

CReSA/ M. Ballester

2010

Annual Report

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Presentation

01

Who are we?

What is CReSA?

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

The CReSA unites the human potential for research into animal health of both founding institutions, and takes advantage of a new and technologically advanced

building, with level-3 bio-containment (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:

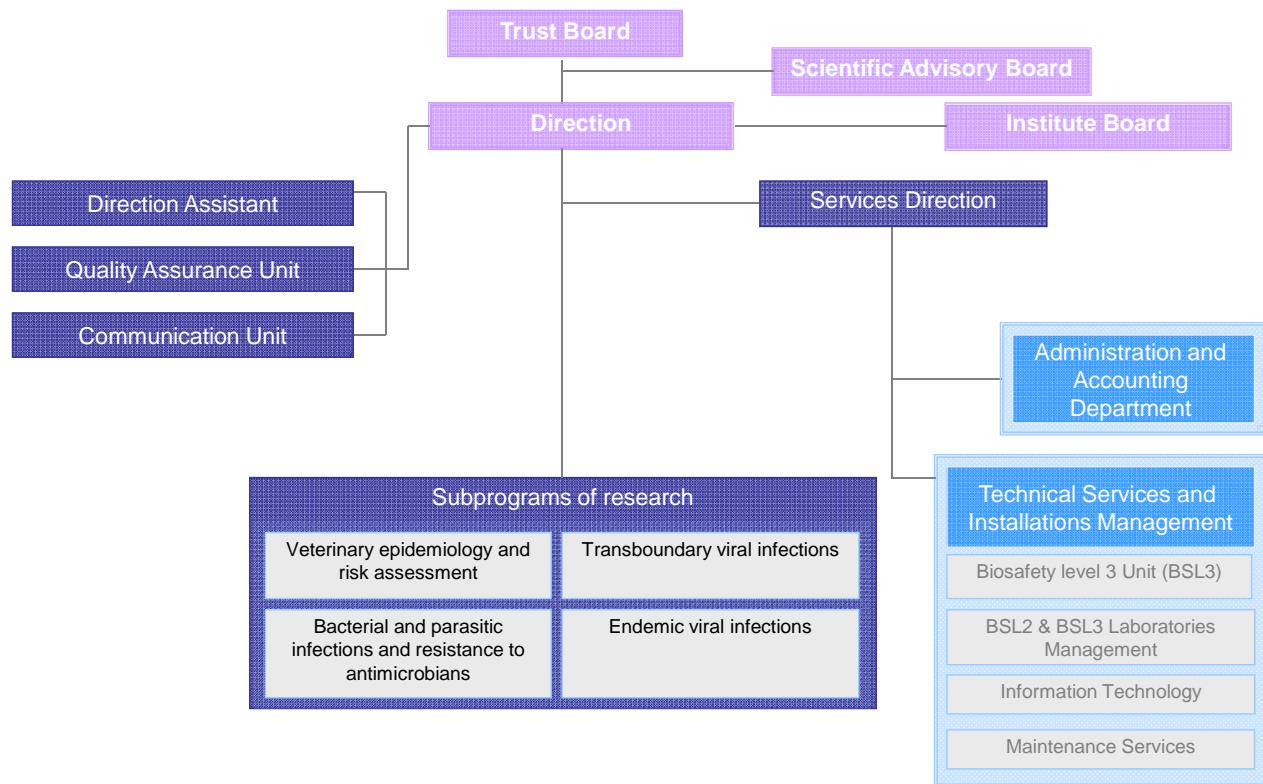
- We develop research and development programs within the field of animal health.
- We transfer the scientific advances that we achieve to the sector.
- We offer services in the research and development field by means of arranged R&D programs.
- We advise agrifood companies and public administration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



The CReSA has been directed by Dr. Mariano Domingo Álvarez, since it was created in 1999 by initiative of the IRTA and UAB.

Organization

Organization chart



The Institute Board of the CReSA

The Institute Board, or Junta de Centre, was created in 2009 as a consultant and advisory body of the CReSA, assisting the direction in discussions of aspects of the center's activity that require advice and intermediation. Meetings are held every two months, or more frequently if required. The Institute Board is composed of the coordinators of the Scientific Subprograms of the CReSA, and the people responsible for BSL2, BSL3, Communication, Administration and Quality Assurance, plus one representative of the Graduate Students and one representative of Technicians.

Board of trustees

Members

PRESIDENT

Ana Ripoll i Aracil
(UAB Rector)

VICEPRESIDENT

Josep Maria Monfort i Bolívar
(General Director of IRTA)

BOARD MEMBERS DESIGNATED BY THE UAB

Jordi Marquet i Cortés
(Vice-rector of Strategic Projects Research Park of UAB)

Ivan Martínez i Flores
(Head of Research and Development Area of UAB)

Manel López i Béjar
(Dean of Veterinary Faculty of UAB)

BOARD MEMBERS DESIGNATED BY THE IRTA

Carles Rosell i Rufat
(Director of Coordination and Programs of IRTA)

Joaquim Porcar i Coderch
(Subdirector of Agriculture, Livestock and Innovation of DAR)

Ramón Jóve i Miró
(General Director of the regional service for Lleida, Alt Pirineu and Aran for the safeguard of health)

BOARD MEMBERS DESIGNATED BY THE IRTA AND UAB

Ramon Moreno i Amich
(General Director of Research Centers Program (CERCA) of the Department of Innovation, Uni-

versities and Companies of the Generalitat of Catalonia)

Rosa M. Cubel Muñoz
(General Director of Agriculture, Livestock)

Joan Roca i Acín
(General Director of the Research Department of Innovation, Universities and Companies of the Autonomous government of Catalonia)



Universitat Autònoma de Barcelona



Functions of the Board of Trustees

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

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. Currently, the SABC is comprised of 6 members:

PRESIDENT

Dr Marian Horzinek
Holland
Dept. of Infectious Diseases and Immunology,
Faculty of Veterinary Medicine, Utrecht University

MEMBERS

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

Dr Philippe Vannier
France
Agence Française de Sécurité Sanitaire des Aliments (AFFSA)

Dr Marion Koopmans
Holland
National Public Health Laboratory (RIVM)

Dr Esteban Domingo

Spain
Centro de Biología Molecular “Severo Ochoa” (CBMSO)

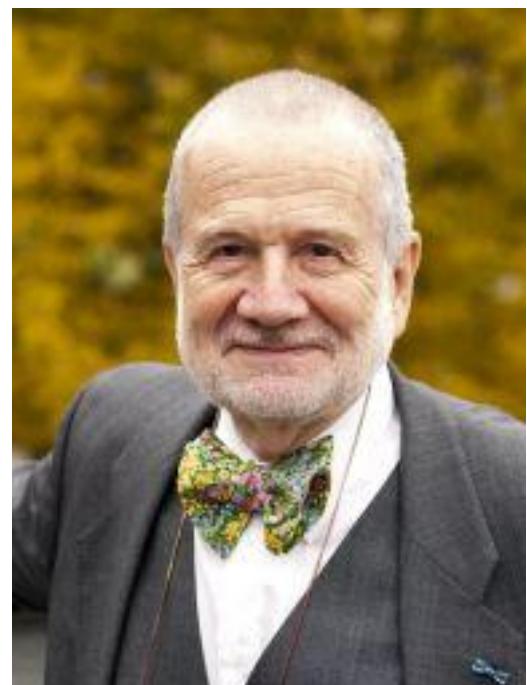
Dr Luis Ortega Mora
Spain
Universidad Complutense de Madrid (UCM)

The first meeting of the SABC on the CReSA facilities was held in April 2010.



Currently, the Scientific Advisory Board is comprised of 6 members from the European Union.

Professor Marian Horzinek was the President of the Scientific Advisory Board of the CReSA in 2010. He resigned from his functions as President at the end of the year and was substituted by Dr Philippe Vannier.



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 bio-security level 2, occupies 717 m².

The area consists of eleven laboratories and equipment rooms in which specific activities are carried out: bacteriology, virology, immunology, molecular biology, pat-

hological anatomy, cell culture, termocyclers, PCR sample extraction, electrophoresis, entomology, ultrafreezing, equipment, preparation of reactants, etc.



A large team of BSL2 laboratory technicians provides essential support for research and development.

The level 3 biocontainment unit



David Solanes is responsible for the Biocontainment Unit.



Francesc Xavier Abad is responsible for the BSL3 laboratories.

Biocontainment systems, barriers and protocols

- Secure management of high-risk infectious agents
- Hermetic isolation systems
- Negative pressure gradients
- Absolute air filtration
- Treatment of liquids and solids
- Mandatory showers on leaving the biocontainment unit
- 6 high security laboratories: virology, bacteriology, cell culture, equipment, molecular biology and prions
- 12 high security rooms 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 of level 3 biosecurity, 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) 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.

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 with regard to the corridor 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 corridor. 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, permitting 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 rapid control of all elements and parameters that directly influence the running of the facilities.



A team of specialised technicians participates in experimental BSL3 protocols while the study is in progress.



Human resources

Direction

Director

Domingo Álvarez, Mariano

Direction of Services

Solanes Foz, David
(Director of Services)

Administration and Accounting Department

Pratsavall Badillo, Sílvia
(Responsible for administration, accounting and human resources)
Gutiérrez Cabello, Marta
(Accounting)
Pastó López, Montse
(Assistant director; management of projects, contracts and human resources)

Menéndez Cabrera, Isabel
(Reception and accounting support)
Lozano Padilla, Carme
(Administrative support to Consolider and DAR)

Technical services and facilities support

Level 2 biosafety laboratories (BSL2)

Royuela Marín, Fernando
(Responsible for BSL2 laboratories)
Ivars Espuñes, Josep Maria
(BSL2 technician)

Cleaning team

Carrero Torres, Mercedes
(Cleaning service)
Castillo Alcalá, Manuela
(Cleaning service)
Muñoz Aguilar, Rosario
(Cleaning service)

Level 3 Biocontainment Unit (BSL3)

Solanes Foz, David
(Responsible for BSL3)
Cordón Morales, Iván
(Animal housing technical coordinator)

Osuna Marín, María
Àngels (Animal care technician)

Rosell Bellsolà, Valentí
(Animal care technician)
Torras Sales, Concepció
(Animal care technician)
Prieto Martín, Juan Carlos
(Animal care technician)
López Aceña, Javier
(Animal care technician)
Pereira Sanchez, Claudia
(Animal care technician)
Galindo Cardiel, Iván José
(Pathologist)

Abad Morejón de Girón,
Francesc Xavier
(Responsible for BSL3 Laboratories)

Maeso García, Raquel
(BSL3 technician)

Núñez Llaves, Raul (BSL3 laboratory technician)

Information Technologies

Cordón Morales, Rubén
(Responsible for IT)



The IT manager supports the hardware and software in the centre, and maintains the server and webmail. He also posts the content provided by the Communication Unit on the CReSA website.



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

Quality Assurance Unit

Ordóñez Ordóñez,
Montserrat (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)

Josep Rexach Fumanya
(Communication technician)



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

Researchers

Researchers

Accensi Alemany, Francesc
Alba Casals, Ana
Allepuz Palau, Alberto
Almería de la Merced,
Sonia
Aragón Fernández, Virginia
Badiola Sáiz, Ignacio
Ballester Devís, María
Bensaid, Albert Moisés
Busquets Martí, Núria
Casal Fàbrega, Jordi
Cerdà Cuéllar, Marta
Darji, Ayub
Darwich Soliva, Laila

De la Torre Martínez, Eugenia
Díaz Luque, Iván
Dolz Pascual, Roser
Fraile Sauce, Lorenzo José
Ganges Espinosa, Lilianne
García Migura, Lourdes
Hernández de la Plaza, Bruno
Kekarainen, Tuija
López Soria, Sergio
Majó Ferrer, Natàlia
Martín Castillo, Margarita
Mateu de Antonio, Enric
Montoya González, María
Napp Avelli, Ernesto
Nofrarías Espadamala,
Miquel

Núñez Garrote, Jose Ignacio
Olvera Van der Stoep, Alex
Pagès Martínez, Nonito
Pérez de Rozas Ruiz de
Gauna, Ana
Pérez de Val, Bernat
Pina Pedrero, Sonia
Pujols Romeu, Joan
Ramis Salvà, Antonio José
Rodríguez González, Fernando
Rosell Bellsola, Rosa
Segalés Coma, Joaquim
Sibila Vidal, Marina
Vidal Barba, Enric
Vilar Ares, Mª José

The CReSA promotes equal opportunities between men and women

The CReSA staff consists of 128 persons (data obtained on December 31st, 2010); 65.6% of these (84) were female.

Laboratory technicians

Aloy Escudero, Núria
Ayats Murillo, Teresa
Ballesté Delpierre, Clara Celia
Cano Carrasco, Esmeralda
Cervera Muñoz, Zoraida
Córdoba Muñoz, Lorena
Espinar Guardeño, María
Galofré Milà, Núria
González Oliver, Judit
Huerta Medina, Eva
Jiménez Melsio, Alexandra
Llorens Segalés, Anna
López Jiménez, Rosa Mª
López Monteagudo, Paula
Martín Fernández, Maite
Martínez Pulgarín, Susana
Mora Salvatierra, Mercedes
Moreno Bustos, Mariano
Muñoz Calvo, Iván
Muñoz Campanya, Marta
Navarro Toro, Nuria

PhD students

PhD students

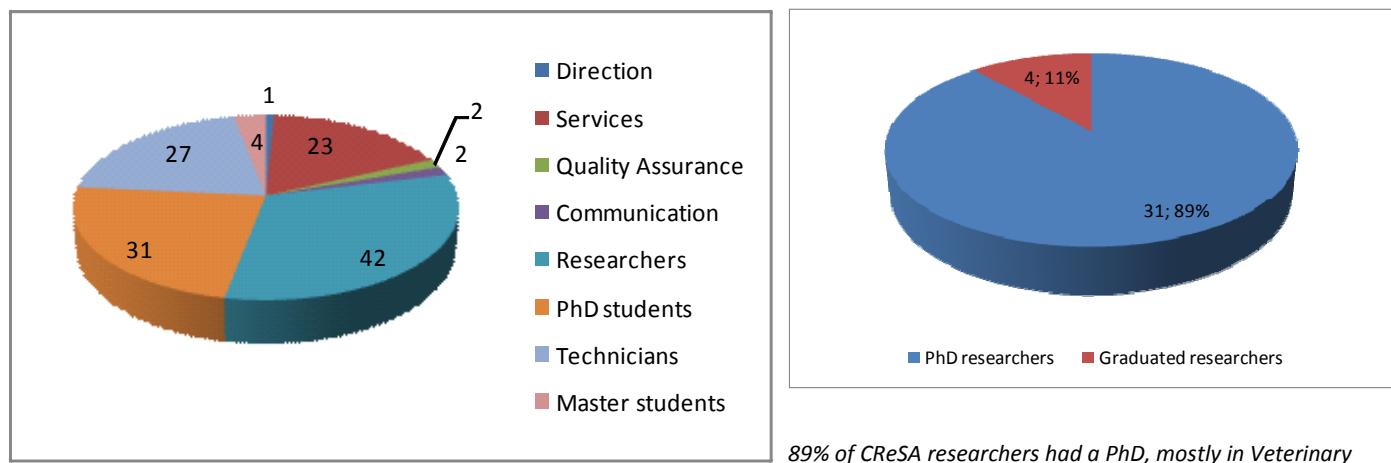
Antillés Silva, Noelia
Aramouni, Mario
Ávila Perez, Ginés
Bertran Dols, Kateri
Chaves Hernández, Aida
Costa Hurtado, Mar
Crisci, Elisa
Dos Santos, Joseane
Gimeno Terradellas, Mariona

González Zabala, Juliana del Pilar
Guta Debela, Sintayehu
Kuzemtseva, Liudmila
Lacasta Marín, Anna
López Vidal, Javier
Lorca Oro, Cristina
Manrique Ramírez, Paula
Marco Salazar, Paola
Martín Valls, Gerard Eduard
Martínez Guinó, Laura

Martínez Moliner, Verónica
Martínez Orellana, Pamela
Mussà, Tufària
Pileri, Emanuela
Rodríguez Pulido, Miguel
Simó Grife, Meritxell
Tarradas Font, Joan
Vergara Alert, Júlia
Urdaneta, Saúl

A clear commitment to young researchers

In 2010, the CReSA trained 27 PhD students and 4 Masters students:
Czerniak, Natalia
Herrero Gil, Aldara
Nieto Blanco, David



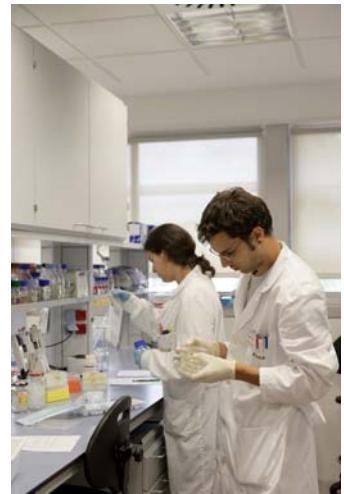
Summary of the activity

02

Relevant facts 2010

Research and development

- The Ministry of Science and Innovation agrees to fund 7 research projects (100%) applied for the CReSA as part of the National Plan 2010.
- 60 peer reviewed papers (ISI Citation Index) published and more than 100 communications at congresses.
- Funding from competitive projects: €1,524,271.38.
- 3 doctoral theses and 8 research studies.
- Participation in 8 European projects and networks: 6 projects of the VII European Framework Program and 2 COST actions.
- Accreditation to carry out assays using agri-food products certified by the Entidad Nacional de Acreditación (ENAC) with number 752/LEI557.
- Certified as a research laboratory complying with Good Laboratory Practices (GLP) and registered in the GLP Verification Programme with number 3/BPL/2009.
- First meeting of the Scientific Advisory Board of the CReSA and, subsequently, first report of recommendations.
- A project research (Dr Joaquim Segalés) was awarded by the fourth edition of the European PCV2 Research Award sponsored by Boehringer Ingelheim.



