fetal y mecanismos asociados con la protección frente al aborto en gestaciones de razas cruzadas en condiciones experimentales
IP CReSA: Sonia Almería

Bovine neosporosis is a protozoan parasitic disease that is now recognized as a major cause of abortion and congenital infection in cattle worldwide. In Spain, previous studies have shown a high incidence of *N. caninum* -associated abortions in high -producing dairy cows, including our area, in northeast Spain. The pathogenesis of bovine abortion associated to *N. caninum* infection is still not well understood. For abortion to occur, the fetus or its placenta has to be so damaged that it is no longer viable. The fetal and placental damage may occur due to primary tissue damage caused by the multiplication of *N. caninum*, to the maternal immune response related to the release of proinflamatory cytokines Th1, particularly IFN-γ, at the placenta or a combination of all. In previous studies, we have demonstrated that the use of beef bull semen, not only reduces the seroprevalence of infection in the herds, reposition with those animals will not remain in the herd, but more importantly, it reduces the risk of abortion in *N. caninum*-seropositive dairy cows, especially if Limousin breed semen is used. The main objective of the project will be to characterize mechanisms associated to the different risk of *Neospora*-associated abortion for purebreed and cross-breed pregnancies. Injury, parasitic, endocrine and immune aspects of the disease will be evaluated, either under field (Sub-project 1-UdL) or experimental conditions (Subproject 2- CReSA).





Epidemiology of *Salmonella* and *Campylobacter* in wild and domestic birds

Epidemiologia de Salmonella y *Campylobacter* en granjas avícolas de cría al aire libre en relación con la proximidad de colonias de gaviotas
IP CReSA: Marta Cerdà

There is a lack of knowledge on the role of outdoor farming systems, such as free-range and backyard poultry, as reservoirs and transmitters of *Salmonella* spp. and *Campylobacter spp*., as well as antimicrobial resistances.

On the other hand, among wild birds, seagulls have the greatest potential to transmit enteric infections due to their large numbers and their feeding habits. However, in Spain the role of these birds (wild and domestic) in the transmission of zoonotic bacteria and the spread of antimicrobial resistance is unknown. Therefore, this project aims to study the prevalence, antimicrobial resistance and subtype distribution of *Salmonella* and *Campylobacter* in both outdoor farming systems and wild birds, particularly seagulls.

A three year sampling of seagull colonies and of poultry farms (both backyard and free-range) has been performed. Seagull colonies sampled included those in the Medes Islands, Ebro Delta, Columbretes Islands, Ons Island, Dragonera Island and the Canary Islands for Yellow legged gull (*Larus michahellis*); Ebro Delta and Alboran Island for Audouin's gull (*Larus audouinii*). Both *Salmonella* and *Campylobacter* have been isolated from both seagull species. Strain diversity and distribution has been studied during this year. High strain diversity has been found for both *Salmonella* and *Campylobacter* isolates, as well as a high diversity of Salmonella serotypes.

Improving *Campylobacter* control in poultry

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

IP 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. The need to reduce levels of *Campylobacter* in broilers is recognized by the European Food Safety Authority (EFSA), since intervention during primary production is likely to be the most cost-effective way of controlling this important public health problem.

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.

Therefore, the objectives of this project include, among others: (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 is being collected. Sampling will finish on autumn 2013. Over 255 flocks have already been analyzed and a high prevalence (around 80%) has been found. To identify risk factors for flock colonization a questionnaire has been prepared for these 20 farms. (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. The study is ongoing with 18 months sampling concluded. (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 from April to November through 2011 and 2012.

Epidemiology of *Campylobacter* in poultry

Epidemiología de *Campylobacter* en granjas de pollos de engorde en España: prevalencia, subtipos existentes, factores de riesgo y dinámica de la infección en granjas

IP CReSA: Marta Cerdà

Campylobacteriosis has become the most common cause of acute bacterial enteritis in many European countries and the main suspected food borne source is poultry meat. There is a need to design effective intervention strategies in conventional broiler production, to reduce levels of *Campylobacter spp* at farm, which should be based on a better understanding of the epidemiology of Campylobacter in broilers.

A study has been conducted to determine *Campylobacter* prevalence and associated risk factors in broilers on a national level. A stratified sampling by regions according to the number of broiler holdings has been performed. Caecal and carcass samples from 107 flocks has been obtained and Campylobacter prevalence and contamination levels have been determined. Also, the infection dynamics in flocks from two farms have been examined during one year. Flocks have become colonized at varying time points. The earliest a flock became positive was at 14 days of age, while the latest was at 39 days.

BACPAR subprogram

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EXOTIQUES subprogram

Transboundary viral infections

Coordinator: Albert Bensaid
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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 repercussions 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 mosquitoes 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 (FP6, 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 authochtonous and recently introduced exotic arthropods pose a threat to transmission of arbovirus that are likely to be introduced in our country.

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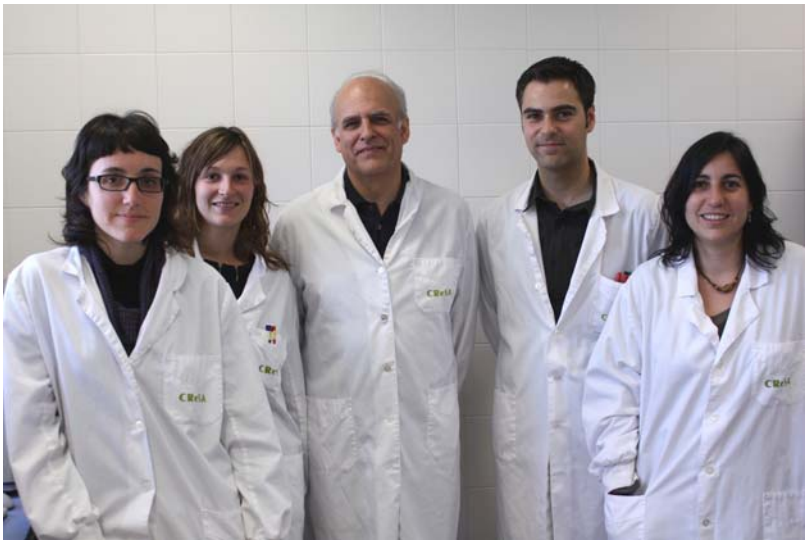


Researchers and PhD students of the ARTROPOVIR research line.

PATHOGENESIS AND PROFYLAXIS OF ASFAVIRUS INFECTIONS (ASFAVIRUS)

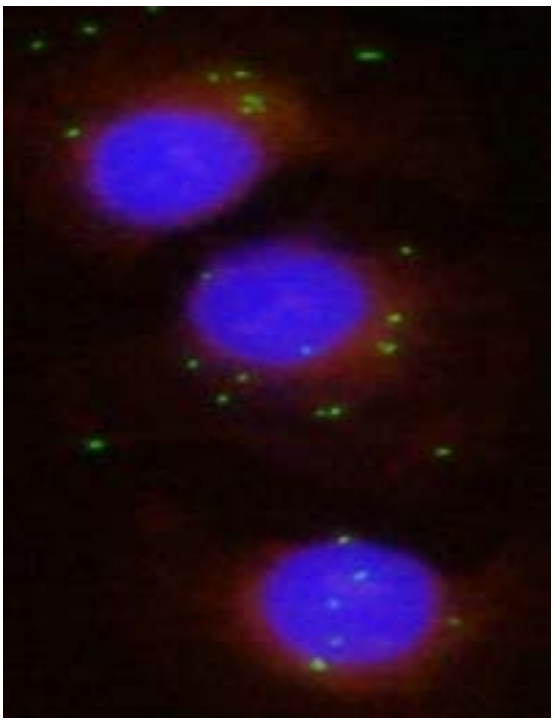
Coordinator

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.



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PATHOGENESIS AND PROFILAXIS OF PESTIVIRUS INFECTIONS (PESTIVIRUS)

Coordinator
Llilianne 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). 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 foscused 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.

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PATHOGENESIS, DIAGNOSIS, EPIDEMIOLOGY AND CONTROL OF AVIAN VIRAL INFECTIONS (VIRUSAVIAR)

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 AIV 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 monitorization of the major viral diseases affecting flocks.

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EXOTIQUES subprogram

Publications

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Main results

Biology and control of vector borne infection in Europe

Biology and control of vector borne infection in Europe (EDENext)
IP CReSA: Nonito Pagès

The Project seeks 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. The Project has selected the main groups of arthropod vectors involved in the transmission of vector-borne diseases in Europe: ticks, mosquitoes, sandflies, and biting midges (Culicoides).
The consequences triggered by VBD for human and veterinary public health in Europe are just starting to emerge in public awareness. 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.
CReSA is involved in the group dealing with Culicoides Borne Diseases (CBD) which involves two specific workpackages. These work packages carry out an integrated assessment of several aspects of Culicoides vector capacity across different countries. It involves studies of potential introduction routes of Orbiviruses, examination of vector susceptibility to infection with Orbiviruses in the laboratory and field examination of behavioural patterns that may influence both their role as vectors and our ability to define control and monitoring techniques. This understanding will be integrated into the development of models for predicting the likelihood that Orbiviruses will establish in different zones and times within Europe and also to develop frameworks within which the quantitative impacts of vector control strategies on midge demography or spread of disease.

Schmallenberg virus in Europe

Implicating vectors of Schmallenberg virus in Europe
IP 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 vector group. Moreover, in areas where the disease has been declared a retrospective and contemporary screening will be performed to detect which 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.
The project aims to evaluate the role of potential vector groups in the transmission of SBV. Through a series of field and laboratory-based studies we will elucidate the epidemiological role played by different vector species by assessing their infection, dissemination and potential transmission rates of SBV across a wide geographic region. Where potential vectors are successfully identified, the potential for vertical transmission will also be assessed.

Mosquitos and new Emerging diseases in Catalonia

Are autochthonous mosquitoes and the tiger mosquito able to transmit new emerging diseases in Catalonia? The case of Chikungunya and West Nile Fever

IP CReSA: Nonito Pagès

An increasing incidence of emergent diseases transmitted by mosquitoes is ongoing in several developed countries. In particular, the European Union has already suffered several outbreaks and epidemics of two diseases that are the study issue of the requested research project: West Nile disease (WND) and Chikungunya (CHIK).

The project expects to achieve three specific objectives. The first one is to perform a study in order to determine genetic variability and population structure of the Catalan populations of Cx. pipiens mosquitoes (potential vector for WND) and Ae. albopictus (potential vector for CHIK).

The second objective is to perform insecticide bioassay tests to determine the resistance of mosquito populations from Catalonia towards different insecticide products. Therefore it will be possible to know if insecticide resistance could be associated to particular populations and genetic strains and have a previous knowledge about the most appropriate insecticide product to use to fight against a mosquito population from a particular area in case of outbreak. The third objective is to perform vector competence studies with West Nile Virus (WNV) and Chikungunya virus (CHIKV) using Catalan mosquito populations (Cx. pipiens and Ae. albopictus) under Biosafety Level 3 measures (BSL3).

Mosquitos, dengue and Chikungunya

Dengue and Chikungunya in Europe and other viral diseases transmitted by vectors and their reservoir

IP CReSA: Nonito Pagès

The project aim is to generate the knowledge and tools to improve the preparedness of Spain and other countries towards the eventual reintroduction of Dengue and Chikungunya diseases in Europe.

The project is split into two projects (virus-human interactions and virus-vector interactions). Virus-human interactions project is carried out in the Instituto de Salud Carlos III (Madrid). Virus-vector interactions project is carried out in CReSA where an Aedes albopictus colony has been reared for vector competence studies with two strains of Chikungunya virus.