Technology transfer and services

- 29 private contracts with companies were signed, for a total income of €1,751,759.
- 9 service contracts for the departments of the Generalitat de Catalunya involving animal and human health.
- 4 congresses and workshops for dissemination of results organized (I Jornades sobre zoonosis i malalties emergents, II Congrés Ibèric d'Epidemiologia, XII Jornades de Porcí de la UAB and Consolider Meeting).
- 2 technical seminars for the PATT Plan of the DAR and 27 technical seminars were organized.
- CReSA Training Program was launched, involving participation of 40 European vets.
- 26,525 analyses for the diagnosis of viral statutory diseases of swine and ruminants were carried out.
- The PRIOCAT laboratory analyzed 16,222 samples for the diagnosis of Transmissible Spongiform Encephalopathies in Catalonia.
- The Servei de Suport a Escorxadors (SESC) managed a total of 189 consultations.
- 485 students from 24 secondary schools in Catalonia visited the center for education activities.
- 433 subscribers to the CReSADIGITAL online bulletin.
- CReSA exhibited at: Fòrum Biocat (Barcelona), 21st International Pig Veterinary Society (Vancouver) and Expoaviga (Barcelona).

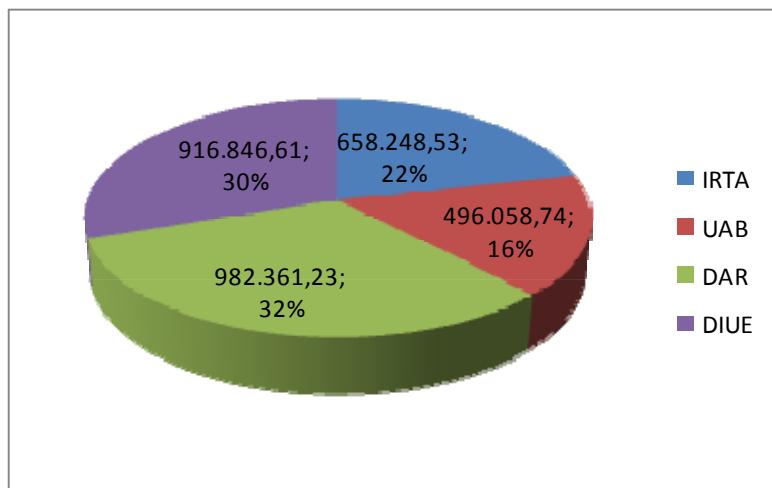
Economic information

In 2010, the CReSA received most of its financing from public sources (trustees and competitive funds). The public budget for 2010 was around 5 million € (competitive income: €1.976.155; non-competitive income: €3.032.322). Twenty-nine private contracts with companies represented a total income of €1,751,759.

Competitive income

BODY	RESEARCH PROJECTS	SUBVENTIONS FOR STAFF	OTHERS	TOTAL
AGAUR	0,00	21.420,00	5.322,00	26.742,00
DIUE	0,00	260.000,00	0,00	260.000,00
CARLOS III	36.666,66	0,00	0,00	36.666,66
FECYT	0,00	0,00	7.200,00	7.200,00
INIA	105.540,35	0,00	0,00	105.540,35
MICINN	1.158.013,40	115.938,96	27.890,00	1.301.842,36
ME	0,00	14.112,84	0,00	14.112,84
UE	217.050,97	0,00	0,00	217.050,97
OTHERS	7.000,00	0,00	0,00	7.000,00
Total	1.524.271,38	411.471,80	40.412,00	1.976.155,18

Non-competitive income from UAB, IRTA and Generalitat de Catalunya



Projects

National Research Plan

Patogenia, epidemiología y biología molecular del Torque Teno Virus (TTV) del cerdo. Uso del TTV como vector de expresión

AGL2006-02778
IP CReSA: Tuija Kekarainen
Awarded: 2006
Duration: 3 years
End: 30/09/2010

Caracterización funcional e inmunológica de las proteínas de superficie y proteínas secretadas de cepas virulentas de *Haemophilus parasuis*

AGL2007-60432
IP CReSA: Virginia Aragón
Awarded: 2007
Duration: 3 years
End: 04/10/2010

AGL-2010-15232 Selección de candidatos vacunales para bloquear los pasos iniciales de la infección por *Haemophilus parasuis*

IP CReSA: Virginia Aragón
Awarded: 2009
Duration: 3 years
Start: 1/01/2011
End: 31/12/2013

Desarrollo de nuevas estrategias de control de la peste porcina africana

AGL2007-66441
IP CReSA: Fernando Rodríguez
Awarded: 2007
Duration: 3 years
End: 04/10/2010

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: 1/01/2011
End: 31/12/2013

Identificación y caracterización de microRNAs víricos que afectan al porcino

AGL2007-66371
IP CReSA: Jose Ignacio Núñez
Awarded: 2007
Duration: 3 years
End: 4/10/2010

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: 1/01/2011
End: 31/12/2013

Epidemiología de la influenza porcina en España: prevalencia, subtipos existentes y modelo epidemiológico de evolución de la infección en granjas de porcino

AGL2007-64673
IP CReSA: Jordi Casal Fàbrega
Awarded: 2007
Duration: 3 years
End: 04/10/2010

Papel de la inmunidad innata del hospedador en la protección y patogenia de la infección por el virus de influenza aviar

AGL2007-60434
IP CReSA: Ayub Darji
Awarded: 2007
Duration: 3 years
End: 04/10/2010

Caracterización antigénica de cepas del virus del síndrome reproductor y respiratorio porcino de distinto origen y su relevancia para el desarrollo de vacunas eficaces

AGL2008-05708-C02-02
IP CReSA: Laila Darwich
Awarded: 2008
Duration: 3 years
End: 31/12/2011

Nuevas estrategias vacuinales frente al virus de la peste porcina clásica. Estudio de mecanismos implicados en la inmunopatogenicidad viral

BIO2008-04487-C03-03
IP CReSA: Mariano Domingo
Awarded: 2008
Duration: 3 years
End: 31/12/2011

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
End: 31/12/2011

Vacunas basadas en capсидas vacías (VLPs) químéricas frente al virus de la gripe porcina: estudios inmunológicos

AGL2009-12945-C02-01
IP CReSA: María Montoya
Awarded: 2009
Duration: 1 year
Start: 1/01/2011
End: 31/12/2011

Caracterización de la respuesta inmune inducida por cepas del virus de la gripe porcina circulantes en España. Desarrollo de vacunas basadas en VLPs químéricas

AGL 2010- 22200-C02-01
IP CReSA: María Montoya
Awarded: 2009
Duration: 3 years
Start: 1/01/2011
End: 31/12/2013

Patogenia de enfermedades víricas porcinas

CONSOLIDER INGENIO CDS2006-00007
Coordinator: Mariano Domingo
Awarded: 2006
Duration: 5 years
End: 14/09/2011

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: 1/01/2011
End: 31/12/2013

Neosporosis bovina: respuesta inmune humoral y celular en gestaciones puras y cruzadas de vacas lecheras crónicamente infectadas a lo largo de la gestación

AGL 2010-21273-C03-02
IP CReSA: Sonia Almería
Awarded: 2009
Duration: 1 year
Start: 1/01/2011
End: 31/12/2011



Most of the research projects in course at the CReSA during 2010 were funded by the National Research Plan (MICINN).

Seventh Framework Programme (7FP) projects

TB-STEP: Strategies for the eradication of bovine tuberculosis

KBBE-2007-212414

IP CReSA: Mariano Domingo

Contract Type: Small or medium-scale focused research project (participation associated with UCM)

Start: 2008-10-01

End: 2011-12-31

Duration: 39 months

NADIR: The Network of Animal Infectiology Facilities

FP7-INFRASTRUCTURES-2008-1, 228394

IP CReSA: Mariano Domingo

Start: 1-05-2009

Duration: 4 years

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

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

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

FP7-KBBE-2009-3-244547

IP CReSA: Marta Cerdà

Small or medium-scale focused research project

Start: 01-01-2010

Duration: 4 years

ARBO-ZONET: International network for capacity building for the control of emerging viral vector borne zoonotic diseases

FP7-KBBE-2007-211757-

Contract Type: Coordination (or networking) actions, invited participation of the CReSA

Start: 2008-05-01

End: 2011-04-30

Duration: 36 months

EDENext: Biology and control of vector-borne infections in Europe

Emerging Diseases in a changing European environment

IP CReSA: Nitu Pagès

Start: 2011/01/01

End: 2014/12/31



CReSA participated in 6 7FP projects of the European Union in 2010.

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

Array technologies for BSL3 and BSL4 Pathogens.

COST B28

IP CReSA: Francesc Xavier Abad/

Ayub Darji

Awarded: 2007



CReSA participated in 2 COST actions, allowing the European collaboration in Science and technology.

INIA projects

Aislamiento y caracterización de bacteriófagos de para su aplicación en el sector avícola y porcino como agentes de biocontrol

RTA2006-00065-00-00
IP CReSA: Montserrat Llagostera
Awarded: 2006
Duration: 3 years + extension
End: 28/02/2010

Ensayos de persistencia ambiental del virus y estudio de la inmunopatogenia en aves criadas en regímenes no intensivos

FAU2006-00019-C03
IP CReSA: Natàlia Majó
Awarded: 2007
Duration: 3 years
End: 11/02/2010

Utilización de un clon infeccioso del Torque teño virus del cerdo como vector de antígenos de agentes víricos de interés económico en la especie porcina. Desafío con los agentes víricos salvajes

TRT2006-00018-00-00
IP CReSA: Tuija Kekarainen
Awarded: 2007
Duration: 3 years
End: 11/02/2010

Epidemiología, control y aspectos entomológicos de la Lengua Azul (BTB) en rumiantes silvestres en España

FAU2008-00019-C03-01
IP CReSA: Jordi Casal
Awarded: 2008
Duration: 3 years
End: 14/12/2011

Epidemiología 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
End: 14/12/2011

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

SGR Research Groups

Immunología veterinaria

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



Projects of the 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: María Montoya
Duration: 3 years
End: 31/10/2012

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: María Montoya
Duration: 3 years
End: 31/10/2012

capacidad de la red RE-LEG, a desarrollar en el laboratorio coordinador de la misma

MICINN-Instituto Carlos III
GR09/0040
IP CReSA: María Montoya
Duration: 3 years
End: 31/10/2012



Estudio comparativo de la respuesta inmune frente al virus gripe pandémico A(H1N1)v en enfermos graves y leves (Inmunoflu)

MICINN-Instituto Carlos III
GR09/0021
IP CReSA: María Montoya
Duration: 3 years

Nuevos procedimientos para el diagnóstico y caracterización del virus A (H1N1)v pandémico, esenciales para mejorar la



Research valorization projects

Revisió i evaluació de la cartera científico-tecnològica del CReSA

VALCON09-1-0011
Projects ACC10 (CIDEIM/COPCA)
IP CReSA: Elisabet Rodríguez
Application: 2009
Duration: 6 months + extension
End: 30/03/2010

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

Other projects

Actividades de celebración del 10º aniversario del CReSA

FECYT
FCT-10-517
IP CReSA: Elisabet Rodríguez
Awarded: 2010
Duration: 1 year
End: 20/05/2011

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

Canal CReSA: Videoclips de divulgación científica per a tothom

DIUE
ACDC-00136
IP CReSA: Elisabet Rodríguez
Awarded: 2010
Duration: 6 months
End: 31/12/2010

Demostración de la hipótesis dinámica de la infección tuberculosa latente

CRS08-002
IP CReSA: Mariano Domingo
Awarded: 2009
Duration: 3 years
End: 31/12/2011

Services for DAR

Pla de vigilància del virus del Nil Occidental a zones considerades de risc
CReSA 13017
IP CReSA: Anna Alba

Vigilància d'influència avíaria i malaltia de Newcastle en aus silvestres a Catalunya

CReSA 13030
IP CReSA: Natalia Majó

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'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

Encuesta epidemiològica de *Besnoitia besnoiti* a les comarques del Pirineu català
CReSA 09027
IP CReSA: Jordi Casal



In 2010 the CReSA executed 9 services for the Departament d'Agricultura, Alimentació i Acció Rural (DAR) 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.

Summary of the scientific activity

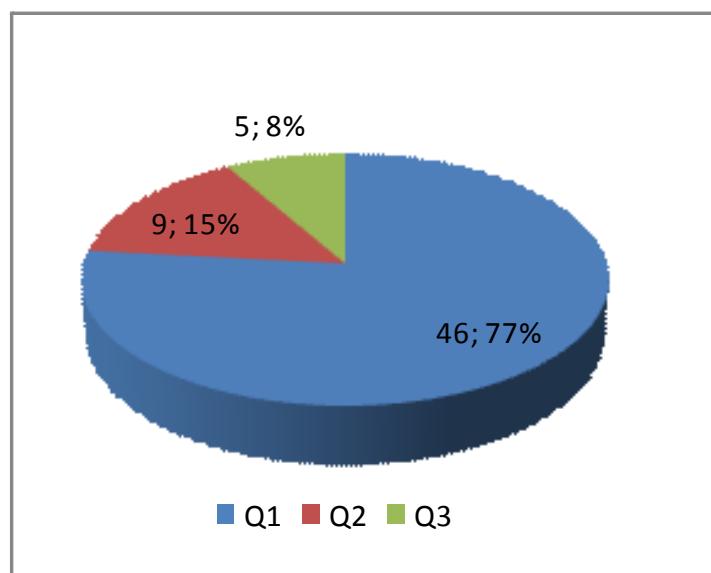
Summary of scientific activity 2001-2010

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

Summary of Peer reviewed papers 2010

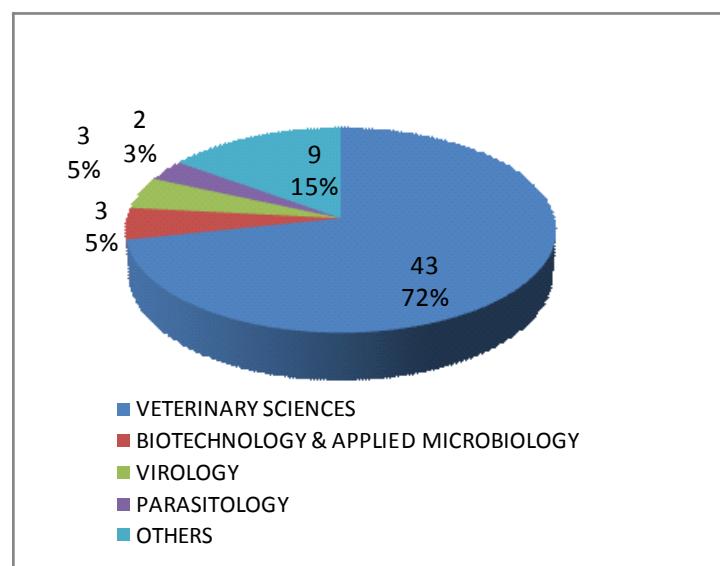
Peer reviewed papers	TOTAL	EPIDEM	BACPAR	EXOTIQUES	ENDEMOVIR	OTHER
Number of publications	60	8	19	10	18	5
Average impact index	2,41	2,22	2,61	2,18	2,73	1,18
Publications in Quartile 1	77% (46/60)	75% (6/8)	84% (16/19)	70% (7/10)	72% (13/18)	40% (2/5)
Publications in Veterinary Sciences category	72% (43/60)	75% (6/8)	68% (13/19)	60% (6/10)	83% (15/18)	100% (5/5)

Quartiles



77% (46) of the scientific publications of the CReSA in 2010 were placed in the first quartile.

Categories



72% (43) of the scientific publications of the CReSA in 2010 were placed in the Veterinary Sciences category.

Research subprograms

03

Research subprograms

New 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 the UAB, with the mandate of developing research activities in the field of Animal Health.

The Cooperative Agro-Alimentary Research System of Catalonia is struc-

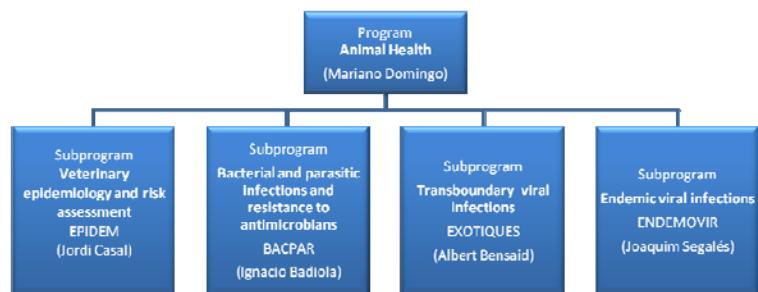
tured around five large areas: Vegetal Production, Global Change and Environment, Alimentary Enterprises, Agro-Alimentary Economy and Animal Production.

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 CReSA's director, Mariano Domingo. The classification of the research activities and

subprograms carried out by the CReSA has been reorganised. activities in research subprograms and lines.



Coordinators of the CReSA Research Subprograms (from left to right: Dr Ignacio Badiola Sáiz, Dr Albert Bensaid, Dr Joaquim Segalés Coma and Dr Jordi Casal Fàbrega)



Veterinary epidemiology and risk assessment

Coordinator: Jordi Casal Fàbrega
jordi.casal@cresa.uab.cat

Objectives

The veterinary epidemiology and risk assessment subprogram deals with both descriptive and analytical epidemiological studies, models and risk analysis, as well as scientific counselling with the design, implementation and evaluation of surveillan-

ce and control programs for several epizootic diseases. It contributes to scientific advances in the study of epidemics and disease control, through basic research projects and field studies, modelling and risk analysis of the introduction of diseases to

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



Research lines

VETERINARY EPIDEMIOLOGY AND RISKS ASSESSMENT (EPIDEM)

Coordinator

Jordi Casal Fàbrega

Focus areas are: (1) Epidemiological studies of different diseases (bovine spongiform encephalopathy, classical swine fever, Aujeszky's disease, swine influenza, cysticercosis and some chronic diseases of small ruminants such as Maedi-Visna, paratuberculosis and border disease); and (2) Modelling and risk analysis of several diseases (classical swine fever, BSE and Avian Influenza).

Researchers

Jordi Casal Fàbrega
Anna Alba Casals
Alberto Allepuz Palau
Sebastián Napp Avelli
Maria José Vilar Ares

PhD students

Meritxell Simon Gifré
Gerard Martín Valls
Sintayehu Guta Debela



Researchers and PhD students of the EPIDEM research line.

EPIDEM subprogram Main results

Epidemiology of the swine influenza in Spain

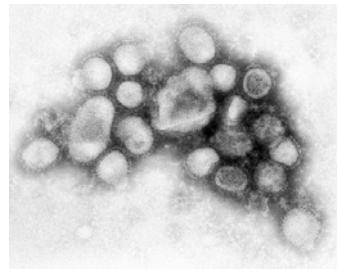
Epidemiologia de la influenza porcina a Espanya: prevalència, subtipus existents i model epidemiològic d'evolució de la infecció a granges de porcs

IP CReSA: Jordi Casal

Influenza is a very important disease due to its impact on health and society. The objective of this project is to determine the subtypes of influenza viruses present in

swine in Spain and their prevalence, and to determine the dynamic of infected farms. The project was completed over the last year: the dynamic of infection was monitored in a sample of fattening pigs on a second farm from 3 to 22 weeks and the data was analysed. The study also continued of outbreaks with clinical signs compatible with swine flu and part of the phylogenetic

study was conducted, which consisted of the sequencing and production of phylogenetic trees for the different isolates. Finally, advances were made with the creation of a model to simulate the evolution of the infection of the flu virus in a herd of pigs.



European Reoviruses surveillance network

MEDREONET. Surveillance network of Reoviruses, Bluetongue and African Horse Sickness, in the Mediterranean basin

IP CReSA: Jordi Casal

The bluetongue and African horse sickness viruses are reoviruses that are transmitted by vectors pertaining to the Culicoides genus that affects ruminants and equines respectively. The aim of this coordinated ac-

tion was the exchange of information on bluetongue, African horse sickness and epizootic hemorrhagic disease between different laboratories working on these diseases. Another objective was to promote regional studies of the risk of introducing and diffusing new strains in neighbouring areas (North Africa and Turkey), overseeing the expansion of C. imicola in other vectors and improving information

technology for the exchange of data on surveillance, vectors and vaccination. The CReSA has coordinated risk analysis studies, has worked on analysing the risk of bluetongue entering via transport networks and semen and has produced a model that enables determination of the risk of the virus remaining in a country during the winter.

In the last year 3 articles have been written and sent on these aspects and data has been analysed that was obtained from epidemiological surveys conducted in Algeria and Turkey.

Epidemiology of Bluetongue in Spain

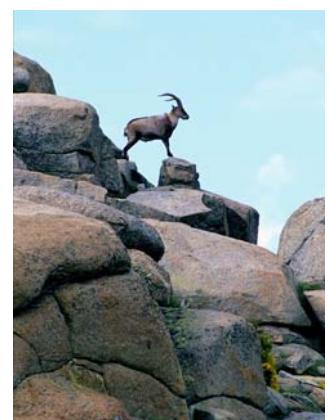
Epidemiologia, control i aspectes entomològics de la llengua blava (VLA) en re-mugants a Espanya

IP CReSA: Jordi Casal

The objectives of the project are: 1. Determine the level of relation between the domestic and wild cycles of BLT infection in Spain. 2. Evaluate the efficiency of inactivated commercial vaccines on different species of wild ungulate: red deer, mouflon, fallow deer and wild goat. 3. Determine the pathogen of BLT-1 and BLT-8 infection on

different species of wild ungulate: red deer, mouflon, and wild goat. 4. Develop and validate sensitive, specific and economic diagnosis methods for the study of the seroprevalence of BLT in wild ruminants in Spain. 5. Establish the general lines for producing an integral programme against BLT in wild ungulate populations in Spain. 6. 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)

Alba A, Casal J, Napp S, Martín PA. **Assessment of different surveillance systems for avian influenza in commercial poultry in Catalonia (North-Eastern Spain).** *Prev Vet Med.* 2010 Nov 1;97(2):107-18.

Alba A, Sánchez-Cabré D, Badiella L, Allepuz A, Napp S, García I, Casal J. **Evolution of the BSE epidemic in Catalonia (1990-2015) based on a stochastic model.** *Vet J.* 2010 May;184(2):182-6.

Allepuz A, García-Bocanegra I, Napp S, Casal J, Arenas A, Saez M, González MA. **Monitoring bluetongue disease (BTV-1) epidemic in southern Spain during 2007.** *Prev Vet Med.* 2010 Sep 1;96(3-4):263-71.

García I, Napp S, Zorrilla I, Vargas A, Pastor J, Muñoz A, Martínez F. **Determination of serum biochemical reference intervals for the Iberian lynx (Lynx pardinus).** *Vet J.* 2010 Feb;183(2):201-4.

García-Bocanegra I, Astorga RJ, Napp S, Casal J, Huerta B, Borge C, Arenas A. **Myxomatosis in wild rabbit: design of control programs in Mediterranean ecosystems.** *Prev Vet Med.* 2010 Jan 1;93(1):42-50.

Napp S, Casas M, Moset S, Paramio JL, Casal J. **Quantitative risk assessment model of canine rabies introduction: application to the risk to the European Union from Morocco.** *Epidemiol Infect.* 2010 Nov;138(11):1569-80.

Solymosi N, Wagner S, Martí-Ágots A, Allepuz A. **Maps2WinBUGS: a QGIS plugin to facilitate data processing for Bayesian spatial modeling.** *Ecography* (2010) 33: 1093-6.

Vilar MJ, García-Peña FJ, Pérez I, Diéguez FJ, Sanjuán ML, Rodríguez-Otero JL, Yus E. **Presence of Listeria, Arcobacter, and Campylobacter spp. in dairy farms in Spain.** *Berliner und Munchener Tierarztliche Wochenschrift* (2010) 123, 58-62.

Bacterial and parasitic infections and resistance to antimicrobians

Coordinator: Ignacio Badiola Sáiz

Ignacio.badiola@cresa.uab.cat

Objectives

The goals are the study of intestinal microbiota, gut health and resistance to antimicrobials, in order to improve knowledge of intestinal microbiota of monogastric farm animals, understanding the modifications produced by different factors, and how these modifications participate in gut health. The

development of new probiotics that could improve animal performance and animal health is another important goal of this Subprogram. Furthermore, this Subprogram includes the study of the principal bacterial diseases that affect the digestive system and its response to antimicrobians. The objective

is to generate knowledge on gastrointestinal microbiota and intestinal health, to develop methods to improve gut health by modifying intestinal microbiota with probiotics or other food additives, and monitor resistance to antibiotics.



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 swine, poultry and rabbits.

The ban of antimicrobial growth promoters has made it necessary to improve knowledge of the components of intestinal microbiota in order to more properly assess the positive effects of different raw food materials and the addition of prebiotics, probiotics or antimicrobials to therapeutic doses on the health of animals. Better knowledge of intestinal microbiota could enable us to design new probiotics, which can serve

to reduce the risk of digestive disorders at different critical phases, such as 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

PhD students

Joseane Dos Santos

Researchers and PhD students of the BACTEDIGES research line.



RESPIRATORY BACTERIAL INFECTIONS (BACTERESP)

Coordinator

Virginia Aragón Fernández

This research line studies epidemiology in farm systems and the pathogenesis of diseases caused by *Haemophilus parasuis*. The final goal of this research is to understand infection by *H. parasuis* in order to develop new tools for diagnosis and control of the disease. The strategy followed in this research line is a combination of genomic and functional studies to identify virulence factors and vaccine candidates. Initially, the genome of the Nagasaki strain (reference virulent serotype 5 strain) was sequenced and annotated. Then a collection of field strains (including putative nonvirulent nasal strains) was built and studied by genotyping. In addition, genomic comparison between virulent and nonvirulent strains was per-

formed and several genes were selected as putative virulence factors and vaccine candidates.

The goal of this research is the identification of antigens for the design of a universal vaccine (i.e., effective against all *H. parasuis* virulent strains). This research line includes research activities and services to companies within the field of porcine respiratory pathogens; specifically, in

epidemiological aspects, pathology and control of the diseases.

Over the last 4 years, the activities have focused on *Mycoplasma hyopneumoniae*, *Paratuberculosis multocida*, *Actinobacillus spp.* and *Streptococcus suis* (important porcine pathogens) through contracts with companies.

Researchers

Virginia Aragón Fernández
Albert Moisés Bensaid

Sonia Pina Pedrero
Alex Olvera Van der Stoep
Marina Sibila Vidal

Laboratory technicians

Nuria Galofré Milà
Marta Pérez Simó
Eva Huerta Medina

PhD students

Mar Costa Hurtado
Verónica Martínez Moliner
Paula Manrique Ramírez



Researchers and PhD students of the BACTERESP research line.

ENDOPARASITIC INFECTIONS (ENDOPAR)

Coordinator

Sonia Almería de la Merced

Researcher

Sonia Almería de la Merced

This research line studies the epidemiology and pathogenesis of parasitic protozoa with deleterious effects on the reproductive system, mainly in ruminants. In recent years, the studies have centred on bovine neosporosis, caused by *Neospora caninum*, with sporadic contributions to studies of the prevalence of *Toxoplasma gondii* in different species. Research activities have been performed in collaboration with the Departament of Producció Animal at the Universitat de Lleida.

This line comprises research and technology transfer activities in relation with diseases that are endemic in livestock. The interest in these diseases comes from the economic losses that they produce.



Researcher and PhD student of the ENDOPAR research line.

ZOONOTIC BACTERIAL INFECTIONS AND ANTIMICROBIAL RESISTANCE (BACTEZOON)

Coordinator

Marta Cerdà Cuéllar

Although studies of *Salmonella* infection had been carried out and animal models of this infection in birds had also been established, there had been little research into this specific subject until last year. In 2008 and 2009 the Spanish Government and EU started to finance studies of *Campylobacter* in birds. The objectives in this area are epidemiological studies of *Campylobacter* infections in wild birds and their relation with infections on poultry farms. Several studies for companies to test the immunotoxicity of some drugs in a *Listeria monocytogenes* animal model have also been carried out.

The area of antimicrobial resistance is focused on the surveillance of the susceptibility degree of antimicrobials of different bacteria involved in animal infections.

The objective of this area is to produce recent data on the susceptibility degree of the principal bacteria to the different antimicrobials used in veterinary medicine. In addition, the secondary objectives of this project are to analyse the principal antimicrobial resistance markers and to design systems to minimize the risk of the development of resistance or their transfer.

The area of control of bovine tuberculosis focuses on the detection, control and eradication of tuberculosis (TBC) in ruminants. The main goal of this line is the development of new vaccination strategies as well as the completion of studies with vaccines developed by others that

could be useful to reduce the prevalence of TBC. In addition, this line is working on the development of diagnosis tools and prevention strategies to control TBC. This group also collaborates with the bovine tuberculosis eradication program in Catalunya, together with the EPIDEM Subprogram.

Researchers

Marta Cerdà Cuéllar
Bernat Pérez de Val
Lourdes García Migura

Laboratory technicians

Maite Martín Fernández
Zoraida Cervera Muñoz
Teresa Ayats Murillo

PhD students

Noelia Antillés Silva
Saulo Urdaneta



Researchers and PhD students of the BACTEZOON research line.

Main results

Characterization of *Haemophilus parasuis* strains

Caracterització funcional i immunològica de les proteïnes de superfície i proteïnes secretades de soques virulentes d'*Haemophilus parasuis*

IP CReSA: Virginia Aragón

Haemophilus parasuis is a colonizer of the upper respiratory tract of healthy pigs. However, virulent strains of this bacterium can cause pneumonia and Glässer's disease, which is characterized by fibrinous polyserositis and meningitis. The goal of this project was to identify virulence factors and anti-

gens for better control of the disease. Thus, our studies focused on secreted and surface-exposed bacterial molecules, which will be accessible to the host immune system. We identified a family of surface proteins, trimeric auto-transporters (vtaA). The vtaA of the virulent strain Nagasaki were produced as recombinant proteins and were demonstrated to be antigenic proteins expressed in vivo, during infection. Therefore, they are good candidates for inclusion in a vaccine prototype. Also, two of these vtaA seem to be implicated

in phagocytosis resistance.

In addition, the analysis of one specific domain of these proteins allowed us to design a new diagnostic PCR for the differentiation of virulent (invasive) and non-virulent (colonizer) strains of *H. parasuis*.

Other aspects studied by this project were the enzymatic activities produced by some strains of *H. parasuis*, such as neuraminidase and acid phosphatase.



Strategies for the eradication of bovine tuberculosis

Strategies for the eradication of bovine tuberculosis (TB-STEP)

IP CReSA: Mariano Domingo

The overall objective of the project is to design new strategies to fight against TB in livestock and wildlife, such as new diagnostic tools or vaccines, in order to include these improvements in the eradication programmes. The CReSA research within the project is focused on

Work Package 1: Vaccination of domestic animals (cattle and goats). Specifically, we are involved in task 1.3 on the development of differential diagnosis and task 1.4 whose main goal is to evaluate the safety and efficacy of BCG-based vaccines in do-

mestic goats that are experimentally infected with *Mycobacterium caprae*.

We satisfactorily tested two peptide cocktails: ESAT-6/ CFP-10 and RV3615c that could be used as DIVA reagents to differentiate infected animals from vaccinated/protected animals. These antigens were developed and supplied by the VLA TB Research group (the other partner of the Work Package).

Preliminary data obtained regarding BCG-based vaccines assays showed significant protection in terms of reduction of pathology and bacterial load in target tissues using two vaccine strategies: single BCG and a primeboost protocol using BCG combined

with a recombinant adenoviral vector expressing antigen Ag85A.