The preliminary results obtained from the first pilot test have showed differences between both strains. The viral strain with A226V mutation had a higher infection rate than the Chikungunya wildtype strain.

This vector competence assay has been the first one performed at CReSA with a virus requiring biosecurity level 3 measures and Culicids mosquitoes, and has allowed the standardization of the procedures for next experiments which will simulate different scenarios of viraemia and climatic conditions.

Classical swine fever virus: new vaccines and diagnostic tools

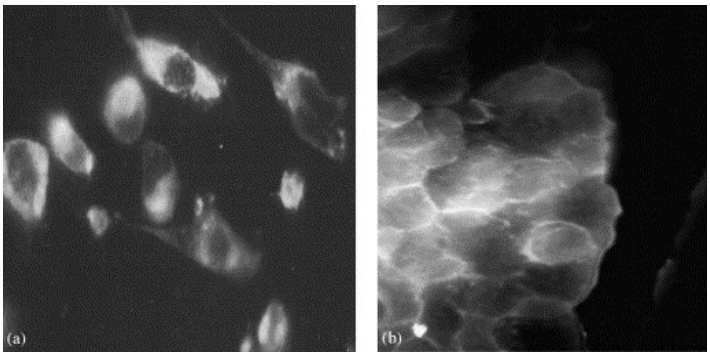
Estudios de inmunopatogenicidad frente al virus de la peste procina clasica (VPPC): Implicaciones para el desarrollo de nuevas vacunas y herramientas diagnosticas

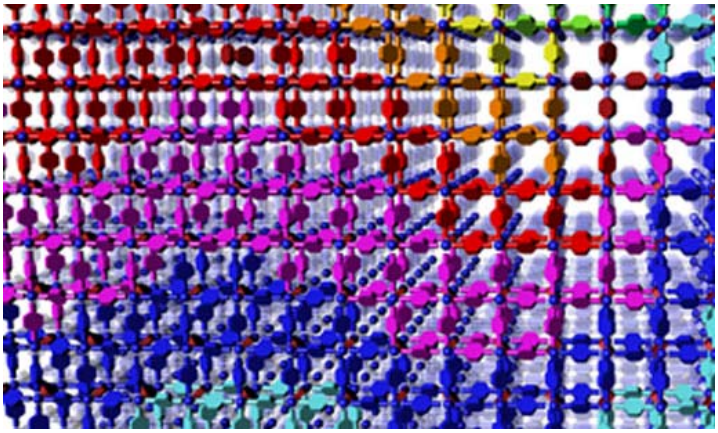
IP CReSA: Llilianne Ganges

The main results of the Pestivirus's line in 2012 within the finalized project BIO2008-04487-C03-03 from the Spanish Government include:

(i) The identification of a new epitope (T "helper") in the non-structural protein NS3 of Classical swine fever virus (CSFV), using dendrimeric peptides. The dendrimeric construction containing this epitope, induces a potent T cells and antibodies response in domestic pigs against CSFV. Furthermore it has been shown that these dendrimer structures are good candidates for the detection of CSFV antibodies by ELISA. These results have been part of two doctoral theses and have been conducted in collaboration with the group of Dr David Andreu, Universitat Pompeu Fabra in Barcelona, and Dr Francisco Sobrino from Centro de Biología Molecular Severo Ochoa (CBMSO)-CSIC in Madrid. More information in: A T-cell epitope on NS3 non-structural protein enhances the B and T cell responses elicited by dendrimeric constructions against CSFV in domestic pigs. Tarradas J, Monsó M, Fraile L, de la Torre BG, Muñoz M, Rosell R, Riquelme C, Pérez LJ, Nofrarías M, Domingo M, Sobrino F, Andreu D, Ganges L. Vet Immunol Immunopathol. 2012, 150:36-46.

(ii) The studies to assess positive selection pressure acting on partial E2 gene of CSF viruses to gain insights into the mechanisms governing virulence and the driving forces of classical swine fever virus (CSFV) evolution in swine populations under regular vaccination. Selection pressure analysis were performed to detect positive selection acting on a particular lineage as well as among sites of the E2-B/C-domain of CSFV nucleotide sequences, reported in a previous study and in the present work. The positive selective pressure analysis estimated six new sites under positive selection on E2 partial gene analysed. Besides, the clinical manifestations of the CSF-disease were related mainly to a mild course of the illness. The high number of positively selected sites suggests that these changes could be associated to viral evasion of the host-immune response. These observations highlight a possible association between escape viral variants and the alterations observed in the virulence and pathogenesis of the virus. Therefore, while the vaccination programs have not led to a genotype change, alterations in virulence were suggested to arise. These studies have been conducted in collaboration with the National Agricultural Health Center in Havana, (CENSA) Cuba (CSFV endemic country). More information in: Positive selection pressure on the B/C domains of the E2-gene of classical swine fever virus in endemic areas under C-strain vaccination. Pérez LJ, Díaz de Arce H, Perera CL, Rosell R, Frías MT, Percedo MI, Tarradas J, Dominguez P, Núñez JI, Ganges L. Infect Genet Evol. 2012, 12:1405-12.





Avian influenza: pathogen, host and ecosystem

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

IP CReSA: 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 AI 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
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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 PVC2 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.

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Researchers and PhD students of the SSDNAVIRUS research line.

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 agsint this virus. The long-term objective is to gain knowledge for the rationale development of new and better vaccines against PRRSV.

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ROLE OF MICRO-RNAS ON VIRAL INFECTIONS OF PIGS (MICRO-RNA)

Coordinator

José Ignacio Núñez Garrote

This research line is in collaboration with The Animal Genetics Department in CRAG (UAB). miRNAs are a group of small (~18–25 nt) non-coding RNAs regulating gene expression at post-transcriptional level through messenger RNA (mRNA) degradation or translation inhibition of target genes. These small non-coding RNAs can also contribute to the repertoire of host-pathogen interactions during viral infection. miRNAs play a central role in several viral infections and in their pathogenesis including the regulation of both viral and host gene expression by DNA virus encoded miRNAs, and the regulation of viral gene expression by host encoded miRNAs. The aims of this line are the molecular characterization of new miRNA encoded by swine viral pathogens and by the porcine genome during infection. The specific objectives are to determine the identity, abundance and functionality of microRNA genes expressed in different diseases. 1) In vitro and in vivo control and challenged samples with Aujeszky's disease virus (ADV); porcine circovirus type 2 (PCV2), and African swine fever virus (ASFV). 2) Field porcine samples infected with PCV2. Altogether will insight into the understanding of both the host-pathogen interactions and the viral tropism or latency, allowing developing novel biomarkers and therapeutics.

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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.

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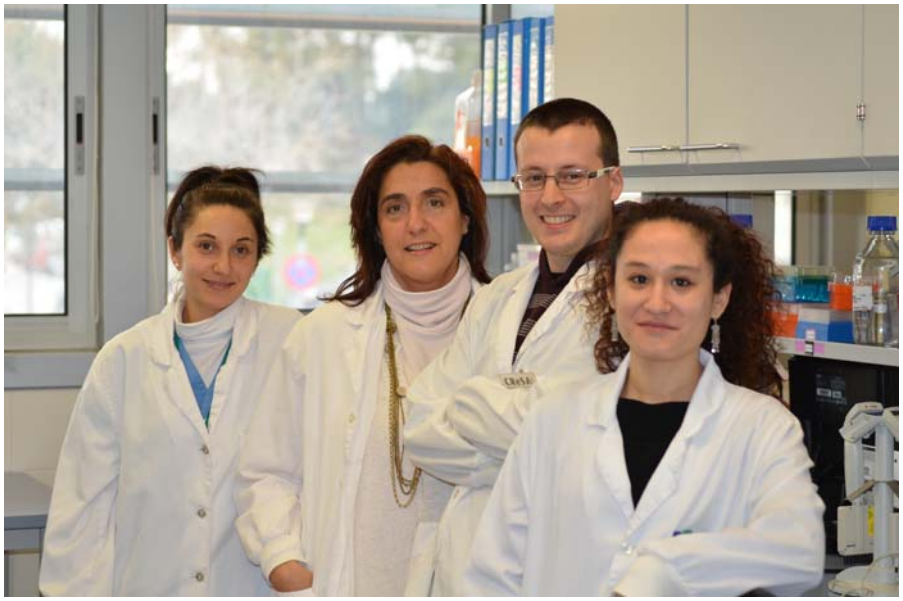


Researchers, technicians and PhD students of the INFLUPORCIN esearch line.

Main results

Development of vaccines against PRRS

Porcine reproductive and respiratory syndrome (PRRS): new generation, efficient and safe vaccine, new control strategies (PoRRSCon)
IP CReSA: Enric Mateu

Porcine reproductive and respiratory syndrome virus (PRRSV) is the major cause of reproductive and respiratory problems in pigs worldwide. Controlling this disease is a top priority in pig producing countries. Due to mutations at a high frequency, new variants of the virus appear that are no longer effectively controlled by the commercial vaccines. In addition, highly virulent variants emerge, leading to high losses. With regard to animal welfare and agricultural economics, there is an urgent need to control PRRS. Furthermore, the abusive use of antibiotics to control PRRSV-associated respiratory problems may lead to resistance that may endanger public health.
PoRRSCon is an initiative of 14 partners originating from Europe and Asia with strong expertise in virology and immunology. They are doing frontline research on PRRSV and/or vaccine development. Two of these partners are leading European pharmaceutical companies that will guide the consortium in the direction of exploitable results. By joining their strengths, they have an ideal position to be successful in one of the most difficult challenges in pig health, controlling PRRS.
To reach this final goal, the following objectives are forwarded:
- characterize genetically and antigenically current PRRSV isolates in Europe and Asia
- have a better understanding of the complex pathogenesis of PRRSV infections, immune response against PRRSV and immune modulation by PRRSV
- define the genetic base of PRRSV virulence
- identify PRRSV proteins and domains on these viral proteins that are involved in the induction of the immunity against PRRSV and in the immune modulation of PRRSV
- develop new generation, efficacious and safe marker vaccines that can be adapted to temporary changes and geographical differences
- develop DIVA assays that allow to differentiate infected from vaccinated animals.
At the end, it will be possible to set up a control strategy by combining marker vaccines with DIVA assays.

Study of viral microRNA in pigs

Identificación y caracterización de microRNAs víricos que afectan al porcino
IP CReSA: 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) exhert 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.

Immunological studies of swine influenza virus

Caracterización de la respuesta inmune inducida por cepas del virus de la gripe porcina circulantes en España. Desarrollo de vacunas basadas en VLPs quiméricas
IP CReSA: 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 two years ago. 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. For example, no antigenic epitopes have been defined for SIV in the porcine model.

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). In the past years new antigens have been described (synthetic peptides and recombinant proteins) which are potentially protective against different livestock relevant pathogens. However, although these antigens may provide an efficient protection in some cases, it is widely accepted that these kind of antigens are poorly immunogenic by themselves. Therefore, strategies conceived to enhance the efficacy of subunit vaccines based on those antigens, such as their incorporation in VLPs for multimeric presentation, are very relevant if field applications are considered.

Results obtained during the last three 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, further work is required to achieve the development of new strategies to control SIV. Therefore, the objectives of this project are: i) studying the immunological mechanisms against SIV and the interaction of different isolates of SIV with cells from the porcine immune system (i.e. dendritic cells); ii) identifying and characterizing new SIV antigenic epitopes, to be used as potential candidates to be included in new vaccine formulations for swine; iii) improving the potential of RHDV VLPs as platforms for antigen delivery by performing an exhaustive structural and immunogenic analysis of RHDV VLPs, aimed at defining optimized insertion sites for foreign B and T cell epitopes, and iv) characterizing the immune response induced by the new chimeric VLPs generated.