We are currently assessing the effectiveness of a prime-boost vaccination with BCG followed by a booster vaccine based on a polyvalent adenoviral construct expressing four mycobacterial antigens.



Improving *Campylobacter* control in poultry

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

IP CReSA: Marta Cerdà

Most human enteric infections originate from zoonotic bacteria, through the ingestion of contaminated food products. Specifically, domestic poultry and their products contaminated with *Campylobacter spp.* are the main source of these 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 aim of this proposal is to study *Campylobacter* prevalence and associated risk factors in broilers on a national level. Also, the infection dynamics in flocks will be examined in detail. In addition, this study will assess how the environment inside and outside of houses can affect the colonization of birds. To identify differences in broiler production across Europe, a standardized questionnaire has been designed

and sent out to 200 farms. Data included are on environment, farm management practices, house construction (including aspects likely to relate to biosecurity), production type, bird breed, water source, nearness to other livestock, etc. Data is currently under analysis.



Campylobacter status on all flocks from 20 farms (randomly selected from those that answered the questionnaire) slaughtered over a two-year period will be collected. Farms have already been selected and sampling will start in 2011. An additional questionnaire has been prepared for these 20 farms to identify risk factors for flock colonization.

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

Epidemiología 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

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 has not been defined yet, as there is no knowledge yet of the role of wild birds as a source of these enteric pathogens on these farms. 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 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, especially seagulls.

During this second year of the project, sampling of poultry farms (both backyard and free-range) and seagull colonies has been continued. In poultry farms, no *Salmonella* has been isolated, while for *Campylobacter* a prevalence of 80% to 100% has been found; both *C. jejuni* and *C. coli* have been isolated. Seagull colonies sampled this year 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. Prevalences in *L. michahellis* ranged from 0% to 2% for *Campylobacter*, and 17% to 38% for *Salmonella*; in *L. audouinii* colonies, prevalences ranged from 24% to 31% for *Campylobacter* and 1% to 8% for *Salmonella*. A high diversity of *Salmonella* serotypes have been isolated. Antimicrobial susceptibility studies are being carried out. A high proportion of *Salmonella* isolates showing resistance to tetracycline, streptomycin, amoxycillin or ampicillin have been found, although at a lower frequency, resistance to fluoroquinolones has also been detected. Genotyping of both *Salmonella* and *Campylobacter* isolates are currently in progress.



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. Many sources of this infection are reported but the main suspected food borne source is poultry meat. So, the EU has recognised the need to reduce levels of *Campylobacter* spp. in con-

ventional broiler production. However, to control this important public health problem, the design of effective intervention strategies will need to be based on a better understanding of the epidemiology of *Campylobacter* in broilers.

So, the aim of this project is to study *Campylobacter* prevalence and associated risk factors in broilers on a national level. The infection dynamics in flocks will also be examined in detail.

An epidemiological questionnaire which includes data on general characteristics of the

farm, environmental data and data related to biosecurity has been designed and sent out to farms. From these farms, pooled caecal samples of 10 birds per flock, from all flocks produced during the year, are obtained at slaughter and data on flock status will be obtained.



Species specific PCR for *Haemophilus parasuis*

Validation of a species specific PCR for *Haemophilus parasuis* able to discriminate invasive and non-invasive strains

IP CReSA: Albert Bensaid

The multiplex PCR for discrimination among virulent and non-virulent *H. parasuis* was developed, standardized and validated at the Centre de Recerca en Sanitat Animal (CReSA) and the Minnesota Veterinary Diagnostic Laboratory (MVDL). The test correctly identified virulent and non-virulent *H. parasuis* strains when using DNA extracted from reference strains with known clinical history. A total of 154 field isolates obtained at CReSA and 100 clinical isolates obtained at MVDL were screened for the presence of the VtaA gene using the multiplex PCR. Complete clinical information, including isola-

tion site and lesions, was available for 224 of the 254 clinical isolates tested. The vtaA of group 1 were detected in all known virulent serotypes and absent in non-virulent reference strains. The vtaA of group 3 were detected in all strains. When multiplexing this two PCR reaction it was possible to detect *H. parasuis* (group 3 positive) and to identify potentially virulent strains (group 1 positive).



BACPAR subprogram Publications

Peer reviewed papers (ISI Citation Index)

Almería S, Araujo R, Tuo W, López-Gatius F, Dubey JP, Gasbarre LC. **Fetal death in cows experimentally infected with *Neospora caninum* at 110 days of gestation.** *Vet Parasitol.* (2010) 169:304-11.

Aragon V, Bouchet B, Gottschalk M. **Invasion of endothelial cells by systemic and nasal strains of *Haemophilus parasuis*.** *Vet J.* 2010 Nov;186(2):264-7.

Aragon V, Cerdà-Cuéllar M, Fraile L, Mombarg M, Nofrarias M, Olvera A, Sibila M, Solanes D, Segalés J. **Correlation between clinico-pathological outcome and typing of *Haemophilus parasuis* field strains.** *Vet Microbiol.* 2010 May 19;142(3-4):387-93.

Cabézón O, Millán J, Gomis M, Dubey JP, Ferroglio E, Almería S. **Kennel dogs as sentinels of *Leishmania infantum*, *Toxoplasma gondii*, and *Neospora caninum* in Majorca Island, Spain.** *Parasitol Res.* (2010) 107:1505-8.

Cerdà-Cuéllar M, Naranjo JF, Verge A, Nofrarías M, Cortey M, Olvera A, Segalés J, Aragon V. **Sow vaccination modulates the colonization of piglets by *Haemophilus parasuis*.** *Vet Microbiol.* 2010 Oct 26;145(3-4):315-20.

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García-Bocanegra I, Dubey JP, Martínez F, Vargas A, Cabezón O, Zorrilla I, Arenas A, Almería S. **Factors affecting seroprevalence of *Toxoplasma gondii* in the endangered Iberian lynx (*Lynx pardinus*).** *Vet Parasitol.* (2010) 167:36-42.

García-Bocanegra I, Dubey JP, Simon-Grifé M, Cabézón O, Casal J, Allepuz A, Napp S, Almería S. **Seroprevalence and risk factors associated with *Toxoplasma gondii* infection in pig farms from Catalonia, north-eastern Spain.** *Res Vet Sci.* (2010) 89:85-7.

García-Bocanegra I, Simon-Grifé M, Dubey JP, Casal J, Martín GE, Cabézón O, Perea A, Almería S. **Seroprevalence and risk factors associated with *Toxoplasma gondii* in domestic pigs from Spain.** *Parasitol Int.* (2010) 59:421-6.

García-Bocanegra I, Simon-Grifé M, Sibila M, Dubey JP, Cabézón O, Martín G, Almería S. **Duration of maternally derived antibodies in *Toxoplasma gondii* naturally infected piglets.** *Vet Parasitol.* (2010) 170:134-6.

García-Isprierto I, Nogareda C, Yániz JL, Almería S, Martínez-Bello D, de Sousa NM, Beckers JF, López-Gatius F. ***Neospora caninum* and *Coxiella burnetii* seropositivity are related to endocrine pattern changes during gestation in lactating dairy cows.** *Theriogenology.* (2010) 74:212-20.

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Yániz JL, López-Gatius F, García-Isprierto I, Bech-Sàbat G, Serrano B, Nogareda C, Sanchez-Nadal JA, Almeria S, Santolaria P. **Some factors affecting the abortion rate in dairy herds with high incidence of *Neospora*-associated abortions are different in cows and heifers.** *Reprod Domest Anim.* (2010) 45:699-705.

EXOTIQUES subprogram

Transboundary viral infections

Coordinator: Albert Moisés 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

The first objective is to study the arthropod vectors of infectious diseases in animals and humans, with a special focus on interactions between the arthropod and the host, and the arthropod and the pathogen. The main focus is Bluetongue and its vectors (basically, vector competence studies, as well as other studies dealing with ecology and molecular biology); and also the establishment of vector competence models for Chikungunya, West Nile and Rift Valley viruses and the genetic characterization of the potential vectors to generate new diagnostic tools. The second objective is integrated and multidisciplinary research of the pathogenesis, diagnosis

and control of viral zoonosis transmitted by arthropod vectors (arbovirosis); basically the causative agents of some of the most important emerging and re-emerging infectious diseases: West Nile fever, Chikungunya fever and Rift Valley Fever.

Researchers

Albert Moisés Bensaid
Nonito Pagès Martínez
Núria Busquets Martí
Joan Pujols Romeu
Francesc Muñoz Muñoz

Laboratory technicians
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Nuria Navarro Toro
Nuria Pujol Lucas
Raquel Rivas Adán
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PhD students

Cristina Lorca Oro



Researchers and PhD students of the ARTROPOVIR line of research.

PATHOGENESIS AND PROFILE OF ASFAVIRUS INFECTIONS (ASFVIRUS)

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. The ASF virus (ASFV) remains endemic in Sardinia and many Sub-Saharan countries, where it causes tremendous economic losses. The recent reintroduction of the virus to Georgia from Eastern Africa and its spread towards former Soviet countries has produced new concerns regarding the risk of ASFV re-entrance in Europe and Asian countries, including China, the biggest swine producer and consumer in the world. The situation is aggravated by the fact there is no vaccine available against ASFV, which limits the control measures for efficient and rapid diagnosis of the disease and culling of the infected

animals.

The general objective of this research is to understand the immune response to ASFV and to develop DNA vaccines to protect pigs against the disease. Many of the results have yet to be published, and a patent has been submitted, which is based on certain immunological properties of ASFV antigens.

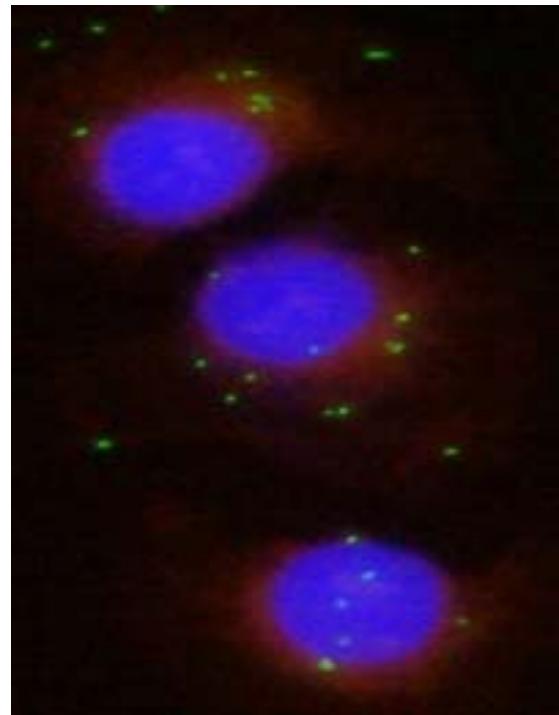
The main objectives for future projects are the thorough characterization of ASFV antigens in order to optimize the final antigenic composition of the vaccine; and to characterize the immunological mechanisms involved in protection against ASFV.

Researchers

Fernando Rodríguez González
Francesc Accensi Alemany
María Ballester Devís
Albert Moisés Bensaid

Laboratory technicians

Mercedes Mora Salvatierra



Researchers and PhD students of the ASFAVIRUS line of research.

PATHOGENESIS AND PROFILING OF PESTIVIRUS INFECTIONS (PESTIVIRUS)

Coordinator

Lilianne Ganges Espinosa

The main objective of this research line is centered on CSFV, a pestivirus which infects pigs and produces one of the most devastating diseases of the pig industry on a worldwide scale with serious repercussions in many countries that rely on a rural economy. With this aim, we made studies of the viral pathogenesis and immunological mechanisms involved in protection. Since current commercial vaccines need to be improved, we aim to generate information for the development of new vaccines and

diagnosis methods to control the disease. It seems important to consider other diseases caused by pestiviruses such as Bovine Viral Diarrhoea and Border disease which infect pigs and cause severe economic losses in ruminants, emphasising a differential diagnostic with CSFV. Simultaneously, experimental infections are conducted with these agents in domestic ruminants and wild ruminants.

The DAR Virological Diagnosis laboratory was established at the CReSA in 2007. This laboratory participates in field diagnosis in the regional CSF survey programme, providing techniques for differentiation of CSFV from other pestiviruses,

in collaboration with the National Reference Laboratory and the World Reference Centre for CSFV.

Researchers

Lilianne Ganges Espinosa
Rosa Rosell Bellsola
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Laboratory technicians

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PhD students

Joan Tarradas Font

Researchers and PhD student of the PESTIVIRUS line of research.



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

Coordinator

Natàlia Majó Masferrer

The main objective of this line is to investigate the pathogenesis of avian influenza virus (AIV) infections in wild and domestic birds.

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 are also objectives of this research line. Environmental factors that affect AIV persistence and transmission are also studied.

This research line also includes a service for the administration, which has been provided since 2005, namely the Avian Influenza in Wild Birds in Catalonia Surveillance Program, in collaboration with the Departament d'Agricultura, Alimentació i Acció Rural (DAR) and the Departament de Medi Ambient i Habitatge (DMAiH). This program is based on the Plan de Vigilancia de la Influenza Aviar of Spain by the Ministerio de Medio Ambiente, Medio Rural y Marino (MARM).

This research line works on the pathogenesis, epidemiology and control of enzootic avian viral infections. Its activity is characterized by close contact with the production sector. Therefore,

besides basic research, this research line is aimed at the development and transfer of diagnostic techniques on the subject as well as epidemiological surveillance of the main diseases affecting flocks.

Researchers

Natàlia Majó Masferrer

Ayub Darji

Roser Dolz Pacual

Antonio José Ramis Salvà



Laboratory technicians

Raquel Rivas Adán

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Aida Chaves Hernández

Júlia Vergara Alert

Kateri Bertran Dols

Juliana del Pilar

González Zabala



Researchers and PhD students of the VIRUSAVIDAR line of research.

Main results

New vaccines against classical swine fever

Nuevas estrategias vacunales frente al virus de la peste porcina clásica. Estudio de mecanismos implicados en la inmunopatogenicidad viral

IP CReSA: Lilianne Ganges

- Peptide-based vaccines: Recently we have shown the immunogenicity of several dendrimeric peptide vaccine candidates (B4T) for CSFV in domestic's pigs. The protective effect is fully consistent with the neutralizing antibody titers observed in the two protected animals, and coherent with the induction of anti-peptide antibodies, and of IFN- γ producing cells even in the absence of neutralizing antibodies before challenge.

- DNA vaccines: Taken into account the feasibility of DNA immunization and its

protective capacity against CSFV (Ganges et al., 2005), we determined to use this methodology as a tool to analyze the potential of swine CCL20 chemokine to enhance the immune response elicited against E2 of CSFV in pigs. In this work, the applicant group shows that co-injection of plasmids pCCL20 and pE2 in domestic pig's results in an enhancement of the humoral and cellular response elicited against CSFV.

- CSFV immunopathogenicity: We use a DNA -E2 as a model to study the cellular immune response focusing on the effective role of Th1 and Th2 cytokine profile induced by our vaccine, in particular IFN-gamma and IL-10. Additionally, the induction of a key component of the innate immunity, IFN alpha, was also followed after vaccination and viral CSFV infection.

Our results support the relevance of the induction of a strong T cellular response to confer a solid protection upon DNA vaccination against CSFV.

We have developed several models on infection in swine (by intramuscular injection, direct contact between infected and uninfected pigs and by air transmission which reproduce various CSF forms of disease. With the aim of study the virus transmission, the quantitative excretion and immune mechanism involved after CSFV replication, we have developed a novel quantitative real time RT-PCR assay for the detection and quantification of CSFV based on SYBR-Green coupled to melting curve analysis with high sensitivity and specificity .



New vaccines against African swine fever

Desarrollo de nuevas estrategias de control de la peste porcina africana

IP CReSA: Fernando Rodríguez

In 2010, the project was closed with the following main findings:

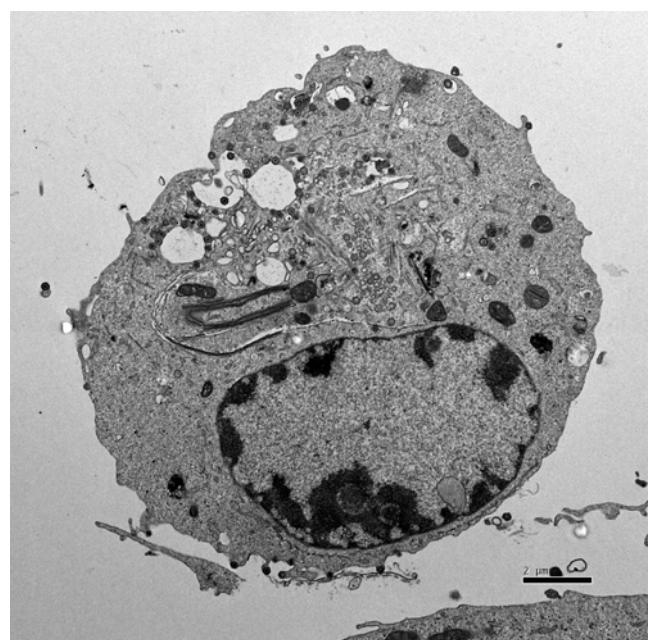
- We were able to correlate the protection conferred by a DNA vaccine that codified for three proteins of the virus that were fused and proceeded by ubiquitin (pCMVUBsHAPQ), with the expansion of a T-CD8+ (CTL) response.