Estudio comparativo de la respuesta inmune frente al virus gripal pandémico A (H1N1)v en enfermos graves y leves (Inmunoflu)
IP: Jesús Bermejo
IP CReSA: María Montoya González

The emergence of the first influenza pandemic of the XXI century implies new challenges for the Health Systems worldwide, and also for the scientific community. The great majority of new variant (nv) H1N1 infections are mild and self-limiting in nature. Nevertheless, a small percentage of the patients require hospitalization and specialized attention in Intensive Care Units (ICUs). The role of host immune responses in clearance of nvH1N1 or the role, if any, of host immune responses in contributing to severe respiratory pathogenesis of nvH1N1 infections is not known at this time. It has previously been identified specific host immune response chemokine and cytokine signatures in severe and mild SARS CoV, H5N1 and Respiratory Syncytial Virus infections. In these studies, early host immune responses are characterized by the expression of systemic levels of chemokines, such as CXCL10, indicative of innate anti viral responses. Severe and mild SARS and RSV illness could further be defined by chemokine and cytokine signatures involved in the development of adaptive immunity.Interestingly, de Jong et al. have demonstrated that "hypercytokinemia" of specific chemokines and cytokines is associated with severe and often fatal cases of human H5N1 infections. To determine if host immune responses play a potential role in the evolution of mild or severe nvH1N1 illness we will perform an analysis of systemic chemokine (CXC &CC) and cytokine (Th0, Th1, Th2, Th17) levels, an analysis of gene expression profiles linked to inflmmation and immunity, along with an analysis of antibodies responses in severe and mild nvH1N1 patients. To determine if the host response could potentially participate in the pathogenesys of this disease could contribute to the design of better treatment approaches, and to prevent the development of severe forms of this disease.

Instituto de Salud Carlos III

Antigenicidad y resistencia a fármacos del nuevo virus de la gripe tipo A(H1N1)v: caracterización y evolución a nivel molecular
IP: José Antonio Melero
IP CReSA: María Montoya

In April 2009 a new influenza virus subtype, named type A (H1N1) virus, with a genetic composition not found before in influenza viruses, started to circulate among humans and has spread now to pandemic level. Although most of the infections caused so far by the new virus have been mild, the extreme plasticity of influenza viruses to incorporate genetic changes and to overcome immune/pharmacologic barriers make uncertain the future of this pandemic and has risen great concern at the Public Health level. Therefore, this project intends to carry out "in vitro" studies, but also studies in animal models, oriented to understand the antigenic properties of the new virus, to identify and characterized key epitopes involved in neutralization and their evolution. This will be done in comparison with the H1N1 viruses of seasonal epidemics in recent years. In addition, the mutations and mechanisms of resistance to the commonly used anti-influenza drugs, oseltamivir and zanamivir, will be addressed in this project. All this knowledge will be highly relevant to evaluate the changes that the new virus may accumulate in the future, facilitating the surveillance activities of the pandemic. Finally, the results derived from this project may have a major impact on the evaluation of future vaccines and on the prophylactic/therapeutic measures to take against the new virus.

Nuevos procedimientos para el diagnóstico y caracterización del virus A(H1N1) v pandémico, esenciales para mejorar la capacidad de la red RELEG, a desarrollar en el laboratorio coordinador de la misma
IP: Pilar Pérez Breña
IP CReSA: María Montoya

There has been an unprecedented number of episodes of human infection by animal viruses recorded in recent years, not only in terms of detected cases but also the diversity of origins and characteristics of the causal viruses. The latest of these was produced by a flu of porcine origin and is now categorised as a pandemic, even thought, must of the infections to date have been minor.

Over the same years, a network of laboratories has been developed in Spain to survey this influenza (RELEG), which has played an essential role in viral diagnoses and hence our understanding of the present pandemic.
The objectives proposed by the RELEG are being met, and the project is currently at a crucial stage involving the incorporation of new laboratories to encourage improvements and expand the technological capacity of the network.

Therefore, the coordinating laboratory of the RELEG (the CNM's Laboratorio de Virus Respiratorios y Gripe) is proposing a coordinated project for in-depth phylogenetic analysis of a group of viruses selected from the AH1N1 isolated in the current pandemic in comparison with another selection of contemporary seasonal AH1N1 viruses. The study will be completed by seeking mutations that generate resistances to anti-viruses and some essays to evaluate the virulence and transmissibility of the selected viruses, in collaboration with other groups participating in the project, and which have recognised experience in this area.

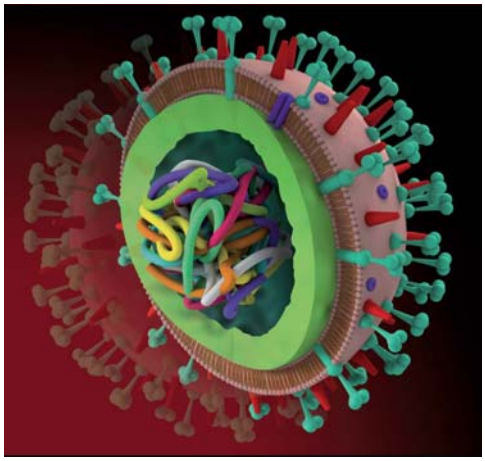
The results of this project will revert to the RELEG through technology transfer to its laboratories, and shall be used to promote and support the most scientific aspects of the network's meetings. It is hoped that this will also stimulate projects initiated as a consequence of the activity between laboratories forming part of the network and others that do not.

Análisis de la virulencia del virus gripe A(H1N1)v pandémico
IP: Amelia Nieto Martín
IP CReSA: María Montoya

Since April 2009, a new influenza A H1N1 virus of porcine origin has produced worldwide outbreaks and has led the Worls Health organization (WHO) to declare a pandemic situation. Although many severe cases are associated to underlying pathologies in the patients or to belonging to high-risk groups, the age group affected by the pandemic virus is generally below 50 years of age. In addition, a small proportion of severe cases and deaths have occurred among young and apparently healthy patients.

This observation would suggest the hypothesis that, among the diverse pandemic viruses that circulate in humans, some strains may show increased levels of virulence. To test such hypothesis we propose the isolation of viruses from patients that show severe infections but are not known to have previous high risk health conditions and to analyse such virus strains in vitro and in vivo to determine whether they contain specific virulence traits.

To this end, we propose the determination of their complete genome sequence and comparison of this to other pandemic strains, as well as the measurement of the pattern of in vitro replication and its interaction with the host factors known to play a role in virulence. In those viruses with appropriate proper ties, we propose the study of their virulence and tropism during the infection of animal models. As controls, we propose the use of pandemic viruses isolated



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Other projects and networks 04

European netwoks

Animal Infectiology Facilities

NADIR: The Network of Animal Infectiology Facilities

IP CReSA: Albert Bensaid

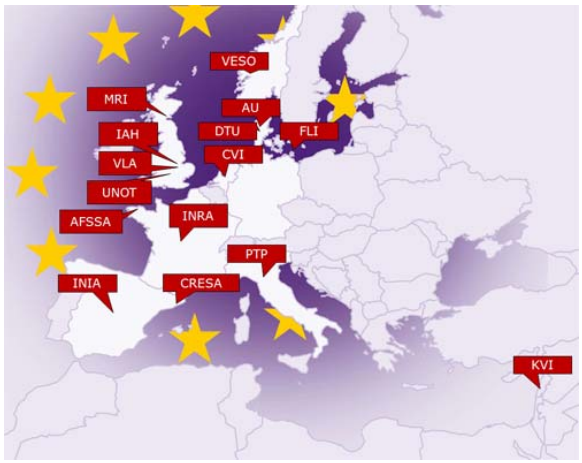
Europe possesses several experimental facilities of level 3 biosafety, which is required to study the vast majority of zoonoses, emerging diseases and a number of other infectious animal diseases. Nevertheless, most of these are loosely connected, leading to redundancy.

NADIR's strategic aim is to realise its potential for European leadership in animal infectiology by bringing together 14 BSL3 animal experiment infrastructures and organising the facilities in order to optimize their investigation and diagnostic/ validation tools, achieve economies of scale and use the saved resources to modernise existing facilities in a coordinated manner.
To achieve these goals, NADIR will:

- internally, to upgrade the collaboration between the partners by setting up an Internet based joint workspace, strengthening the sharing of knowledge, best practices and ethical considerations, commonly managing biological resources, organising transnational access to the infrastructures involved, and jointly executing research activities designed to improve the services provided by these facilities;
- externally, to enhance access to the network's infrastructures by setting up an electronic portal presenting all the infrastructures and services offered by the network in a unified way, providing access by non-member institutions to these infrastructures, coordinating actions with other relevant initiatives, and jointly presenting safety and ethical recommendations.

NADIR is organised around four types of activity:
- three networking activities, consisting of internal and external communication, knowledge and best practices sharing, and joint management of biological resources;
- three research activities, made up of characterising animal lines, improving infection monitoring tools, and developing new infection models for emerging diseases;
- as many transnational access activities as infrastructures involved in the network;
- one project management work package.

NADIR
The Network of Animal Disease Infectiology Research Facilities



Partners

INRA - Institut National de la Recherche Agronomique (France)
AU - Aarhus Universitet (Denmark)
AFSSA - Agence française de sécurité sanitaire des aliments (France)
CReSA - Centre de Recerca en Sanitat Animal (Spain)
FLI - Friedrich-Loeffler-Institut (Germany)
IAH - Institute for Animal Health (United Kingdom)
INIA - Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (Spain)
KVI - Kimron Veterinary Institute (Israel)
MRI - Moredun Research Institute (United Kingdom)
VET - Veterinærinstituttet (Denmark)
AS VESO - Veterinærmedisinsk oppdragssenter (Norway)
VLA - Veterinary Laboratories Agency (United Kingdom)
UR CVI - Central Veterinary Institute of Wageningen (Netherlands)
PTP - Parco Tecnologico Padano (Italia)
UNOTT - University of Nottingham (United Kingdom)

Diagnostics of "Imported" Viral Diseases

European Network for Diagnostics of "Imported" Viral Diseases (ENIVD)
IP CReSA: Núria Busquets

Considerable attention has recently been directed to emerging and re-emerging infections in national and international discussions. Infectious diseases are a continuing menace to all people, regardless of age, gender, lifestyle, ethnic background, and socio-economic status. They cause suffering and death, and impose an enormous financial burden on society.

Numerous viral outbreaks in the last few years like Ebola in Kikwit/Zaire, Côte d'Ivoire, and Liberia in 1996/97 and Nipha Virus in Malaysia in 1998 led to the building of the European Network for Diagnostics of "Imported" Viral Diseases (ENIVD). After several meetings scientists from university medical centres, country health departments, and hospitals all over Europe have raised this network and agreed to collaborate on a few major tasks for the future, fixed in a manifest signed by all members and their institutions.

The ENIVD members meet regularly together with representatives from EC and WHO to exchange and gather information working on the improvement of the collaboration and diagnostics for "imported" viral diseases in Europe. Sharing the duties and strengthen the collaboration in the EC will help to enhance the emergency preparedness in all participating countries to the benefit for there citizens.

Understanding and Combating PRRS

EuroPRRSnet: COST Action FA902: Understanding and combating porcine reproductive and respiratory syndrome in Europe

IP CReSA: Enric Mateu

EuroPRRSnet is a A European Network for Understanding and Combating Porcine reproductive and respiratory syndrome in Europe. This network is funded by the European COST office (2009-2013).

The objective of EuroPPRSnet is to have concrete outcomes such as the identification of key challenges and propose potential solutions to problems to increase progress and facilitate the use of these new technologies in animal health. The aim of this initiative is to develop more effective multidisciplinary collaborative PRRS research in Europe centred on PRRSV epidemiology, immunopathology, vaccine development and diagnostics tools.

Partners
NC229: Porcine Reproductive And Respiratory Syndrome: Mechanisms Of Disease And Methods For The Detection, Protection And Elimination of the PRRS Virus
PoRRScon
Epizone: Network of Excellence for Epizootic Disease Diagnosis and Control
Fairness and Accountability in Research
The Roslin Institute
The University of Edinburgh

Prionic diseases

Transmission barrier of prions

Estudio de los determinantes de la barrera de transmisión en *Oryctolagus, Canis y Gallus* mediante modelos de replicación de priones in vitro e in vivo
IP CReSA: Enric Vidal Barba

This project ended in 2012. Results of the conducted experiments have demonstrated for the first time that bovine spongiform encephalopathy (BSE) prions are able to transform, in vitro, cellular prion protein (PrPC) from allegedly prion resistant species: dog , horse and rabbit.
In the case of the dog and rabbit these new BSE prions have been shown to maintain the pathobiological characteristics of the BSE strain: not only at a biochemical level, but also at a biological level because we found that these new prions are indeed infectious for the transgenic mouse model botg110 (expressing bovine PrPc) and, in the case of rabbit, met129 transgenic mouse model (expressing the human PrPc) was also infected. These results suggest that, if infected with BSE dog and rabbit prions would probably be infectious to cattle and also for humans.
In the case of the horse, however, although in vitro we have been able to transform horse PrPc using BSE prions these have not proved infectious, at first passage, to any of the tested transgenic mouse models (expressing bovine, human and equine PrP). These results show that the horse PrPc has a very strong (strain) transmission barrier, i.e. a very low susceptibility to acquire the BSE strain conformation.
Using Scrapie prions it has not been possible to transform dog PrPc, only that from rabbit and horse. Rabbit scrapie prions have presented no ability to infect the tg338 transgenic model (expressing sheep PrP) and only a very limited infective capacity has been observed in the case of the horse. This demonstrates the reduced ability of scrapie (SSBP1 strain) compared to BSE to overcome some transmission barriers.
Finally, we have successfully generated two new transgenic mouse models expressing PrPc of rabbit and dog. These models are still being challenged with different prion strains to characterize their susceptibility. Up to now, it has not been possible to infect the dog model with any prion strain. The rabbit model, however, has proved to be susceptible to BSE prions and rabbit prions transformed in vitro from BSE and scrapie and also form rabbit spontaneous prions (transformed in vitro without initial seed).

CYTED

Iberoamerican network on pig meat

Red Iberoamericana para el desarrollo de la cadena de producción porcina a través de sistemas innovadores y sustentables en salud animal, nutrición, reproducción y sistemas de producción

IP CReSA: Joaquim Segalés

The network is intended to improve pig meat production in Latin American countries by developing innovative and sustainable strategies in the fields of health, nutrition, reproduction and production. More specific objectives include identification of deficiencies or inadequate practices in order to counteract the same, implementation of a program of good health practices in pig production, improved diagnosis and control of diseases, continuous education and, finally, identification of opportunities for collaboration between the participant institutions.
A summary of the pig production and consumption data has been collected from Argentina, Chile, Costa Rica, Colombia, Cuba, Mexico, Spain, Uruguay, Dominican Republic, Venezuela and Brazil. Also, the handbook of good production practices as well as the handbook of safe pig production is being produced and editors have been assigned. Importantly, an online magazine has been designed and will presumably be operative in 2011 as a platform towards achieving the abovementioned objectives.

Other publications

Other publications (collaborations)

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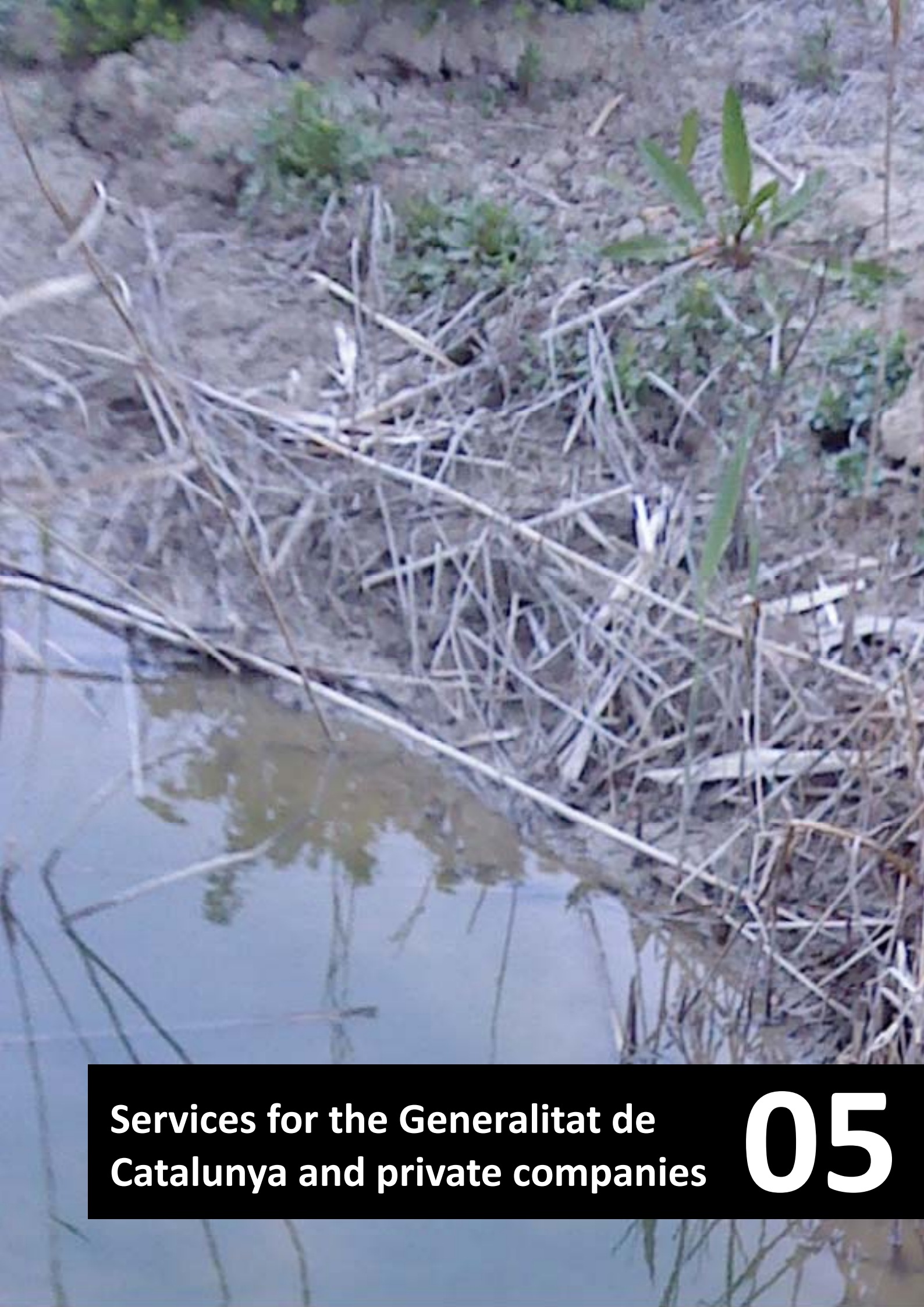


Services for the Generalitat de Catalunya and private companies

05

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.

In the framework of these contracts, CReSA has worked in epidemiology, diagnostics, and general studies of diseases, including bovine tuberculosis (bTB), bluetongue (BT), avian influenza (AI), West Nile Disease (WND), Newcastle disease (ND), bovine spongiform encephalopathy (BSE), Aujeszky's disease (AD), classical swine fever (CSF), Maedi-Visna, paratuberculosis, border disease, rabies, and brucellosis in cattle and small ruminants.

In 2012, CReSA received 546,000€ from DAAM and 372,107€ from DS to carry out the services commissioned.

Livestock

Virological analyses

Prestació de serveis d'anàlisis virològiques
IP: 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 serogroup viruses. SBV affects domestic ruminants as sheep, goats, cattle and wild ruminants.

In the 2012 period, 11.238 samples were analysed.

These samples came from Laboratoris de Sanitat Ramadera, Seccions Territorial de Ramaderia i Sanitat Animal and Serveis Veterinaris Oficials 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-ENISO/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
IP: Núria Busquets, Ana Alba

The monitoring of the avian influenza (AI) in wild birds in Catalonia in 2012 belongs to the vigilance 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, 2012. The main objective in wild birds during 2012 has been the detection of highly pathogenic avian influenza viruses such as A/H5N1. The implementation of these programs includes 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 operative network to collect samples from avian wildlife for AI, a monitoring of the Newcastle disease viruses (NDV) has been carried out mainly in columbiform dead birds as differential diagnostic of AI. To collect information on the H5N1 AI virus and NDV circulating in wild birds, different activities based on passive surveillance have been implemented.

None of the total of 59 sick or dead bird samples have tested positive for AI. Whereas, four in the total of 37 bird samples analysed for NDV 3 *Streptopelia decaocto* and 1 *Passer domesticus*, have resulted positive for highly pathogenic NDV.

Surveillance for West Nile virus in Catalonia

Programa de vigilància del virus del Nil occidental a zones considerades de risc
IP: Ana Alba, Núria Busquets

The monitoring of the West Nile virus in wild birds and equines in Catalonia in 2012 belongs to the vigilance of West Nile disease (WND) being undertaken since 2006.

The aim of the surveillance program is the early detection of the West Nile virus (WNV) in Catalonia in the main reservoirs (birds) and domestic animal hosts (equines), basically in the main risk areas. The program involves the participation of the DAAM, CReSA, the 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 program is based on different components: active and passive surveillance of equines (291 samples), wild birds (144 samples d and entomologic monitoring. In 2012, seropositivity against WNV-like has been detected in both horses and migratory and resident wild birds. Nine equine sera have tested positive by ELISA, being 3 of them positive by seroneutralitzation test (SNT) with a low titers (<1/20)) and 11 avian sera have resulted positive by ELISA, although uniquely one sample has been positive by SNT with a low titer (1/20)).

These results indicate that the enzootic cycle of WNV-like not only has remained in Catalonia in wild birds near highly populated urban areas, but also that the incursion of this virus is probable in other areas of the region.

Surveillance plan of the animal transmisible sponfigorm encephalopaties

Diagnòstic del pla de vigilància de les encefalopaties espongiformes transmissibles animals
IP: 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 2012, 6265 samples were analysed and no cases of TSE were diagnosed.

Support to Eradication program of bovine tuberculosis

Assessorament i diagnòstic per al control i eradicació de la tuberculosi bovina
IP: Sebastián Napp, Bernat Pérez de Val

Tuberculosis (TB) is a zoonotic disease mainly caused by Mycobacterium bovis and M. caprae affecting a range of domestic and wild animal hosts. TB in cattle is subjected to an eradication programme in Catalonia. By commission of the DAAM, CReSA conducts the diagnosis, the epidemiological follow-up of positive herds and provides expert guidance.
In 2012, 24 cattle herds were affected by TB, which supposed a 0.6% of annual prevalence, a reduction of 0.3% in comparison to 2011, whereas the incidence of new TB infected herds was reduced from 0.5% in 2011 to 0.2% in 2012.

Furthermore, 17 out of the 24 positive herds recovered the Official TB-Free qualification during 2012.