- We were able to identify a CTL immunodominant epitope of 9 amino acids in the

hemagglutinin of the ASFV, with protective potential. We prepared a homologous protection model with a diminished ASF virus.

- We characterised the profound changes that affect the cellular nucleus after in vitro infection with the ASFV, highlighting: a disruption to the nuclear membrane at early stages coinciding with the collocation of the viral genome with lamina, and also the re-collocation of markers such as RNA pol II to be degraded at later stages.

- We started with the creation of a pathological guide to the disease (NADIR Program).



Persistence and transmission of influenza virus

Ensayos de persistencia ambiental del virus y estudio de la inmunopatogenia en aves criadas en regímenes no intensivos

IP CReSA: Natàlia Majó Maserferr

The present is a coordinated project that involves three Spanish research institutes: Instituto de investigación en recursos cinegéticos (IREC), Instituto vasco de investigación y desarrollo agrario (NEIKER) and Centre de recerca en sanitat animal (CReSA). The main objectives are:

To study the persistence of avian influenza virus (AIV) in different environments and

the principal factors that influence its persistence.

To evaluate the participation of different extensively-reared bird and mammal species in the epidemiology of AIV.

To determine the viral infection dynamics in birds reared in semi-extensive regimes (quails and partridges).

A large number of results have been obtained over these three years. Related to the first objective, it has been demonstrated that water salinity and temperature affect AIV viability in vitro and that the maximum level of viral inactivation is reached during the desiccation

process. Another important result is that the AIV prevalence and subtypes detected in different Spanish wetlands follow the same temporal pattern as in Northern Europe. Following our results, storks seem to play an important role in the epidemiology of AIV. Finally, it has been demonstrated that feathers can be an important source of infective virus in dead birds, and that quails and partridges show different susceptibility to highly pathogenic avian influenza virus, but get infected and shed significant quantities of low pathogenic avian influenza virus.



New vaccines against avian and swine influenza

Nuevas formulaciones vacunales para prevenir la influenza aviar y porcina. Desarrollo de una potencial vacuna universal producida a bajo coste

IP CReSA: Ayub Darji

The influenza virus is one of the greatest threats of infectious origin to the human population. Likewise, this virus generates relevant losses in swine livestock and the pig is, per se, a reservoir for the virus and is a key component for transmission from birds to humans, resulting in highly pathogenic pandemics. Limitations in the annual production of the vaccine in eggs and the possibility of simultaneously combining seasonal and pandemic vaccines has alternatively focused on vaccines based on cell cultures. However, high production costs and relatively inefficient systems make application to

animal health difficult. This project presents different strategies for obtaining new and more economic, immunologically effective, easily upscaled and possibly more universal vaccines than existing ones. This will be carried out by different developments, with a first utility to be applied to pig livestock but with a potential future application in humans. Baculovirus vectors combined with insect larvae as biofactories will be used to reduce production costs. Two adjuvant molecules fused with the vaccine antigens will be used to enhance effectiveness by either driving antigens to antigen presenting cells or stimulating innate and adaptive immune responses. For vaccine universality, the antigens selected are derived from the ectodomain of protein M2 of the virus, as well as peptides representing HA protein re-

gions relevant in the virus binding to cellular receptors with a high degree of antigenic preservation. The development of this project could lead to entirely new experimental vaccine formulations that are ready to be tested in clinical animal phases, and constituting the basis for future vaccines against influenza with applications to swine livestock and potentially in human health.



EXOTIQUES subprogram

Publications

Ballester M, Galindo-Cardiel I, Gallardo C, Argilaguet JM, Segalés J, Rodríguez JM, Rodríguez F. **Intranuclear detection of African swine fever virus DNA in several cell types from formalin-fixed and paraffin-embedded tissues using a new *in situ* hybridisation protocol.** J Virol Methods. 2010 Sep;168(1-2):38-43.

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Cabezón O, Velarde R, Rosell R, Lavín S, Segalés J, Marco I. **Experimental infection of lambs with Border disease virus isolated from a Pyrenean chamois.** Vet Rec. 2010; 167: 619-621

Cabezón, O., Rosell, R., Velarde, R., Mentaberre, G., Casas-Díaz, E., Lavín, S., Marco, I. (2010b). **Border disease virus shedding and detection in naturally-infected southern chamois (*Rupicapra pyrenaica*).** J Vet Diagn Invest 22:744-747.

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Busquets N, Xavier F, Martín-Folgar R, Lorezno G, Galindo-Cardiel I, Pérez de Val B, Rivas R, Iglesias J, Rodríguez F, Solanes D, Domingo M, Brun A. **Experimental infection of young adult European breed sheep with Rift Valley Fever Virus field isolates.** Vector-Borne and



ENDEMOVIR subprogram

Endemic viral infections

Coordinator: Joaquim Segalés Coma
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Objectives

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

in herds (excluding 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, which despite being able to persist in a territory for a number of years, is still considered an exotic disease).

Lines of research

Immunopathogenesis and protection against PRRSV (INMUNOPRRS)

Coordinator

Enric Mateu de Pozo

This research line aim to identify the major factors involved in the development of porcine reproductive and respiratory syndrome virus (PRRSV) infection as well as the relevant immunological parameters for protection against this viral infection. The long-term objective is to develop an efficacious vaccine against PRRSV.

Researchers

Enric Mateu de Pozo
M. Eugenia de la Torre Martínez
Marga Martín Castillo
Laila Darwich Soliva
Iván Díaz Luque

Laboratory technicians

Núria Navarro Toro
Esmeralda Cano Carrasco

PhD students

Mariona Gimeno Terradellas
Liudmila Kuzemtseva



Researchers and PhD students of the INMUNOPRRS line of research .

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

Coordinator

Tuija Kekarainen

This research line includes the study of epidemiology, pathogenesis and diagnosis of infections caused by ssDNA viruses in pigs, namely Porcine circoviruses (PCV) and Torque teno sus viruses (TTV). PCV type 2 (PCV2) causes one of the most significant enzootic pig disease in the world.

The main objective of this research line is to find out about epidemiology, pathogenesis and immune mechanisms for protection against PCV2 in a postweaning multisystemic wasting syndrome (PMWS) context. The study of safety and efficacy of PCV2 vaccines is another important objective of this research line.

Researchers

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Laboratory technicians

Alexandra Jiménez Melsió
Anna Llorens Segalés
Mónica Pérez Maillo

PhD students

Mario Aramouni
Laura Martínez Guinó
Emanuela Pileri



Researchers and PhD students of the SSDNAVIRUS line of research.

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

Coordinator

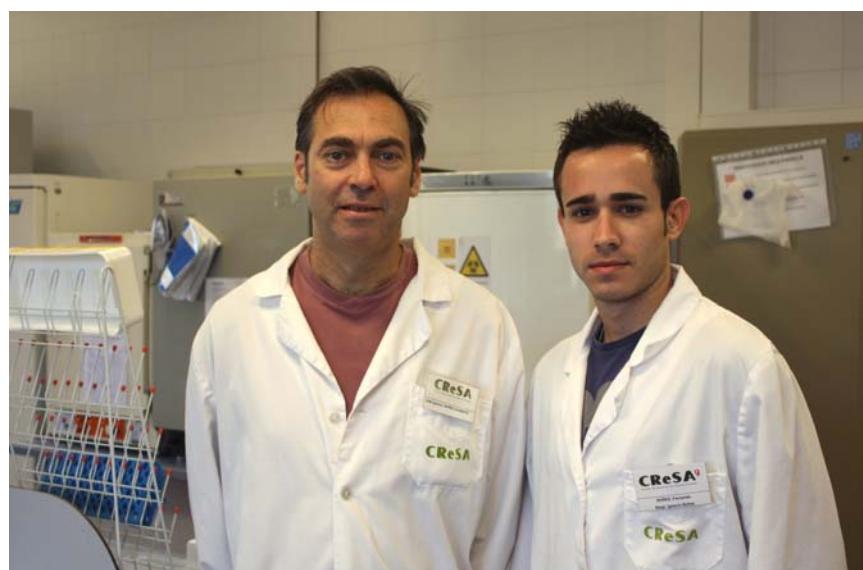
José Ignacio Núñez Garrote

This is a recently initiated research line at the CReSA, in collaboration with the Genetics Research Group at the Veterinary School of the Universitat Autònoma de Barcelona. The main objective is to identify the existence of micro-RNAs in viruses of importance for swine, and their potential regulatory role. Results of this research line are still at a very preliminary stage and have not yet been published.

Researchers

José Ignacio Núñez Garrote

Researcher and PhD student of the MICRO-RNA line of research .



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 to control viral infections and more specifically infection with swine influenza. It also aim to develop new vaccine vectors that could be used to control this particular infection. This line has two specific objectives:

- To investigate the mechanisms of protective immunity to viral infections.

-To develop new vaccines against swine influenza.

Researchers

María Montoya González

Laboratory technicians

Lorena Córdoba Muñoz

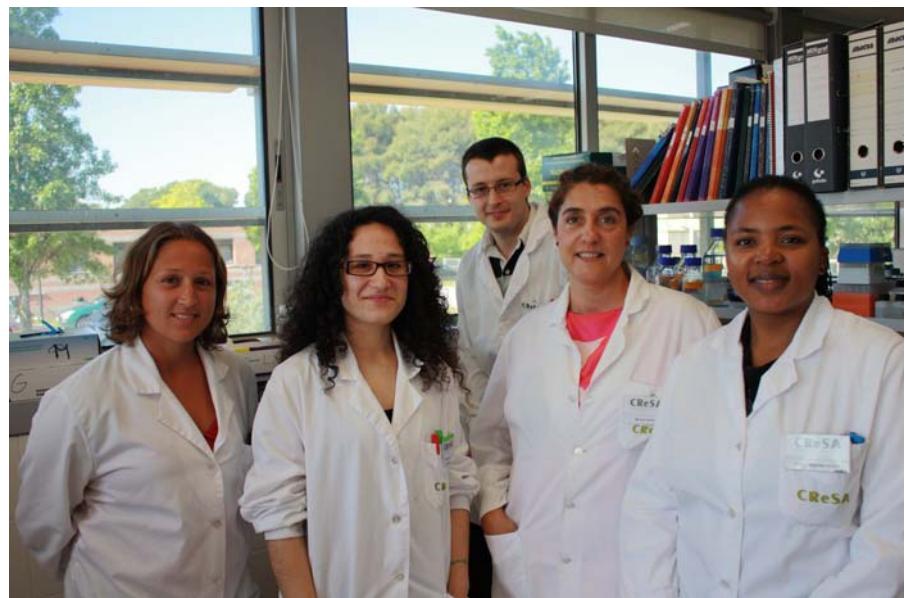
PhD students

Elisa Crisci

Pamela Martínez Orellana

Tufária Mussà

Maximiliano Baratelli



Researchers and PhD students of the INFLUPORCINA line of research.

Main results

Development of vaccines against PRRS

Caracterització antigènica de soques del virus de la síndrome reproductora i respiratòria porcina de diferent origen i la seva rellevància per al desenvolupament de vacunes eficaces

IP CReSA: Laila Darwich

The aim of this research project is to characterize the influence of antigenic diversity of porcine reproductive and respiratory syndrome virus (PRRSV) on the different components of the immune response of the pig and to determine the significance of this variability in the protection against re-infections with heterologous isolates, with the final objective of finding strains of the virus with some immunogenic characteristics that make them suitable candidates for

the development of a universal PRRS vaccine, able to protect vaccinated animals against any type of challenge strain. To this end, we propose the following objectives:

Immunogenic characterization of different PRRSV strains. For this purpose we will follow two approaches: 1 Determination of the relationship between different strains of PRRSV and the host, studying the pattern of cytokine induction and other changes in the host cell (necrosis, apoptosis). Furthermore, a second point was to evaluate the genomic differences between strains (basically deletions in non structural proteins) and their capacity to induce or regulate immune response.

Plasmid constructions will therefore be required in this section.

2 Determination of innate response: modulation of Toll-like receptors (TLR) and intermediate markers (NF- κ B, MyD88b, TIR,...) by different viral strains and in different cell systems (Alveolar Macrophages, Dendritic cells,...) as determined by Flow cytometry, IFI, western blot and real-time PCR.



Study of the porcine torque teno virus

Patogenia, epidemiología y biología molecular del Torque Teno Virus (TTV) del cerdo. Uso del TTV como vector de expresión

IP CReSA: Tuja Kekarainen

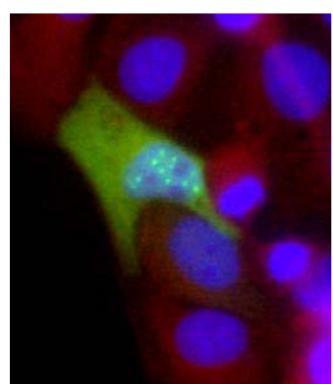
In this research line, studies of the molecular, epidemiological and pathological aspects of swine infecting Torque teno virus (TTV) are tackled.

We have shown that very young animals can be infected with TTV and the

prevalence increases as these as animals get older. It was previously thought that the oral-nasal route is the most important method for the transmission of this virus but our recent results indicate that even fetuses can be infected during gestation.

Furthermore, it was shown that there is a high degree of genetic variation within TTV species. Disease association of TTV is under debate and our group has revealed a higher prevalence of TTV2 in

postweaning multisystemic wasting syndrome affected pigs. Also, diseased animals do not control the viral infection and therefore TTV2 viral titers are continuously increasing while in the number of healthy animals is decreasing.



Study of viral microRNA in pigs

Identificación y caracterización de microRNAs víricos que afectan al porcino

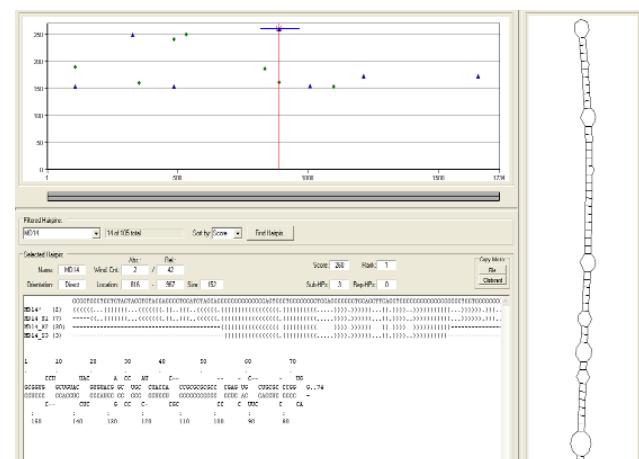
IP CReSA: Jose Ignacio Núñez

Recently, small non coding RNA molecules with 18-23 nucleotides, namely microRNAs (miRNAs) have been described. These molecules play a very important role in gene expression regulation with multiple implications of miRNAs in different processes such as embryogenesis, growth and cellular differentiation, and pathogenesis of human diseases. These aspects are at the early

stages of description. Also miRNA are shown to be involved in tropism and pathogenesis of viral infections, as well as in viral evolution.

The aims of this project are the identification of virus encoded miRNAs affecting swine, such as Aujeszky's disease virus (ADV), the prototype disease at the eradication stage in our country, and the analysis of the differences in the expression of microRNAs in pigs infected with viruses such as porcine circovirus type 2 (PCV2). We have identified miRNAs

coded by ADV by high-throughput sequencing of small RNAs libraries and have designed and optimized qPCRs for detecting specific miRNAs. We have carried out an experimental infection in order to identify different patterns of expression of miRNAs in tonsil and mediastinal lymph node of infected and non-infected pigs with PCV2.



Immunological studies of swine influenza virus

Vacunas basadas en capsídas vacías (VLPs) quiméricas frente al virus de la gripe porcina: estudios inmunológicos

IP CReSA: María Montoya

Presently, there is no effective vaccine against SIV able to protect animals from all circulating serotypes. Current vaccines are based on inactivated viruses and require the use of adjuvants.

Results obtained in the last two years as part of the co-

ordinated project AGL2006-13809-C03/GAN, have shown that VLPs derived from calicivirus rabbit hemorrhagic disease virus (RHDV) constitute an excellent vaccine delivery system, capable of inducing protective anti-viral immunity against inserted foreign immunogenic epitopes in the absence of adjuvant.

Despite recent advances, it is necessary to keep working on the development of new strategies to control SIV, ranging from studying the im-

munological mechanisms against SIV and their interaction with the cells from the immune system, such as dendritic cells, to the generation of the knowledge required for antigenic-epitope prediction in SIV.

Additionally, the development of new experimental tools in the field of porcine immunology is required.



Influenza pandemic virus: coordinated studies

Estudio comparativo de la respuesta inmune frente al virus gripe 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 21st century implies new challenges for worldwide Health Systems and also for the scientific community. The vast majority of nvH1N1 infections are mild and self-limiting in nature. Nevertheless, a small percentage of

patients require hospitalization and specialized attention in Intensive Care Units (ICUs). The role of host immune responses in the 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.

To determine whether 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 inflammation and immunity, along with an analysis of antibody responses in severe and mild nvH1N1 patients. Determining whether the host response could potentially participate in the pathogenesis of this disease could contribute to the design of better treatment approaches, and prevent the development of severe forms of this disease.



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)v, with a genetic composition not found before in influenza viruses, started to circulate among humans and has now spread to a pandemic level. Although most of the infections caused by the new virus so far have been mild, the extreme plasticity of influenza viruses to incorpo-

rate genetic changes and to overcome immune/pharmacologic barriers make the future of this pandemic uncertain and have caused great concern at the Public Health level. Therefore, this project intends to carry out "in vitro" studies, but also studies in animal models, aimed at understanding the antigenic properties of the new virus, to identify and characterize 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 in evaluating the changes that the new virus may accumulate in the future, facilitating the pandemic surveillance activities. 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 be taken against the new virus.



**Instituto
de Salud
Carlos III**

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 though most 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

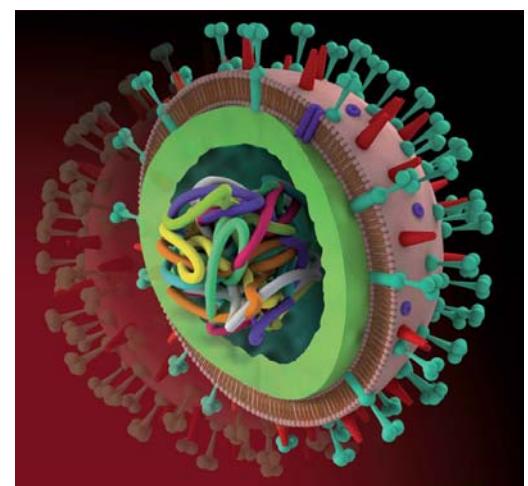
Since April 2009, a new influenza A H1N1 virus of porcine origin has produced worldwide outbreaks and has led the WHO to declare a pandemic situation. Although many severe cases are associated to underlying pathologies in the patients or to belonging to high-risk groups, the age group affected by the 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 properties, we propose the study of their virulence and tro-

pism during the infection of animal models. As controls, we propose the use of pandemic viruses isolated from mild infections as well as seasonal influenza viruses.



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Other projects and networks

04

Consolider

PORCIVIR: Pathogenesis of porcine viral infections

PORCIVIR: patogenia de enfermedades víricas porcinas

IP: Mariano Domingo

Animal health is one of the limiting factors in the competitiveness of the Spanish swine sector. Viral infections are one of the main causes of economic losses among those health problems. This is aggravated by the lack of satisfactory methods for the control of several diseases.

PORCIVIR was set up in order to achieve significant advances in the improvement of swine health and food safety. This is a multi-disciplinary project in which the most advanced research groups involved in this issue participate. This project belongs within the framework of the CONSOLIDER-INGENIO 2010 Program, which is an initiative of the Ministry of Education and Science that supports high quality research that is made up of the leading consolidated groups within the Spanish science community, and which has an accredited history within the international scientific and technical community.

General objective

The general objective of PORCIVIR is the study of viral swine diseases that have economic, sanitary and public health repercussions.

Research areas

The PORCIVIR project is organized into three main areas:

a) Immunity and pathogenesis of viral diseases with the aim of developing vaccines

This area is focused on conducting research into those important diseases for which there is a lack of totally effective vaccines (for example, porcine reproductive and respiratory syndrome, swine circovirus type 2, and African swine fever virus). Investigation is also carried out into the use of established models (e.g., classical swine fever) for the development of new vaccination methods.

b) Models of infections and development of diagnostic techniques

This section includes the development of an arsenal of reagents and methods for studying the pathogenesis of these infections and also comprises the creation of a strain bank, tissues and reagents that are useful as basic materials for these studies. The improvement of some of the existing infection models is proposed (e.g., porcine reproductive and respiratory syndrome and swine circovirus type 2 in piglets). The development of other models for swine infections of zoonotic potential (for example, hepatitis E virus, porcine calicivirus, etc.) is also being worked on.

c) Epidemiology and risk analysis, including risk of transmission of swine virus to humans

Activities undertaken to evaluate disease eradication programs, risk assessment and the impact of the introduction of exotic diseases (classical swine fever virus, foot and mouth disease virus) are proposed at this point. Moreover, steps are proposed to produce information about the epidemiological situation of several infections that could affect humans (such as hepatitis E, swine influenza or porcine calicivirus or torovirus infections).



Participants

The aim of this proposal's activity program is to undertake a broad approach to the study of porcine viral diseases by agglutinating 7 Spanish groups from four different institutions that have demonstrated expertise and competence in this area over the years (51 PhD researchers):

Centre de Recerca en Sanitat Animal (CReSA)
Responsable: Mariano Domingo Álvarez

Centro de Biología Molecular (CBMSO-CSIC)
Responsable: Francisco Sobrino Castelló

Centro Nacional de Biotecnología (CNB-CSIC)
Responsable: Dolores Rodríguez Aguirre

Centro de Investigación en Sanidad Animal (CISA-INIA)
Responsable: Alejandro Brun Torre

Departamento de Biotecnología (Biotecnología-INIA)
Responsable: Francisco Javier Domínguez Juncal

Departamento de Biotecnología (Biotecnología-INIA)
Responsable: José Ángel Martínez Escribano

Universidad Complutense de Madrid (UCM)
Responsable: José María Castro Arganda

Viruses studied

On the one hand, the present proposal focuses on swine viruses of known economic or sanitary importance: Porcine Reproductive and Respiratory Syndrome (PRRSV), Porcine Circovirus type 2 (PCV2), Swine influenza virus (SIV), African swine fever virus (ASFV), Classical swine fever virus (CSFV), Foot and mouth disease virus (FMDV) and Aujeszky's disease virus (ADV). On the other hand, it focuses on viral agents that infect pigs but whose importance is unknown although there is evidence that sug-

gests that they could be zoonotic agents: Hepatitis E virus (HEV), Porcine caliciviruses; namely noroviruses (NV) and sapoviruses (SaV), Porcine Torque-tenovirus (TTV) and Toroviruses (ToV).

2010 activities

Since the start of the funding period (September 2006) the programme has started and developed activities in all the specified workpackages (WP) having almost reached the end of some, including WP1, WP5, WP6, WP7, WP8, WP10 and WP14. For this final year of progress in the end of the remaining WPs is expected to be reached. Specifically, in

2010 many of the prototypes, proteins, vaccine candidates, etc have been tested in animal models. Also, in vivo studies of pathogenesis and protection have been performed. Epidemiological field studies have all been started and have all been finished or almost finished. Several coordinated projects involving the participation of different institutions participating in PORCIVIR have been initiated or are being applied for. Also, the participation of researchers in coordinated activities between groups is being encouraged.

Prionic diseases

Studies of transmission of prionic diseases

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

In order to identify the molecular determinants of the transmission barrier in transmissible spongiform encephalopathies (TSE) prions have been generated *in vitro* with the protein misfolding cyclic amplification technique (PMCA) using, as a substrate, normal brain homogenates (NBH) from species in which no natural cases of TSE have been described to date: *Oryctolagus*, *Canis* and

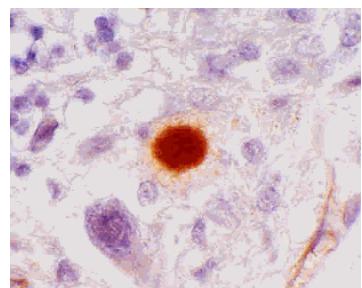
Equus and, as seeds, known animal health and public safety relevant prion strains (BSE and *Scrapie*).

The new prions have been biochemically characterised and their infectivity tested *in vivo* via:

Intracerebral inoculation of transgenic murine models expressing the prnp gene of the species *Bovis*, *Ovis*, *Homo*, *Oryctolagus*, and *Equus*, in absence of the murine prnp gene.

The *Oryctolagus* model has been generated within the projects context and a second model expressing *Canis* prnp is being set up.

So far prions originating from rabbit and dog PrPc have efficiently infected bovine prnp transgenic mice and, in the case of rabbits, also human prnp mice. This knowledge is to be taken into account when evaluating risks associated to the consumption and feeding of these species. The different biological models are being neuropathologically characterised by studying their lesion profile and PrPsc deposition profile as well as other responsive mechanisms of the host.



European Network of Animal Infectiology Facilities

NADIR: The Network of Animal Infectiology Facilities

IP CReSA: Mariano Domingo

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 presen-

ting 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.



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 (Italy)

UNOTT - University of Nottingham (United Kingdom)

Networks

Iberoamerican network on pig meat

Red Iberoamericana 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.

In 2010, the coordinator met several different representatives in Latin America and Spain, and a joint meeting was organized in Varadero (Cuba) in October 2010. 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.



Epizone

Testing of different prime boost strategies to deliver candidate protective African swine fever virus antigens

IP CReSA: Fernando Rodríguez

This is a collaborative project between researchers from different European countries:

Denmark (DETU), France (ANSES) and England (IAH).

Different prime-boost protocols were carried out in order to optimize the responses obtained from a DNA CReSA vaccine. The antibody response was improved, but no improved protection could be demonstrated.



Other publications

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Services for the Generalitat de Catalunya and private companies

05

Services for Administration

From 2001 until the present the Centre de Recerca en Sanitat Animal (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 an annual services and research activities contract, or occasional contracts for specific activities. On the regional level (Catalonia), the CReSA has an annual contract with the Department of Agriculture, Livestock and Rural Affairs (DAR) and the Department of Health (DS) of

the Catalonian Government. There are also some occasional collaborations with the Catalan Food Safety Agency (ACSA), ascribed to the DS, and there is also coordination with the Department of Environment (DMAiH) for some specific activities. On the national level, the CReSA has recently started a collaboration with the Ministry of Environmental, Rural and Marine Affairs (MARM) and has conducted some studies for other regional governments, such as those of Andalusia and Galicia. In the framework of these con-

tracts, the CReSA has worked in epidemiology, diagnostics, and general studies of diseases, including bovine tuberculosis (bTB), bluetongue (BT), avian influenza (AI), West Nile fever (WNF), 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.

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Agriculture, Food and Rural Action

Surveillance for avian influenza in wild birds in Catalonia

Programa de vigilància d'influença aviària en aus salvatges i aus d'autoconsum a Catalunya IP: Natàlia Majó, Núria Busquets

The monitoring of the avian influenza (AI) in wild birds in Catalonia in 2010 forms part of the vigilance of AI being undertaken by the European Union and is developed in coordination with the other Autonomous Communities as part of the avian influence surveillance programme in

Spain, 2010. The implementation of the programme includes the participation of the DAR, the Department of the Environment and Habitat (DMAiH), the CReSA, the Algete Central Veterinary Laboratory (LNR) and the Ministry of Agriculture and the Rural and Marine Environment (MARM). In order to collect information on the AI circulating in wild birds actions were implemented that involved active surveillance on the basis of hunting and ring-

ing of wild birds and passive surveillance.

Of the total of 313 birds analysed, 270 were negative, 39 were not evaluable and 4 were positive for low pathogenic AI. Of these positive samples, two isolates of avian influenza could be sub-typified, one as H5N2 and one as H1N3.

All of the positive cases were mallard ducks (*Anas platyrhynchos*) captured by active surveillance during the autumn and winter in the Ebre Delta.



Surveillance for West Nile Virus in Catalonia

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

The aim of the surveillance programme is the early detection of the West Nile Virus (WNV) in Catalonia in the main reservoirs (birds) and animal hosts (equines), basically in the main risk areas from May to November. The programme involves the participation of the DAR, the CReSA, the DMAiH, the Mos-

quito Control Services, fauna recovery services, equine veterinary clinics and the LNR. The programme is based on different components: active and passive surveillance of wild birds and equines, monitoring of sentinels in self-consumption birds and entomologic monitoring.

The samples from passive surveillance were analysed by RT-PCR in the specific real time for the WNV virus and from active using the compe-

tition ELISA, and these were confirmed using the virus sero-neutralisation test (VNT).

In 2010, no active infection of the WNV was detected in any of the components. However, we did detect positive serology in 5 nesting birds of prey outside of the risk zones, indicating that the incursion of the virus in Catalonia via seasonal migrating birds is possible.

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

Bovine tuberculosis (TBC) is a zoonotic disease being subjected to an eradication programme among cattle herds in Catalonia. By commission of the DAR, the CReSA's TBC laboratory makes a diagnosis of the disease, epidemiologically surveys it and provides expert guidance to the Department.

In 2010, 29 cattle farms were investigated belonging to the specific Plan for the fight against positive herds, 2 goat farms, 2 zoological centres and samples of reactor animals to the intradermotuberculation test at officially free holding farms or suspicious samples from slaughterhouses. In total, 6686 analyses were made using the interferon- γ test, 303 analyses using the antibody detection test by ELISA, 889 macroscopic evaluations of lesions, 153 stains

of Haematoxylin-Eosin, 149 stains of Ziehl-Neelsen, 266 mycobacterium cultures and 366 DNA detections by PCR. The epidemiologic surveillance, integral evaluation of the diagnostic results obtained and the specific actions to be observed in each case were discussed on a monthly basis by a mixed work group formed by researchers from the CReSA and veterinary scientists from the DAR's Servei de Sanitat Animal.



Entomological surveillance of Bluetongue

Vigilància entomològica de la llengua blava

IP: Nitu Pagès

Bluetongue (BT) is a non-contagious infectious viral disease that affects ruminants. The virus is of high antigenic variability, with as many as 24 different serotypes having been found. The transmission of the virus between susceptible hosts occurs via hematophagia by small Culicoides. There are around 1400 species of Culicoides around the world. Since 2003, and by commis-

sion of the DAR, the CReSA has designed and implemented the Entomologic BT Surveillance Programme in Catalonia. In 2010, the surveillance of the Culicoides species led to the conclusion that the activity of these vectors is very low in the winter and there is a more restricted period of activity that starts in spring and lasts until late autumn. The data obtained by the Entomologic BT Surveillance Programme has led us to conclude that in Catalonia, if a BT virus enters, there is a high risk of transmission

from August to November because the main vectors, *C. imicola* and the *Culicoides* of the *Obsoletus* complex are at their highest abundance of the year. Neither can we discard transmission in other periods, as the *Culicoides* of the *Obsoletus* complex are active in all periods of the year in some zones.



Virological analysis

Prestació de serveis d'anàlisis virològiques

IP: Rosa Rosell

The objective of the provision of virus analysis services is the diagnosis of the main viral diseases of domestic animals subjected to official control programmes by the DAR's Servei de Sanitat Animal. The diseases subjected to diagnosis are: Classic Swine Fever (CSF), Swine Vesicular Disease (SVD), Bluetongue (BT) and Aujeszky's disease (AD). In

the 2010 period, 26263 samples were received and 26524 analyses were made (5078 BT, SVD, Pestivirus and AD virus detections using PCR and RT-PCR techniques and 21446 CSF and SVD antibody detection analyses using Serum-Neutralisation techniques.

The results obtained show that with respect to BT all of the samples were negative in their detection of the virus. With respect to CSF, all samples were negative for the detection of the virus and

the serum samples received confirm that 22.3% were positive for Pestivirus antibodies of ruminants and negatives for CSF using the Serum-Neutralisation technique. With respect to SVD, all stool samples were negative for the detection of the virus from the serum samples received it was confirmed that 38% were positive for SVD antibodies using the Serum-Neutralisation technique. As for Aujeszky's disease, the tissue samples received from sacrificed

animals as a result of the results of the ELISA detection of positive gE antibodies were negative for the detection of the virus.