The Mycobacteria Diagnostic Unit of CReSA performed a total of 4144 analyses by the Interferon-γ assay, 380 by the antibody detection ELISA test, 422 by anatomopathological evaluation, 309 by mycobacterial culture and 280 by PCR. The laboratory techniques were carried out under international quality standards (UNE-EN ISO/IEC 17025). The data obtained from epidemiological surveys and the integral diagnostic results were assessed and discussed in a monthly workshop formed by CReSA's researchers and veterinarians of DAAM, which recommended specific measures for decision making.

Entomological surveillance for bluetongue

Entomological surveillance program for Bluetongue disease
IP: 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 throughout 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).

Public health

Transmissible sponfigorm encephalopaties

Diagnòstic del pla de vigilància de les Encefalopaties Espongiformes Transmissibles Animals a Catalunya

IP: Enric Vidal Barba

The PRIOCAT laboratory performs, by commission of the Agency for the Protection of Public Health 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 bovines older than 72 months and a sample of small ruminants older than 18 months destined for human consumption in order to determine the presence of prion diseases. Samples from fallen stock population (both cattle and small ruminants) are also analysed as requested by the Department of Agriculture.

Apart from routine tests, in cases with an initially positive result from rapid tests, confirmation tests are conducted. In 2012, 18.602 samples were analysed and no cases of TSE were diagnosed.

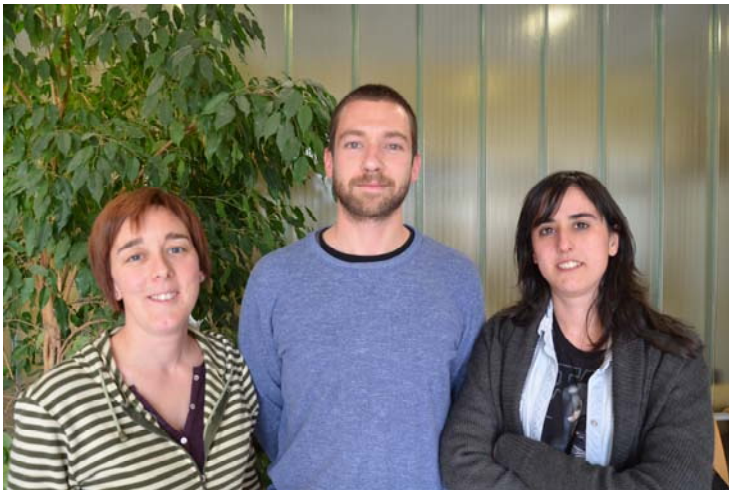
The laboratory has also developed a research line funded by national and European research projects regarding the study of different aspects of TSE such as the transmission barriers determinant factors of animal prions (BSE and Scrapie) and the characterisation of the transmissibility of atypical variants of Scrapie to other livestock species and humans.

In October 2012 the VIII scientific-technical meeting on Transmissible Spongiform Encephalopathies was organised in which research and surveillance results were reported.

PRIOCAT
Laboratori de Referència en Malalties Priòniques Animals de Catalunya

Researchers
Enric Vidal Barba

Laboratory technicians
Sierra Espinar Guardeño
Marta Valle González



Researcher and technicians of the PRIOCAT Laboratory.

Support for slaughterhouse veterinarians

Servei de Suport a Escorxadors (SESC)

IP: Enric Vidal Barba

In 2012, the Slaughterhouse Veterinary Support Service (SESC) managed a total of 151 queries by official vets conducting inspections of slaughterhouses in Catalonia. Of these, 12 were telematic queries and the other 139 corresponded to requests for sample laboratorial 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 SESC CASE ARCHIVE website: a specialised blog on slaughterhouse veterinary pathology (www.cresa.cat/blogs/sesc) which provides continuing education to meat inspectors and other related animal health professionals.

The blog was migrated during 2012 to a Wordpress platform and protected under a creative commons license. It was also translated to Spanish and English languages; this quadrupled the number of visitors to the blog (over 19K since the new platform kicked off). Diffusion through social media (twitter, facebook and linkedin) has also been implemented.

SESC
Suport a escorxadors

Services for companies

In 2012, 64 contracts with 20 private companies and 2 public institutions were signed, with a total income of €2.220.248,24€.

The different types of study are shown below:

- Studies of antimicrobial sensitivity
- Development of experimental challenges in pigs, ruminants and poultry
- Studies with pharmaceutical products
- Trials with insecticides
- Research on viruses
- Pathological anatomy
- Immunological studies (immunological response of vaccines, efficacy of adjuvants, etc)
- Assessment and consultancy for companies (conferences, meetings, trainings, colloquia, monographs, etc)
- Trials with vaccines and/or premixes in ruminants, swine and poultry (safety and efficacy)
- Studies of diagnosis and detection of pathogens
- Collection of bacterial strains
- Quality control in bioprocesses
- Sequencing and molecular characterization
- Studies of bacteriology and intestinal microbiota

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

As a result of the activity in 2012, this group has conducted 11 studies for the private industry, have given support to 22 studies (half of them related to research projects and the remaining ones to private companies) and have participated in the *Servei de Suport a Escorxadors (SESC)* and *Assessorament en el control de tuberculosi en el boví i el cabrum*. Most studies have been directed for porcine but it has also been dealt with avian, bovine, rabbits, goats and ovine.

Researchers
María Eugenia de la Torre Martínez
Miquel Nofrarías Espadamala
Sergio López Soria

Laboratory technicians
Diego Pérez Rodríguez
Maria Jesús Navas
Rosa María López Jiménez

Researchers and technicians of the CReSA Field trial Group.

Knowledge transfer and training 06

Doctoral thesis and Master research studies

Doctoral thesis

Estudios de inmunopatogenicidad del virus de la peste porcina clásica aplicados al desarrollo de nuevos métodos de vacunación
Joan Tarradas Font
Director: Llilianne Ganges
Date: 25 January 2012

Estudio de la neosporosis bovina en ganado lechero de Venezuela
Nelitza Linarez
Director: Sonia Almería
Date: 16 March 2012

Distribución tisular de los receptores Toll-like (TLR) 3, 7 y 9 en el cerdo y efecto in vitro de la infección por el virus del síndrome respiratorio y reproductivo porcino en su regulación en macrófagos alveolares porcinos
Liudmila Kuzemtseva
Director: Laila Darwich
Date: 5 June 2012

Immunoregulation of porcine dendritic cells by influenza viruses and *Haemophilus parasuis*
Tufària Mussá
Director: María Montoya; Lorenzo Fraile
Date: 20 September 2012

Insights on the interaction between *Haemophilus parasuis* and alveolar macrophages
Mar Costa Hurtado
Director: Virginia Aragón
Date: 26 September 2012

Immune response to influenza infection and vaccination
Júlia Vergara Alert
Director: Ayub Darji
Date: 28 September 2012

Role of Torque teno sus viruses during coinfection with other swine pathogens
Mario Aramouni
Director: Joaquim Segalés, Tuija Kekarainen
Date: 29 October 2012

Epidemiology, vaccination and infection in wild ruminants with bluetongue virus
Cristina Lorca Oró
Director: Mariano Domingo, Ignacio García Bocanegra, Jorge R. López Olvera
Date: 9 November 2012

Epidemiologia de la influença porcina: estudis seroepidemiològics i dinàmica de la infecció en explotacions porcines
Meritxell Simon Grifé
Director: Jordi Casal
Date: 23 November 2012

Insights in the molecular epidemiology and antigenic characterization of influenza A viruses of pigs
Gerard Martín Valls
Director: Enric Mateu
Date: 14 December 2012

Master research studies

Evaluación del consumo de cefalosporinas en granja de cerdos, como factor de riesgo relacionado con la aparición de resistencias en *E. coli* productoras de cefalosporinasas
Karla Cameron
Director: Lourdes Migura

***Salmonella* and *Campylobacter* contamination of broiler caeca and carcasses at the slaughterhouse**
Laia Muñoz
Director: Marta Cerdà

Identification of a subpopulation of peripheral blood mononuclear cells from swine through negative selection to obtain putative plasmacytoid dendritic cells
Marlies Cortés Hinojosa
Director: María Montoya

La vigilancia de triquina en España: situación actual y valoración de un sistema alternativo
L Cárdenas Contreras
Director: Sebastián Napp, Jordi Casal

***Aedes albopictus* en Cataluña: estudio de la estructura genética poblacional y análisis filogeográfico**
Marco Brustolin
Director: Nonito Pagès, Núria Busquets

Ecogeografía del corzo en Aragón y las relaciones entre distribución, abundancia y dinámica poblacional
J Ferreres
Director: Pelayo Acevedo

Uso del espacio por el jabalí en montes de Toledo centrales: implicaciones como reservorio de enfermedades
Javier Gutiérrez
Director: Pelayo Acevedo, J Vicente

Tendencias poblacionales de especies de interés cinegético: datos de 20 años de monitorización
M Boadella
Director: Pelayo Acevedo

Aspectos inmunológicos de la colonización del tracto respiratorio por *Haemophilus parasuis*
Bernardo Bello
Director: Virginia Aragón, Joaquim Segalés

Identificación de una adhesina de *Haemophilus parasuis*
Yaqing Wang
Director: Virginia Aragón

Technical seminars

Technical seminars of the PATT Plan (DAAM):

Tuberculosi: situació actual i avenços científics
05/06/2012
75 attendees

VIII jornada sobre EET's
01/10/2012
40 attendees

Bioseguretat a les granges
12/11/2012
69 attendees
87 attendees

CReSA technicals seminars
In 2012, 27 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.

Rountable: VIII jornada sobre EET's

Rountable: Bioseguretat a les granges

Rountable: Tuberculosi: situació actual i avenços científics

Awards

Awarded a porcine circovirus research project from CReSA
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.

Since 2007, Boehringer Ingelheim Animal Health has funded independent European research projects related to Porcine Circovirus Type 2 (PCV2) infection and associated diseases. So far, 17 research projects have been awarded, each supported with 25,000 euro, in total 425,000 euro. In the past five years, 50 research projects were submitted to the European PCV2 research award, demonstrating the continuous interest and need for applied PCV2 research.

The 2012 European PCV2 research awards were recently presented to the successful investigators by the head of the review board, Prof. Maurice Pensaert, former head of the Laboratory of Virology of Ghent University in Belgium, and George Heidgerken, Senior Vice President Boehringer Ingelheim Animal Health.
In the 6th edition the independent review board selected the following projects to be awarded:

- Effect of maternal derived immunity on PCV2 infection dynamics and production parameters in PCV2 vaccinated pigs (Prof. Joaquim Segalés and Dr. Marina Sibila, CReSA and Universitat Autònoma, Barcelona, Spain)
- Are amino acids 169 and 173 of PCV capsid protein determinant for virulence? (Dr. Beatrice Grasland, Anses – LERAPP laboratory, Ploufragan, France)
- Does prophylactic treatment with Iscom-Matrix adjuvant affect a subsequent PCV2 infection in pigs? (Prof. Caroline Fossum, Swedish University of Agricultural Sciences, Uppsala, Sweden)

The award has an independent review board with leading European scientists in applied porcine research reviewing the entries and deciding upon the winning proposals. A maximum of three prizes, worth 25,000 euro each, are granted to European researchers every year, to advance scientific knowledge in these areas.

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 production and animal health
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.