Health protection



Enric Vidal Barba
Manager of the PRIOCAT laboratory
and the SESC support service
enric.vidal@cresa.uab.cat

Transmissible spongiform encephalopathies

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 Health pertaining to the Health Department, an active Transmissible Spongiform Encephalopathies surveillance programme, whereby it specifically analyses samples from all of Catalonia of the central nervous system of bovines older than 48

months and a sample of small ruminants older than 18 months destined for human consumption in order to determine the presence of prion diseases. Apart from routine tests, in cases with an initially positive result from rapid tests, confirmation tests are conducted. In 2010, only one case of TSE was confirmed, specifically an atypical presentation of scrapie in a goat. The last case of TSE being diagnosed in the laboratory was in 2008, which shows that the

epizootic is heading towards extinction. The laboratory has also developed a line of research financed by national and European research projects into the study of different aspects of TSE such as the determinant factors of the transmission barriers of animal prions (TSE and Scrapie) and the characterisation of the transmissibility of atypical variants of Scrapie to other species of productive interest and humans.



Researchers
Enric Vidal Barba

Laboratory technicians
Mariano Moreno Bustos
María Espinar Guardeño
Marta Valle González

Support for slaughterhouse veterinarians

Servei de Suport a Escorxadors (SESC)

IP: Enric Vidal Barba

In 2010, the Slaughterhouse Veterinary Support Service (SESC) managed a total of 190 queries by official vets conducting inspections of slaughterhouses in Catalonia. Of these, 19 were telematic queries and the other 171 corresponded to requests for the laboratorial analysis of samples.

Of the queries received there was a notable prominence of doubts regarding lesions with a suspicion of bovine

tuberculosis, followed by suspicions of cattle muscle lesions hoping to eliminate fears of Bovine cysticercosis and Marek's disease in poultry. 11 cases were published in the case histories on the SESC website in order to provide information to the users of the service. In 2010, the case history pages were visited a total of 9,313 times.



Services for companies

At the request of the agri-food sector companies, the CReSA Field trial Group designs and/or executes laboratory and field studies of the efficacy and tolerance of pharmacological, biological and nutraceutical products. In general, the objective of these studies is to conduct:

- Necessary trials for the registration of the medication on a national and European level
- Product trials to support marketing strategies.

Laboratory studies

These assays are necessary to demonstrate the efficacy and the tolerance of veterinary medicines. These trials are made with a limited number of animals under controlled conditions, on experimental farms or in the CReSA's biocontainment facilities under the proposed conditions of use of the medicine. The results obtained are very useful for assessing the efficacy and tolerance of veterinary medicines because of this controlled environment and the detailed monitoring of the clinical and pathological variables.

The CReSA has its own facilities for the housing of farm animals, in isolated conditions, and which are suitable for performing the assays that involve the use of medicines against infectious agents.

Field trials

The studies conducted on the farm under real production conditions are necessary to demonstrate the efficacy and tolerance of the veterinary medicines. At the CReSA, these types of study are conducted by field specialists. The selection of a suitable farm is of crucial importance for the success of the study. The farm must be experiencing the disease that is the objective of the treatment or must be very likely to experience it when the batch of animals in the study reaches the age at which there is an outbreak of the disease (this must be documented by previous diagnostic studies of the farm). Moreover, the farm must be free of other diseases that could interfere with the assessment of the results of the assay. The CReSA collaborates with the

study sponsor by looking for the appropriate farm.

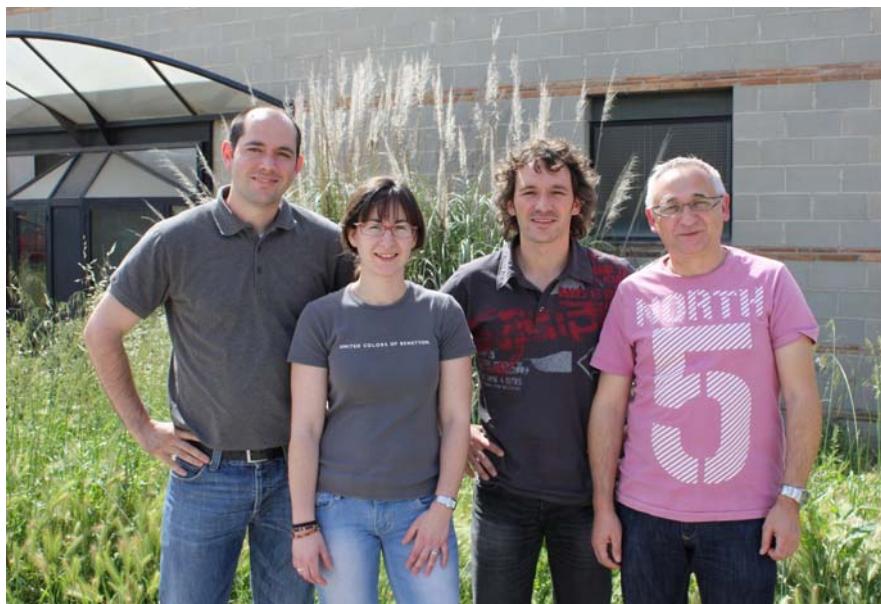
2010 Activities

In 2010, 29 contracts with 20 private companies and 2 public institutions were signed, with a total income of €1,751,758.88. The different types of study are shown below:

- Diagnosis, detection and classification
- Studies with strains
- Pathological anatomy
- Trials with vaccines in ruminants, swine and poultry
- Trials with premixes in swine
- Development of experimental challenges
- Consultancy
- Biosecurity studies

Clients in 2010

AGROSEGURO
APC EUROPE
BOEHRINGER INGELHEIM
VETMEDICA GMBH
CECAV
CEESA
CLINOBS
DS
ERA BIOTECH
HARLAM LABORATORIS
INTERVET R&D LABORATORIES
LABORATORIOS CALIER
LABORATORIOS DR. ESTEVE
LABORATORIOS HIPRA
LABORATORIOS INMUNOVET
LABORATORIOS SYVA
LOHMANN ANIMAL HEALTH
ESPAÑA
ONDAX SCIENTIFIC
PFIZER EUROPE
RUBINUM ANIMAL HEALTH
SYBA
UNIVERSIDAD COMPLUTENSE
DE MADRID
VETERQUIMICA S.A.



Researchers

Sergio López Soria
Miquel Nofrarías Espadamala
Lorenzo José Fraile Sauce

Laboratory technicians

Rosa María López Jiménez
Diego Pérez Rodríguez

Knowledge transfer and training

06

Doctoral thesis and research works

Doctoral thesis

Mosquitos del género Culicoides: caracterización genotípica de potenciales vectores de la Lengua Azul en Cataluña y desarrollo de nuevas herramientas diagnósticas
Nonito Pagès Martínez
Directors: Fernando Rodríguez González and José Ignacio Núñez Garrote
8 April 2010

Ultrastructural studies on Porcine Circovirus type 2 (PCV2) infection
Carolina Rodríguez Cariño
Director: Joaquim Segalés Coma
13 July 2010

Application of stochastic models to assess the probability of introduction and persistence of Bluetongue in an área
Sebastián Napp Avelli
Director: Jordi Casal Fàbrega
24 November 2010

Research works

Metanàlisi per a determinar la sensibilitat i l'especificitat de la Intradermoreacció i del Gamma-interferó, en el diagnòstic ante-mortem de la tuberculosi bovina
Ariadna García Sáenz
Director: Jordi Casal Fàbrega

Characterization and isolation of a subpopulation of myeloid cells from swine peripheral blood: possible identification of plasmacytoid dendritic cells
Pamela Martínez Orellana
Director: María Montoya González

Patogenia y patogenicidad de un nuevo genotípico de virus de bursitis infecciosa aviar
Jennifer Strauss
Directors: Natàlia Majó Mafferrer and Roser Dolz Pascual

Caracterización molecular de virus de Laringotraqueítis Infecciosa Aviar aislados de pollos y gallinas ponedoras de un brote ocurrido en España en 2009 – 2010
Saulo Urdaneta
Directors: Natàlia Majó Mafferrer and Roser Dolz Pascual

Immunohistochemical study of BDNF, P75 and TRKB in the brains of BOTG110 transgenic mice with BSE
Natalia Czerniak
Director: Enric Vidal

Longitudinal study of Torque teno sus virus 1 (TTSuV1) and 2 (TTSuV2) loads in serum of healthy pigs
David Nieto
Directors: Tuija Kekarainen and Joaquim Segalés



One of the priorities of the CReSA is to train future researchers.

Internships

International internships

Mar Costa Hurtado

PhD student

Feinberg School of Medicine

United States

FPI-MICINN

01/05/2010-01/10/2010



Elisa Crisci

PhD student

Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)

Spain

FPI-MICINN

15/02/2010-21/05/2010



Julia Vergara Alert

PhD student

Medical College of Georgia

United States

FPI-MICINN

01/03/2010-28/05/2010



Kateri Bertran Dols

PhD student

Istituto Zooprofilattico Sperimentale delle Venezie

Italy

FPU-ME

06/09/2010-17/12/2010



Congresses

Organization of congresses and workshops

II Congreso Ibérico de Epidemiología

4-5/02/2010

Bellaterra

50 attendees

XII Jornadas de Porcino de la UAB

10-12/02/2010

Bellaterra

120 attendees



Roundtable. Jornades sobre zoonosis i malalties emergents.

Avenços en la lluita i prevenció de la llengua blava

Technical seminar of the

PATT Plan (DAR)

19/04/2010

Bellaterra

75 attendees



Roundtable. Avenços en la lluita i prevenció de la llengua blava.

Avenços científics i situació actual de malalties d'impacte econòmic: grip aviària i campilobacteriosi

Technical seminar of the

PATT Plan (DAR)

Bellaterra

15/07/2010

82 attendees



Roundtable. Avenços científics i situació actual de malalties d'impacte econòmic: grip aviària i campilobacteriosi.

Jornada de resultats de l'activitat del CReSA 2008

16/12/2010

Bellaterra

120 attendees

Seminars

Technical seminars

Since 2007, Dr Maria Montoya has been in charge of the coordination of technical seminars with guest speakers from different institutions:

Porcine plasmacytoid dendritic cells and their interaction with RNA viruses
Artur Summerfield
Institute of Virology and Immunoprophylaxis, Switzerland
15/01/2010

Estrategia de influenza en el CReSA
Mariano Domingo, Natalia Majó, Maria Montoya, Ayub Darji
CReSA
22/01/2010

On the development of vaccines against bovine TB and the immune response to mycobacteria in cattle or three stories with a common theme
Bernardo Villareal
Veterinary Laboratory Agency , United Kingdom
19/02/2010

SORTER FACSARia: funcionamiento de la Unidad
Lorena Córdoba, Raquel Maeso, Xavi Abad
CReSA
04/03/2010

Wildlife Disease Investigation and Avian Influenza Research in the Southeast USA
Taiana Costa
The University of Georgia, College of Veterinary Medicine, Department of Pathology, Athens, GA - USA
05/03/2010

Presentació del Nou Aplicatiu de la CEEAH de la UAB

David Solanes
CReSA
12/03/2010

Alternative live-attenuated influenza vaccines protect against epidemic and pandemic flu

Alicia Solorzano
Research Assistant Professor
Department of Veterinary Medicine, University of Maryland, College Park, USA
17/03/2010

Torque teno virus loads in tissues of different age animals

Mario Aramouni
CReSA
19/03/2010

Surface polysaccharides of *Actinobacillus pleuropneumoniae*: structure-function relationships

Mario Jacques
Research group on Infectious Diseases of Swine (GREMIP)
University of Montreal, Canada
09/04/2010

Dos historias diferentes: Filogenia de circovirus porcino tipo 2 en Cuba y desarrollo de qRT-PCRs para miRNAs y para el virus de la peste porcina clásica

Lester Josué Pérez Rodríguez
Investigador del grupo de Virología Animal del Centro Nacional de Sanidad Agropecuaria, (CENSA), La Habana, Cuba
16/04/2010

Porcine plasmacytoid dendritic cells and their interaction with RNA viruses

Artur Summerfield

Institute of Virology and Immunoprophylaxis, Switzerland
23/04/2010

Morbillivirus en delfines del Mediterráneo

Sara Soto Martín
Resident Unitat de Patologia, UAB
30/04/2010

Transcript profiling in *Actinobacillus pleuropneumoniae* in infection-like conditions

Vincent Deslandes
PhD Student. Université de Montréal, Canada
05/05/2010

Recent trends in the diagnosis of emerging and re-emerging viral diseases of domestic and wild animals

Sandor Belak
Head of Joind division R&D Division, Dept. Virology.
The National Veterinary Institute, Sweden
07/05/2010

Technical aspects of diagnostic immunohistochemistry: from the desk to the bench

Jose Antonio Ramos Vara
Purdue Universit, USA
11/05/2010

Disseny d'enquestes

Anna Alba
CReSA
21/05/2010

Malassezia nana i dermatitis felina

Gemma Castellà
Dept. Sanitat I Anatomia
Animals, UAB
28/05/2010

Seminars

Identification of genetic determinant of virulence in classical swine fever virus Manuel Borca Lead Scientist Plum Island Animal Disease Center 29/05/2010	Noves estratègies vacunals en front el virus de la Pesta Porcina Clàssica i estudi de la immunopatogenicitat viral Joan Tarradas Font CReSA 08/10/ 2010	Utilización de la microscopía electrónica en el estudio de la patogenia de la Peste Porcina Africana Librado Carrasco Dpto Anatomía y Anatomía Patológica Comparadas Facultad de Veterinaria, Universidad de Córdoba 12/11/ 2010
Salud intestinal: Influencia de la fibra en la inmunología y en la microbiota intestinal de cerdos Joseane dos Santos CReSA 04/06/2010	Antiviral strategies against African Swine Fever Virus Maria Ballester CReSA 15/10/2010	Prestació de serveis d'anàlisis virològiques : Pestivirus, Malaltia Vesicular Porcina i Llengua Blava (Conveni CReSA-DAR) Rosa Rosell CReSA 19/11/ 2010
The "state-of-the-art" in Pig Industry in Italy (production, health and research) and possible scenarios Paolo Martelli Dipartimento di Salute Animale, Università degli Studi di Parma, Parma, Italia 11/06/2010	Porcine Dendritic Cell Response to TLR Agonists and Influenza Viruses Tufaria Mussà CReSA 22/10/2010	6th International Symposium on Emerging and Re-emerging Pig Diseases: un congrés internacional organitzat pel CReSA-UAB Joaquim Segalés Coma CReSA 29/10/2010
Epidemiologia i diagnòstic clínic de la infecció pel virus del Papil-loma Humà (HPV) en pacients VIH+ Laila Darwich Soliva CReSA 02/07/2010	Virus, cerdos y microRNAs Jose Ignacio Núñez CReSA 05/11/2010	

Awards



The 3 honoured researchers. On the right, Prof. Joaquim Segalés

Porcine Circovirus remains in the spotlight of European researchers

The fourth edition of the European PCV2 Research Award sponsored by Boehringer Ingelheim saw a record number of applications showing the continued interest in Porcine Circovirus Type 2 (PCV2) research: 13 researchers from ten different countries submitted proposals. A maximum of three prizes, each of 25,000 euros, are granted to European researchers every year. Segalés' project received the award in 2010:

Effect of maternal derived immunity on porcine circovirus type 2 (PCV2) infection dynamics and production parameters in PCV2 vaccinated pigs (Prof. Joaquim Segalés, CReSA). In his project, Prof. Segales will compare the efficacy of PCV2 vaccination in pigs with low and high levels of maternally derived antibodies under field conditions.

CReSA Training Programs

CReSA Training Programs, an initiative for professionals in the animal health sector, has recently been implemented. Investigators from the CReSA disseminate their knowledge within the areas of expertise.

CReSA Training Programs are seminars and courses offered by CReSA. Topics are related with the competencies and knowledge of the researchers at the center (bacteriology, virology, immunology, entomology, epidemiology, research, diagnosis, control and eradication of diseases, etc.).

Each training program is designed according to needs. The topics, trainers and times are adapted for each activity. This offer is aimed at the public sector (administrations or public entities) as well as the private sector (agrifood, pharmaceutical, biotechnology companies, producer associations, veterinarians, laboratory technicians, etc.). It can be offered in Catalan, Spanish or English.

This experience has been successfully tried by pharmaceutical companies with programs designed for tra-

ning groups of vets specialized in pigs and poultry from different European countries.