Máster en Virología

International visits

The CReSA received 58 international visits in 2012, coming from 14 different countries. The reasons for the visits were institucional, to attend seminars, research collaborations, business or internships:

H. De Smit
The Netherlands

Dominique Martínez, Pierre Pugin, Claire Garros, Thomas Balenghien
CIRAD
France

Filip de Bock, Ilka Borremans, Maena Hant
Pfizer
Belgium

Elsa Jourdain, Nicolas Bertho, Pauline Maisonnasse
INRA
France

P. Roy, E. Schadert, M. Bech, P. Bridler, K. Topfer
Boehringer Ingelheim
Germany

Maria Gofredo
Valentina Federici
IZSAM-KT
Italy

Simon Carpentier
Institut For Animal Health
United Kingdom

Lourenço Paulo Mapaco
IIAM/DCA
Mozambique

Noorbebi Ismael AdamoMisau-Moz
Mozambique

Joliana Ghneman
Boehringer Ingelgeim
Germany

Kate Joanne Howell, Lucy Weineri, Alexander Dan Tucker
University of Cambridge, Vet School
Cambridge, UK

Meredich Stewart
Lshtm
United Kingdom

Cor Vonk Noordegraaf
MSD Animal Health
The Netherlands

Elabrak Abderrahman
ONSSA
Morroco

Monika Sme´Kalova
Palacký University in Olomouc

Czech Republic

Hans Cristian Philipp, Istvan David
Lohmann
Germany

Mari Heinonen, Taneli Tirkkonen, Pirjo Lertesniemi, Olli Ruoho, Ari-Matti Pyyhtiä, Juhapekka Jalli, Kari Kaunismäki, Pentti Kunnas, Peter Flittner, Kati Moilanen, Johamma Auranen, Jerina Wallius, Riitta Neste, Timo Wahlroos
Pfizer
Finland

Esmail Warrakah
Patrick Sinnett Smith
Pfizer
United States of America

Jürgen Dämmgen
SABC
Germany

Philippe Vannier
SABC
France

Marian Horzineck , Marion Koopmans
SABC
The Netherlands

Carl Gagnon
U De Montreal, Quebec
Canada

Elsa Mercado
Centro Nacional de Investigaciones Agropecuarias (INTA), Castelar
Argentina

Rocío González Barrientos
Serv. Nac. de Serv. Vet
Ministerio de Agricultura y Ganadería
Costa Rica

Dirk Werling
The Royal Vet College

Patricia Gil
NADIR network
France

Erwin van den Born
MSD Animal Health

Nilsa De Deus
INS
Mozambique

Training programs

Training on porcine circovirus: pathology, epidemiology and diagnosis
Pfizer Finland
16 November, 14 attendants

CReSA Training Programs
Courses and Seminars for Professionals

Science and society

07

Website and press releases

Website users: a general view

Cresa.es statistics

15.942 usuarios han visitado este sitio.

Visitas	49.654
Visitantes únicos	15.942
Número de páginas vistas	98.560
Páginas / Visita	1,98
Duración media de la visita	00:02:44
Porcentaje de rebote	66,43%
% de visitas nuevas	30,16%

Top 10 visitor countries

	País/territorio	Visitas
1.	Spain	42.852
2.	Mexico	780
3.	Italy	568
4.	United States	514
5.	Colombia	399
6.	United Kingdom	361
7.	France	302
8.	Argentina	255
9.	Germany	249
10.	Costa Rica	220

Top 10 visitor countries

Cresa.cat statistics

7.894 usuarios han visitado este sitio.

Visitas	27.887
Visitantes únicos	7.894
Número de páginas vistas	44.732
Páginas / Visita	1,60
Duración media de la visita	00:02:11
Porcentaje de rebote	73,50%
% de visitas nuevas	26,38%

	País/territorio	Visitas
1.	Spain	24.590
2.	Italy	608
3.	France	474
4.	Denmark	434
5.	United States	323
6.	Ireland	233
7.	Germany	112
8.	Mexico	102
9.	United Kingdom	100
10.	Canada	69

Press releases

28 news stories about the research and activities carried out by the CReSA were written and disseminated in 2012:

28-12-2012
Representatives of technological centers visited the CReSA
Last December, 10th, a group of members of the ACTec (Catalan Association of Technology) associated centers visited CReSA (Bellaterra, Barcelona).

14-12-2012
A step forward towards a vaccine against the African swine fever
Researchers from CReSA have demonstrated that protecting pigs against African swine fever it is not science fiction. These are the conclusions of a study recently published in the journal PLoS One. African swine fever virus (ASFV) is in continuous expansion since its last entrance in Europe through Georgia in 2007.

04-12-2012
The Councilor of Agriculture, Livestock, Fisheries, Food and Natural Environment of the Catalonian Government visits the CReSA facilities
On the 9th October 2012, the Honorable Mr. Josep Maria Pelegrí visited the facilities of CReSA, located in Bellaterra (Cerdanyola del Vallès, Barcelona, Spain). The CReSA is one of the research centres (CERCA) of the Generalitat de Catalunya.

30-11-2012
A new discovery in the virulence mechanisms of the porcine pathogen *Haemophilus parasuis*
CReSA's researchers have found that *Haemophilus parasuis* can utilize the sialic acid from the host to avoid recognition by the immune system and be able to cause disease. In addition, a gene associated with the virulence of the bacterial strain has been identified. This gene could be useful in the diagnosis of virulent strains of *H. parasuis.*

27-11-2012
A new vaccine against human tuberculosis is successfully tested in goats for the first time
The new vaccine has been developed by researchers of Canada (McMaster University) and is currently in clinical trials phase I. The study, carried out by CReSA researchers, opens a new way for the study of new treatments.

26-10-2012
Following classical swine fever
The research trajectory of CReSA in classical swine fever during the last 4 years has resulted in new insights in the protective response against the virus, and in the viral evolution in endemics areas. This information is the great interest for the development of new diagnostic techniques and new vaccines. These studies have resulted in the publication of six articles in prestigious international journals.

25-10-2012
Workshops about tuberculosis and prionic diseases
During the last months, CReSA organized two technical workshops addressed to veterinarians and other professionals interested in knowing the last new son these diseases. The presentations are already available to consult (Spanish/ Catalan version).

10-10-2012
Representatives of the Ministry of Agriculture and Livestock of Morocco visited the CReSA
Last September 2012, 22nd, Dr. Abderrahman El Abrak, Chef de la Division de la Santé Animale de l'Office National de Securité Sanitaire des Produits Alimentaires (ONSSA, Rabat, Morocco) visited CReSA facilities located in Bellaterra (Cerdanyola del Vallès).

26-09-2012
Rift Valley fever: what do we know today?
Rift Valley fever virus (FVRV) has shown the ability to inflict significant damage to livestock and is also a threat to public health. A review published by researchers of the Centro de Investigación en Sanidad Animal (CISA-INIA) and CReSA discuss several aspects of the virus and measures proposed to limit future epidemics.

18-09-2012
More than 100 science teachers attended a workshop organized by CReSA
The "I update workshop for science teachers" organized by the CReSA was hold in July 2012, 4. This first edition was entitled "Zoonosis: concepts, techniques and biosafety" and was very successful, with more than 100 registrations.

24-08-2012

CReSA doctoral thesis on September

Next September 2012, Tufària Mussá, Mar Costa and Júlia Vergara (PhD students of CReSA) will defend their doctoral thesis on the research carried out on porcine viruses and/or bacteria.

27-06-2012

Workshop on influenza in Mozambique

A group of scientist from CReSA-IRTA and Hospital Clínic de Barcelona-CRESIB visited the Instituto Nacional de Saúde (INS) and Instituto de Investigãçao Agrária de Moçambique (IIAM) in Maputo, Mozambique to exchange experiences on influenza.

21-06-2012

Experimental West Nile Virus infection in hybrid falcons

For the first time, researchers of the CReSA have reported an experimental infection with West Nile Virus (WNV) in Gyr-Saker hybrid falcons and have demonstrated that can become infected with WNV.

15-05-2012

PMWS clinical expression under field conditions is modulated by the pig genetic background

Post-weaning multisystemic wasting syndrome (PMWS) is one of the porcine circovirus type 2 (PCV2) associated diseases. Researchers of CReSA studied the effect of 3 different genetic boar lines on the expression of PMWS in their offspring.

27-04-2012

New doctoral thesis on PRRS

Last March 2012, 28th, Mariona Gimeno (CReSA-UAB PhD student) defended her doctoral thesis entitled "Immunological and pathogenic characterization of different genotype-I porcine reproductive and respiratory syndrome virus (vPPRS) isolates" directed by Dr Enric Mateu.

24-04-2012

Dr Joaquim Segalés Coma, new director of the CReSA

Dr. Joaquim Segalés has been appointed Director of CReSA by the Patronate of the centre, gathered in session on 17th of April, 2012. He substitutes Dr Mariano Domingo Álvarez who has directed the center since it was created 12 years ago.

23-04-2012

CReSAPIENS issue number 2 is now available

Different aspects concerning food safety are discussed in CReSAPIENS issue number 2. CReSAPIENS is a science divulgation journal aimed to divulgate the knowledge and results of research generated at the CReSA.

13-04-2012

Virus-like particles are suitable as vaccine vectors against swine viruses

Researchers of CReSA have demonstrated the strong potential and immunogenicity of virus-like particles in pig and, therefore, their suitability as appealing vaccine vectors for veterinary viral vaccinology. This is the first immunological report on the potential use of chimeric RHDV-VLPs as antigen carriers in pigs.

30-03-2012

Rabbits also can suffer diseases caused by prions

Researchers from CReSA have participated in a recently published study which proves that rabbits are not resistant to prion infection, the opposite of what was believed for the last four decades. The paper has been published in the scientific journal Proceedings of the National Academy of Sciences of the United States of America.

23-03-2012

Porcine circovirus research projects from France and Spain awarded

For the fifth time, the European PCV2 Research Award sponsored by Boehringer Ingelheim funds research projects related to Porcine Circovirus Type 2 (PCV2) infection and associated diseases. Two projects from the CReSA were awarded.

19-03-2012

The association between consumption of antimicrobials and occurrence of resistance will be studied

This study from CReSA will investigate the presence of extended-spectrum cephalosporinase (ESC) producing *E. coli* and *S. enterica* in pigs, and evaluate the possible association between consumption of different antimicrobials and occurrence of resistantce.

05-03-2012

NADIR Annual Meeting held in Barcelona

The last General Annual Meeting of the NADIR (Network of Animal Disease Infectiology Research Facilities) was held in Barcelona in November 2-4 2011, and was organized by the NADIR Executive Committee and CReSA.

23-02-2012

Schmallenberg virus: a new bovine and small ruminants virus

More than 140 veterinarians attended the informative meeting about the Schmallenberg virus. The meeting counted on Iscle Selga (Head of the Animal Health Prevention Service of the Generalitat de Catalunya) and Mariano Domingo (Director of the CReSA).

17-02-2012

Are the mosquitoes in Catalonia capable to transmit new emerging diseases?

The answer to this question is a key issue for the design of future prevention and control strategies to avoid both the introduction and dissemination of viral emerging diseases in our country, such the West Nile Fever and Chikungunya. This question pretends to be solved by CReSA researchers trough a research grant from Recer-Caixa 2011 call.

15-02-2012

Swine influenza virus interacts with porcine dendritic cells

Scientists from CReSA studied the particular interaction of swine influenza virus with porcine dendritic cells. This virus causes sub-acute or acute respiratory infections on swine farms and pigs can act as "mixing vessels" for new influenza strains.

13-02-2012

Training and assessment in Mozambique about influenza

A new project will be coordinated by the CReSA to train technicians from the Instituo Nacional de Saúde (INS) and Instituto de Investigação Agrária (IIAM) in Mozambique. Training will be focused on diagnosis, surveillance and research on the influenza virus.

30-01-2012

More than 150 attendants at CReSA training seminars

During November 2011, CReSA organized two technical seminars addressed to veterinarians and other professionals interested in the lasts news on West Nile fever and the cases of the Support Service for Slaughterhouses of the CReSA.

19-01-2012

Doctoral thesis on Classical Swine Fever

On January 25, 2012, Joan Tarradas Font (PhD student of the CReSA) will defend his doctoral thesis entitled "Studies on immunopathogenesis of classical swine fever virus for developing of new vaccination methods", directed by Dr Llilianne Ganges.

Mass media

La Vanguardia

Monography.

11th October 2012.

Entrevista | **Joaquim Segalés** Director de Fundación CReSA

"Nuestro trabajo revierte en la mejora en la calidad, cantidad y seguridad de los alimentos que llegan al consumidor"

CReSA (Centre de Recerca en Sanitat Animal) es una fundación pública dedicada a la investigación en sanidad animal. Este centro cuenta con dos patrones: la Universitat Autònoma de Barcelona (UAB) y el Institut de Recerca i Tecnologia Agroalimentàriès (IRTA), instituto de investigación de la Generalitat de Catalunya adscrito al Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural. En estos momentos el CReSA cuenta con un equipo de 113 trabajadores, de los cuales 39 son investigadores.

¿Cuándo se creó el CReSA?

Nuestros orígenes se remontan al año 1999, como resultado de la necesidad de cubrir aquellos aspectos relacionados con la investigación y vigilancia sanitaria animal en Cataluña, aunando los esfuerzos y recursos de ambas instituciones fundadoras. En el año 2005 se terminó de construir el actual Edificio CReSA, situado en el campus de la UAB, en Bellaterra.

¿Cómo es este edificio?

Se trata de un edificio muy singular, hasta el punto de que tan sólo existe una instalación similar en Madrid y muy pocas parecidas en el resto de Europa. Aquí disponemos de laboratorios y de animalario en biocontención de tipo 3, un hecho que permite que trabajemos enfermedades como la peste porcina clásica, la peste porcina Africana, la gripe aviar altamente patógena, etc. en condiciones óptimas de bioseguridad. En caso de aparición de ciertas enfermedades emergentes en nuestro país, la ventaja de disponer de este tipo de infraestructura nos permite reaccionar rápidamente, estudiando los agentes causantes y proponiendo las medidas adecuadas para solucionar estos problemas. La calidad de este centro también nos brinda la posibilidad de colaborar con otras entidades e investigadores del resto de España y del mundo.

¿Cuáles son sus principales líneas de investigación?

Las principales líneas de investigación que desarrollamos tienen que ver con los campos de enfermedades víricas, bacterianas y parasitarias que afectan a los animales de producción, epidemiología veterinaria y análisis de riesgo, y enfermedades exóticas (aquellas que no afectan actualmente a nuestra cabaña animal pero representan un riesgo importante para su salud en caso de introducción en el país). Además, llevamos a cabo servicios de gran relevancia para la administración pública y para las empresas.

¿En qué consisten estos otros servicios?

Para la administración pública realizamos labores de seguimiento epidemiológico y vigilancia sanitaria en casos como la peste porcina clásica o la peste porcina africana, gripe aviar, virus de la fiebre del Nilo Occidental y otras, así como el diagnóstico de encefalopatías espongiformes transmisibles (comúnmente conocida en bovinos como la "enfermedad de las vacas locas"). También participamos en la vigilancia sanitaria y el estudio de enfermedades que puedan transmitirse de los animales a las personas (zoonosis), como la tuberculosis. Pensamos que esta función es muy importante para la sociedad porque contribuimos a que los alimentos que llegan al consumidor estén en las mejores condiciones posibles. No hay que olvidar que ello también contribuye a la mejora de la competitividad del sector ganadero. Por lo que respecta a la contratación de empresas y/o asociaciones privadas, respondemos a los problemas que se plantean en sus procesos de elaboración y les asesoramos en el desarrollo y registro de sus productos (fármacos, vacunas, insecticidas, hemoderivados, etc). CReSA también desarrolla modelos animales para estudiar enfermedades humanas. Además, nos avala el hecho de que trabajamos con Buenas Prácticas de Laboratorio (BPLs) y normativas ISO.

¿Cuáles son sus proyectos de futuro más destacados?

A nivel científico, nuestras metas están centradas en estar siempre a la vanguardia del conocimiento científico que permita mejorar la sanidad y producción animales, y la salud pública, así como en responder a potenciales alarmas sanitarias que se produzcan en el futuro. Todo ello debe revertir en la mejora en la calidad, cantidad y seguridad de los alimentos que llegan al consumidor. Uno de los objetivos irrenunciables del CReSA es seguir realizando investigación de excelencia, con lo que es importante asegurar la viabilidad de los centros de investigación como el nuestro, a pesar de que esta época de crisis económica global lo hace difícil.

CReSA
Centre de Recerca en Sanitat Animal

Centre de Recerca en Sanitat Animal (CReSA)
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E-mail: cresa@cresa.uab.cat

Un paso más hacia una vacuna frente a la peste porcina africana
CReSA| 12 diciembre 2012 11:42
Investigadores del Centre de Recerca en Sanitat Animal han demostrado que es posible proteger a los cerdos frente al virus de la peste porcina africana. Son las conclusiones de un estudio publicado en la revista PLoS One. Desde su entrada en Georgia en el año 2007, el virus se expande sin demasiado control por países colindantes.

Descubren cómo la bacteria Haemophilus parasuis produce la enfermedad de Glässer en cerdos
CReSA| 23 noviembre 2012 13:50
Investigadores del Centro de Investigación en Sanidad Animal han descubierto que *Haemophilus parasuis* puede utilizar el ácido siálico del cerdo para pasar desapercibido al sistema inmune y ser capaz de producir enfermedad en los cerdos. Además, han identificado un gen relacionado con las cepas virulentas de la bacteria que podría ayudar al diagnóstico.

Una nueva vacuna contra la tuberculosis se prueba por primera vez con éxito en cabras
CReSA| 02 noviembre 2012 12:44
Investigadores del Centre de Recerca en Sanitat Animal (CReSA) han realizado el primer estudio de vacunación frente a la tuberculosis utilizando como modelo experimental la cabra doméstica. La vacuna, denominada AdAg85A, ha sido diseñada por investigadores de McMaster University (Canadá) para prevenir la tuberculosis en humanos, y actualmente se halla en fase I de ensayos clínicos.

La fiebre del valle del Rift amenaza al ganado y a humanos también en Europa, Asia y América
CReSA| 13 septiembre 2012 10:09
El virus de la Fiebre del valle del Rift puede ocasionar daños importantes en el ganado y también en humanos. Un estudio en el que han participado investigadores españoles alerta de que, aunque tradicionalmente los brotes se han producido en el África subsahariana, la reciente aparición de brotes en Oriente Medio ha aumentado la preocupación por la posibilidad de que el virus se extienda por Europa.¡, Asia y el continente americano.

Los halcones híbridos pueden infectarse con el virus del Nilo occidental
CReSA| 11 junio 2012 11:14
Por primera vez, investigadores han descrito una infección experimental con el virus del Nilo occidental (VNO) en halcones híbridos Gyr-Saker y han demostrado que pueden infectarse por este virus. Los resultados obtenidos en este estudio demuestran que, aunque los halcones híbridos no parecen ser buenos reservorios para la transmisión del VNO a través de mosquitos, sí que pueden contraer el el virus y desarrollar viremia y anticuerpos frente al virus.

Activities for students

Escolab 2012

From February to May 2012, CReSA offered visits within the initiative Escolab 2012. In total, 279 secondary level students from 10 different schools have been able to know the center:

08/02/2012
IES Martí Miquel i Pol
Cornellà de Llobregat
Cicle Formatiu Superior
30 students

17/02/2012
Escola Daina
Olesa de Montserrat
Batxillerat
30 students

22/02/2012
Institut Gorgs
Cerdanyola del Vallès
Batxillerat
20 students

01/03/2012
Escola Borges Blanques
Borges Blanques
ESO
50 students

07/03/2012
Sant Gabriel Viladecans
Viladecans
Batxillerat
15 students

13/03/2012
IES Castell d´Estela
Amer
Batxillerat
20 students

21/03/2012
Institut de Parets del Vallès
Parets del Vallès
Batxillerat
30 students

28/03/2012
Institut Escola Municipal del Treball
Batxillerat
Granollers
20 students

17/04/2012
Institut Escola Municipal del Treball
Granollers
Cicle Formatiu Superior
28 students

24/04/2012
INS Miquel Martí i Pol
Roda de Ter
Batxillerat
16 students

16/05/2012
IES Barcelona Congrès
Barcelona
Batxillerat
20 students

30/05/2012
IES Verdaguer
Batxillerat
Barcelona
30 students

Science week 2012

On the occasion of the 16th edition of Science Week (16-25 November 2012) the CReSA received a total of 5 groups:

15/11/2012
Escola Fort Pius
Batxillerat
Barcelona
15 students

20/11/2012
Centre Estudis Dolmen
CFGS
Hospitalet de Llobregat
20 students

21/11/2012
Escola Pia Santa Anna
Batxillerat
Mataró
32 students

22/11/2012
IES Roger Llúria
CFGS Laboratoris
Barcelona
20 students

28/11/2012
Esc. Sant Ignasi de Sarrià
Batxillerat
Barcelona
15 students

Activities for teachers

First update workshop for science teachers

The “First update workshop for science teachers” organitzed by the CReSA was hold in July 2012, 4. This first edition was entitled “Zoonosis: concepts, tehcniques and biosafety” and was very successful, with more that 100 registrations.

Teachers who attended the conference came from secondary education centers throughout Catalonia: Barcelona, Tarragona, Les Borges Blanques, Olot, Barberà del Vallès, Rubí, L'Hospitalet del Llobregat, Vilamoura, Cerdanyola del Vallès and many other locations.

The workshop was inaugurated by Jordi Sabaté, from the Education Department of the Generalitat de Catalunya.
Four sessions were organized in the morning, focused on update in microbiology and bacterial resistance to antibiotics, immunology and new vaccination strategies, update on laboratory techniques, and zoonotic diseases and biosecurity protocols. In the afternoon, the teachers visited different laboratories at CReSA: PCR (extraction, amplification and electrophoresis), pathology laboratory, virology and cell culture, bacteriology laboratory, or external route at BSL3 laboratories.

The workshop was funded by the Spanish Foundation for Science and Technology (FECYT).

Divulgation

CReSAPIENS, science divulgation journal

CReSAPIENS is a science divulgation journal aimed to divulgate the knowledge and results of research generated at the CReSA. CReSAPIENS has been created with the aim of approaching science to society, trying to make understandable issues only reserved for the scientific community until now. The Editorial Board of CReSAPIENS is a multidisciplinary team that has been working enthusiastically to create this divulgation tool in order to disseminate the scientific knowledge in animal health and advances achieved by the CReSA researchers.

In the second issue we dealed with the food safey (from the farm to the table). In the third issue we dealed with the world of animal health vaccines. This issue has been funded by Boehringer Ingelheim, Novartis Animal Health, Esteve, Rubinum, Invesa, Circovac (Merial), Clinobs and Fundación Española para la Ciencia y la Tecnología (FECYT).

CReSA & the city: a blog from us to everybody

We recently developed the corporative blog CReSA & the city. This new tool is shared for all the CReSA people (researchers, PhD students, laboratoy technicians and support staff); because all of us work every day for the society, for the citizens. And the citizens are our target. CReSA & the city is the voice of CReSA for the general public. We inform you about our ideas and opinions, our research projects, our achievements and the activities that we organize. Whitout technical terms, whithout complications. A blog from us, for everybody.

The posts:

Science Week: discovering science

Science Week 2012 was celebrated on November, 16 to 25 2012. CReSA participated in this initiative and offered activities throughout the week, addressed to secondary education students.

Virulent comments (2): VIH and cinema

Virology and film are matters of the twentieth century, the century when they have reached their maturity

From farm to fork, through the slaughterhouse

Animal health is an issue for humans too! Certain diseases, known as zoonoses, can affect both animals and people. Examples of these diseases are tuberculosis, trichinosis or cysticercosis, among others.

CReSAPIENS nº 3; Animal health vaccines

CReSAPIENS issue number 3 is now available. The world of animal health vaccines is a passionate world that you will discover through the CReSA experts.

Virulent comments (I): About noroviruses. And at this time, not due to cucumbers…

In the last weeks of September (the first cases occurred on 19 September), around eleven thousand people (mostly children and youth) from institutes in eastern Germany (Berlin and southern Thuringia, Brandenburg and Saxony) have suffered diarrhea and vomiting due to norovirus.

Debating about prion diseases

Last week (October 1) we celebrated the VIII scientific-technical meeting on Transmissible Spongiform Encephalopathies (TSE) in the Faculty of Veterinary Medicine, UAB. specially administration staff related to TSE surveillance plans.

CReSA and the fire department

Una visió simplista interpretaria que els bombers són aquells que s'encarreguen d'extingir incendis. No obstant, els incendis són accidents i, per tant, no són la regla, sinó l'excepció de la vida del dia a dia. Aleshores, aquesta versió simple podria continuar amb tota una sèrie de qüestions… I què fan la resta del temps? Val la pena mantenir un parc de bombers si la major part del temps no fan la feina que els ha originat? I si en temps de crisi reduïm el nombre dels parcs de bombers?

A blog from us, for everybody

What do you know about the CReSA? Do you know that… we study animal diseases, including those that can be a public health problem? … we analyze if cows sacrified in Catalan slaughterhouses are infected by prions ("mad cows" disease)? … we carry on avian flu and West Nile virus surveillance? … we organize guided tours around our laboratories for secondary level students every year? … we have a videoclip channel and a journal for the public in general?

More than 100 science teachers attended a workshop organized by the CReSA

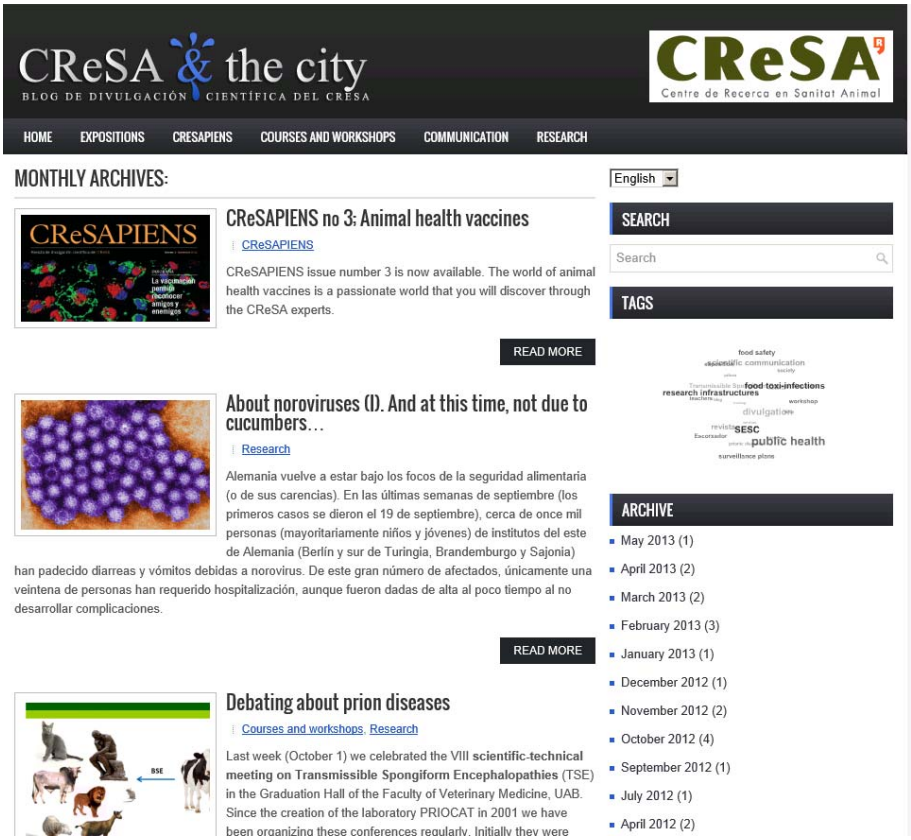
The "First update workshop for science teachers" organitzed by the CReSA was hold in July 2012, 4. This first edition was entitled "Zoonosis: concepts, tehcniques and biosafety" and was very successful, with more that 100 registrations.

CReSAPIENS issue number 2 is now available

Different aspects concerning food safety are discussed in CReSAPIENS issue number 2. CReSAPIENS is a science divulgation journal aimed to divulgate the knowledge and results of research generated at the CReSA.

CReSA scientists: close to you

An itinerant exhibition for the general public on research in animal health is shown from November, 2011. The exhibition will be offered to schools, libraries and other institutions to be used during the 2012 plan-



The new blog: CReSA & the city

CReSADIGITAL: more than 500 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, associations, companies and institutions, as well as anybody interested in life sciences.

2 bulletins were published in 2012:

CReSADIGITAL 18
February 2012

CReSADIGITAL 19
December 2012

CReSA TV and YouTube

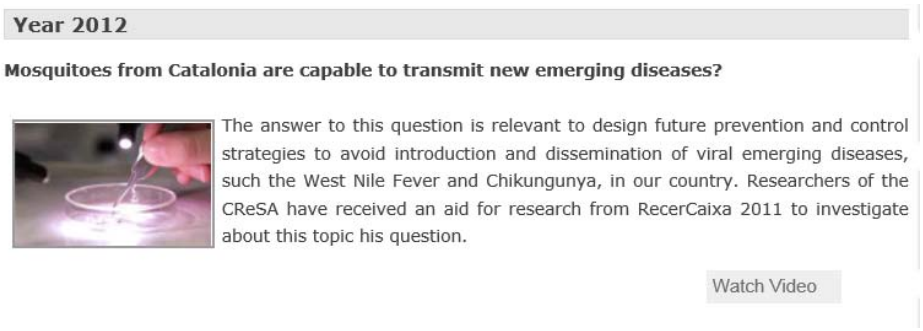
The digital channel called CReSA TV was funded by a project funded by the *Comissionat per a Universitats i Recerca* of the *Generalitat de Catalunya*. To reach all audiences, the aim of this channel is to offer content related to the activity of the CReSA in an informative and comprehensive way. Five different video clips have been recorded that seek to solve the eternal problem of understanding science: they can be understood by the general public.

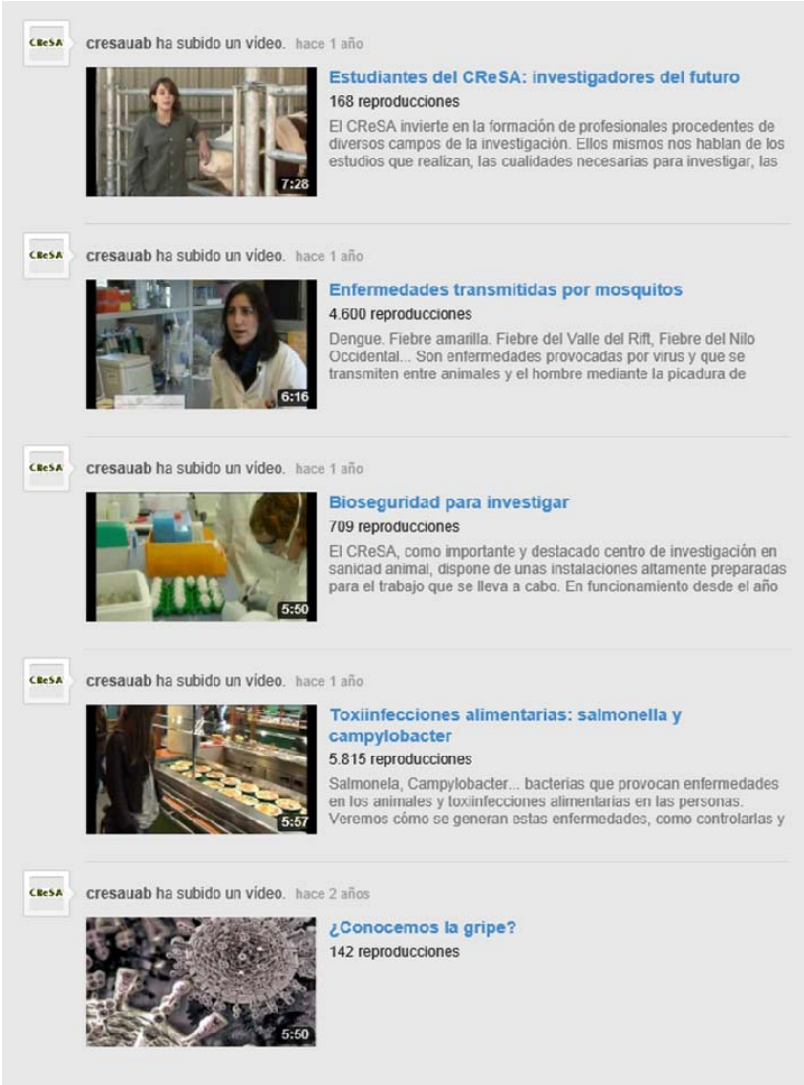
In 2012 a new videoclip was updated:
Mosquitoes from Catalonia are capable to transmit new emerging diseases?

Moreover, 3 videoclips were produced to be 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





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 toxiinfections
- "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 2012:

Esc. Daina Isard (Olesa Montserrat)
Escola Pia Santa Anna (Mataró)
Facultat de Veterinària UAB (Hall & Library)
Facultat Veterinària UCH (Valencia)
Fàbrica del Sol (Barcelona)

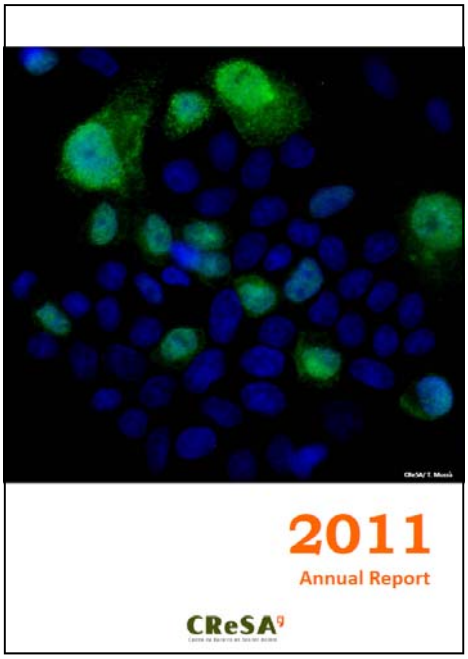
Meeting for university students

Come to investigate to CReSA: animal health grants, research... and much more
Informative meeting to explain opportunities for research in CReSA.
11th April, 15 students

Parlem del CReSA

This electronic bulletin was launched in 2012 as a tool of internal information for the CReSA staff.
6 internal informative bulletins were sent in 2012.

Publications: materials and reports



CReSA Annual Report 2011

Associations and networks

Euroscience

Consell Català de la Comunicació Científica (C4)

Associació Catalana de Comunicació Científica (ACCC)

Plataforma Vet+i

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