In 2010, 3 programs were requested by pharmaceutical companies. Around 60 European vets (from Russia and Denmark) were trained:

Program 1

- Welcome and introduction to CReSA. Mariano Domingo (Director of CReSA. UAB Professor)
- Swine influenza virus interactions with the immune system. María Montoya (CReSA Researcher)
- Emerging infections in pigs: what's new?. Joaquim Segalés (CReSA Researcher. UAB Professor)
- Lessons learned from the development of new experimental vaccines against animal viruses. Fernando Rodríguez (CReSA Researcher)
- Round table on swine pathology. M. Domingo, M. Montoya, J. Segalés, F. Rodríguez.

Program 2

- Welcome and introduction to the CReSA. Elisabet Rodríguez (Head of Communication of CReSA)

- Roundtable on swine pathology with CReSA researchers. Joaquim Segalés (Porcine Respiratory Disease Complex and Porcine Circovirosis), Lorenzo Fraile (Porcine Respiratory Disease Complex and Enteric Diseases), Fernando Rodríguez (African Swine Fever), Llilianne Ganges (Classical Swine Fever), María Montoya (Swine Influenza)
- Visit to the CReSA facilities (BSL-2 and BSL-3).

Program 3

- Welcome and introduction to the CReSA. Elisabet Rodríguez (Head of Communication of CReSA)
- Round table on avian pathology. Diagnostic, epidemiology and control of avian viral infections. Roser Dolz (CReSA Researcher)
- Visit to the CReSA facilities (BSL-2 and BSL-3)

CReSA TRAINING PROGRAMS

Courses and Seminars for Professionals

Master in Virology

First Master in Virology in Spain

The Master in Virology (starting on October 5th, 2010) is open to graduates from Life Sciences, Health Sciences, Experimental Sciences and Agro food Sciences. The objective is to gain a clearly specialized perspective in order to work in research laboratories, hospitals and biotech companies. The Master in Virology 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:
1.Universidad Complutense de Madrid (UCM)
2.Universidad Politécnica de Madrid (UPM)
3.Sociedad Española de Virología (SEV)
4.Instituto de Salud Carlos III (ISCIII)
5.Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)
6.Centro de Biología Molecular Severo Ochoa (CBMSO)
7.Centro de Investigaciones Biológicas (CIB)

8.Centro Nacional de Biotecnología (CNB)
9.Centre de Recerca en Sanitat Animal (CReSA)

After studying common subjects, students will be able to choose one of the four different routes of specialization: Human virology, Plant virology, Veterinary virology and Other specialties. The students will be able to do practical work at the CReSA under the direction of researchers from the center (also Professors Masters lecturers).



Master in Virology: subjects.

International visits

The CReSA received 65 international visits in 2010, coming from 18 different countries. The reasons for the visits were institutional, to attend seminars, research collaborations, business or internships:

Artur Summerfield
Institute of Virology and
Immunoprophylaxis
Switzerland

Alex Thiermann
OIE
Chile

Phil Bofield
STERIS
United Kingdom

Bernardo Villareal
Veterinary Laboratory
Agency (VLA)
United Kingdom

Clinician veterinarians (20)
Different companies
United States

Taiana Costa
The University of Georgia
United States

Mario Jacques
Université de Montréal
Canada

Denny Sonnemans
Vivian Cornelissen
Saskia van de Zande
INTERVET
Netherlands

Alicia Solorzano
University of Maryland
United States

Olli Peltoniemi
University of Helsinki
Finland

Dominik Maes
University of Ghent
Belgium

Vincent Deslendes
Université de Montréal
Canada

Lester Josué Pérez Rodríguez
CENSA
Cuba

Liam O'Callaghan
ENFER
Ireland

Thomas Meyssier
JANVIER
France

Sandor Belak
The National Veterinary Institute
Sweden

Jose Antonio Ramos Vara
Purdue University
United States

Erdal Erdogan

Duygu Ozar
Ankara University
Turkey

Arda Kara

Chris Ottley
PRI
United States

Estella Devillard

Adisseo France S.A.A
France

Kateřina Dědková

Palacký University Olomouc
Czech Republic

Lisa Macera

Universidad de Pisa
Italy

Paul Wood

Pfizer Animal Health
United States

Theo Kanellos
Pfizer Animal Health
France

Jeff Stromatt
Knowledge Sharing Systems
United States

Hans de Smith
Alex Eggen
INTERVET
Netherlands

Mauricio Cesa
Pfizer Animal Health
Mexico

Ian Nanjini
Pfizer Animal Health
United Kingdom

Neils Wuyts
Pfizer Animal Health
France

Moez Sanaa
ANSES
France

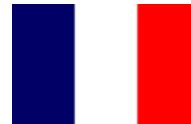
Mario Guzmán García
Daniel Garzón Cortés
Universidad Autónoma de
Nuevo León
Mexico

Chwan-Heng Wang
Dr. Wang
China

Paolo Ferro
ELANCO
Italy

Geoffrey Labarque
ELANCO
France

Olga Berhevit
Fernando Bertazzo
ELANCO
United States



Science and society

07

Website

Users: a general view

88,219 Visits/year (25.526.cat / 62.693 .es)
 9,102 Visits/month (2.960 .cat / 6.142 .es)
 140.290 Pages visited/year
 1,78 Pages/visit
 142 Countries/territories

Ranking of visitor countries

1	Spain	73829
2	United States	1948
3	Italy	539
4	Mexico	511
5	United Kingdom	361
6	Netherlands	302
7	Germany	296
8	Colombia	292
9	France	260
10	Brazil	215
11	Canada	210
12	Chile	193
13	Argentina	189
14	Venezuela	143
15	Japan	135
16	Peru	132
17	Portugal	130
18	Belgium	126
19	Switzerland	115
20	Turkey	94
21	Romania	75
22	Mozambique	61
23	China	60
24	Denmark	59
25	Ecuador	58
26	Philippines	52
27	Czech Republic	48
28	India	45
29	Russia	42
30	Bolivia	41

The screenshot shows the homepage of the CReSA website. At the top, there is a banner for the 'International Symposium on Emerging and Re-emerging Pig Diseases' held in Barcelona from June 12-15, 2011. Below the banner, there is a sidebar with a menu titled 'ENLLAÇOS DIRECTES' (Direct Links) which includes links to 'Actualitat', 'Personal', 'Oms ens trobem?', 'Projects', 'Oferta tecnològica', 'Sèrveis', 'Ofertes de treball', and 'Contacte'. The main content area features a news article about 'Vacunes ADN basades en minigenes del Virus de la Febre Aftosa' (DNA vaccines based on minigenes of the Foot-and-Mouth Virus) and a calendar for the month of May.

Press releases

37 news stories about the research and activities carried out by the CReSA were written and disseminated in 2010:

20-12-2010

A report situates the CReSA at the forefront of research

The College of Veterinarians of Barcelona has recently published a report focused exclusively on the CReSA. Its director, Mariano Domingo and one of the researchers at the center, Natalia Majó, offer a radiograph of the current situation at the CReSA and talk about work on the H1N1 virus.

16-12-2010

The XIII Swine Conference registration form is already available

Registration to attend the XIII UAB Swine Conference is now available. This event, organized by the Faculty of Veterinary Science at the Autonomous University of Barcelona, will be held in the Auditorium of the Faculty from February 2 to 4.

10-12-2010

Science Week brings young people to the CReSA

On occasion of the 15th edition of Science Week, held from November 12 to 22, the CReSA has offered a total of eight tours of the center. More than 130 students were able to learn how a technological center like the CReSA operates.

03-12-2010

Relevant facts on the research activities of the CReSA in 2009

Last year, the team of researchers of the CReSA made the following achievements, among others: 72 scientific, indexed articles, 119 communications in congresses, 29 competitive projects in progress (including 5 European projects funded by the 7th Framework Program), 5 doctoral theses, and 38 new contracts with private companies. The CReSA Annual Report 2009 can be consulted.

30-11-2010

CReSA will participate in the third Forum Biocat

Next Thursday, December 2nd,

the third edition of the Forum Biocat begins. Representatives of different companies and organizations in the biotechnology, biomedical and medical technology sectors will have the opportunity to exchange views and knowledge at this show. For the first time, the CReSA is participating as an exhibitor at the conference.

26-11-2010

CReSA describes new vaccine antigens against Glässer's disease

Haemophilus parasuis is a swine pathogen transmitted by air or by direct contact. It causes Glässer's disease, a serious health problem for the pork industry. Its control by vaccination has been limited due to the existence of different variants of the bacteria. A study by the CReSA has found that trimeric autotransporters of *H. parasuis* can be used to improve future vaccines.

19-11-2010

Defence of the doctoral thesis on bluetongue

Next November 24th, Sebastián Napp Avelli, a PhD student at the CReSA, will defend his doctoral thesis entitled "Application of Stochastic Models to Assess the probability of introduction and Persistence of Bluetongue in an area" led by Dr. Jordi Casal.

17-11-2010

New knowledge on the pandemic

H1N1 virus in pigs CReSA scientists have published a study to determine the relevance of human H1N1 virus in pigs previously infected with circulating influenza virus. Thanks to this, important questions that threatened the pig sector in Europe have been answered.

09-11-2010

Two projects will study emergent diseases transmitted by arthropods and their mosquito vectors

The CReSA is looking for candidates of high academic backgrounds to apply for an early competitive PhD fellowship and initiate their PhD studies in

2011. Both projects will focus on the role of autochthonous mosquito populations on some emergent diseases of medical and veterinary concern (Dengue, Chikungunya, Bluetongue, African Horse Sickness).

03-11-2010

The "International Symposium on Emerging and Re-emerging pig Diseases" presents the program of lectures and discussions

The International Symposium on swine diseases, which will take place in Barcelona on June 12th, 2011, has presented its final program. Over 4 days, prominent scientists and veterinarians will visit the Catalan capital to learn about the most important developments in the sector.

29-10-2010

The Ministry of Science and Innovation finances 6 CReSA projects

Bovine tuberculosis, swine influenza, bovine neosporosis, *H. parasuis*, African swine fever virus and porcine microRNAs in viral infections are the topics of the new projects that the Ministry of Science and Innovation has decided to finance.

27-10-2010

Avian influenza virus circulating in wild birds in Catalonia

Virus Research journal has recently published a study involving the participation of CReSA researchers that shows that the avian influenza circulating in wild birds in Catalonia is phylogenetically related to Eurasian viruses. This study is a pioneer in the detection and study of different subtypes of avian influenza virus in Spain from their natural hosts, wild birds.

19-10-2010

European vets attending the CReSA Training Programs

CReSA Training Programs, an initiative for professionals in the animal health sector, has recently been implemented. CReSA researchers disseminate knowledge in their areas of expertise.

06-10-2010

CReSA is awarded a grant for science divulgation from the DIUE

The CReSA has been granted a subvention from the Department of Innovation, Universities and Enterprise (DIUE) to fund the project "CReSA channel: a science video channel for everybody".

04-10-2010

CReSA actively participates at the IPVS2010 in Vancouver

The CReSA took part in the world swine congress with 39 scientific communications and a stand for the promotion of the 6th International Symposium on Emerging and Re-emerging Pig Diseases. This symposium will be organized by the CReSA in Barcelona next June 2011.

21-09-2010

CReSA receives FECYT grant to carry out divulgation activities

The CReSA has received a grant from the Spanish Foundation for Science and Technology (FECYT) to carry out divulgation activities for the general public within the Program of scientific culture and innovation 2010.

UBDIVULGA

REVISTA DE DIVULGACIÓ CIENTÍFICA



Agrodigital.com

La web del campo

17-09-2010

JARC representatives of the pig sector visited CReSA

Last July 29th, representatives of Joves Agricultors i Ramaders de Catalunya, (JARC, Young farmers of Catalonia) arranged a meeting with CReSA researchers to discuss different pig health problems.

15-09-2010

Conclusions of the flu conference organized by the CReSA and SEV

A total of 118 veterinarians and human health professionals attended the 1st Conference on Zoonosis and Emerging Diseases. Different aspects related to avian, swine and human influenza were discussed.

08-09-2010

CReSA seminar on avian diseases

Last July 19th, 2010, the CReSA promoted a technical seminar entitled "Scientific advances and current situation of diseases with economic impact: avian flu and campylobacteriosis", included in the Annual Plan for Technological Transfer (PATT) of the Department of Agriculture, Food and Rural Action (DAR) of the Generalitat of Catalonia.

08-07-2010

39 CReSA scientific papers during first semester 2010

The scientific output of CReSA researchers during this period resulted in 39 publications included in the Science Citation Index; mostly related to swine diseases.

05-07-2010

Defence of doctoral thesis on porcine circovirus

Next July 13, 2010 (Tuesday), Carolina Rodríguez Cariño, PhD student at the CReSA, will defend her doctoral thesis entitled "Ultrastructural studies on Porcine Circovirus type 2 (PCV2) infection" directed by Dr Joaquim Segalés.

23-06-2010

Call to researchers proposing experiments to be conducted at the CReSA facilities

The Network of Animal Disease Infectiology Research Facilities (NADIR) invites the research

Community to make proposals to bid for funding to carry out projects within the facilities participating in the network. Proposals may be submitted by any European research laboratory or consortium of laboratories (public or private).

14-06-2010

Experimental infection of European bred sheep with Rift Valley fever virus

The CReSA carried out for the first time an experimental infection of sheep with Rift Valley fever virus (RVF) in the level-3 biocontainment facilities of this center in 2009. Subsequently, the CReSA took part in ENCRAD (European Network for the Co-ordination of Rift Valley fever Animal experimentation and Diagnostic).

17-05-2010

CReSA Bluetongue seminar Last April 19th, 2010, the CReSA promoted a technical seminar entitled Advances in the fight against and prevention of Bluetongue, included in the Annual Plan for Technological Transfer (PATT) 2010 of the Department of Agriculture, Food and Rural Action (DAR) of the Generalitat of Catalonia.

11-05-2010

Pigs used as a model for studying human tuberculosis for the first time The Unitat de Tuberculosis Experimental (UTE), Institut per a la

Investigació en Ciències de la Salut Germans Trias i Pujol (IGTP) has developed a new experimental model in minipigs for *Mycobacterium tuberculosis*, in collaboration with the CReSA. The mini-pig model highlights new aspects that could help gain a better understanding of tuberculosis infection control in humans.

05-05-2010

Next Conference on Avian and Swine Flu organized by the CReSA and the SEV

The 1st Conference on Zoonosis and Emerging Diseases will be held on June 17-18th, 2010, in Barcelona. Different aspects related to the influenza virus will be discussed. The Conference is

organized by the CReSA and the Spanish Society of Virology (SEV) with the support of the Department of Innovation, Universities and Enterprise of the Generalitat de Catalunya.

30-04-2010

First Master in Virology in Spain: open registration The Master in Virology (starting on October 5th, 2010) is open to graduates in Life Sciences, Health Sciences, Experimental Sciences and Agro food Sciences.

The objective is to gain a clearly specialized perspective for working in research laboratories, hospitals and biotech companies.

12-04-2010

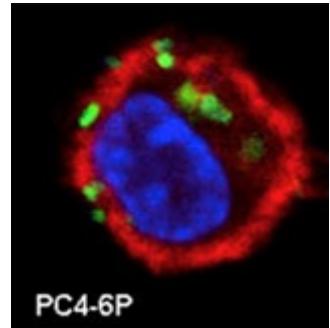
Award for Porcine Circovirus research by Professor Segalés Dr Segalés (CReSA) will investigate the negative impact of PCV2 on the immune system and the possibility of preventing this effect by vaccination. This project will be funded by the European Porcine Circovirus Research Award conceded by Boehringer Ingelheim.

31-03-2010

Defence of doctoral thesis on vectors of Bluetongue Next Thursday, April 8th, 2010, Nonito Pagès Martínez, CReSA researcher, will defend his doctoral thesis entitled "Culicoides biting midges: genotype characterization of potential vectors of Bluetongue in Catalonia and development of new diagnosis techniques" directed by Dr Fernando Rodríguez González and Dr José Ignacio Núñez Garrote.

16-02-2010

Reported new non-described cryptic Culicoides species in Catalonia using molecular analysis Accurate analysis of Culicoides species using morphological and molecular approaches resulted in the detection of diagnostic metric traits for cryptic species and the design of several new species-specific PCR



04-02-2010 Insemination with beef bull semen reduces the risk of neosporosis abortion in dairy cows	Virginia Aragon from a collaborative study conducted with researchers from Université de Montréal.	26 researchers of the CReSA are involved in this project.
Different crossbreed pregnancies carried different abortion risks in <i>Neospora</i> -infected dairy cows. This is one of the conclusions obtained from a collaborative study carried out by Universitat de Lleida, CReSA-Universitat Autònoma de Barcelona and Universidad de Zaragoza.	26-01-2010 Technical events organized by CReSA-UAB (February 2010) El II Congrés Ibéric d'Epidemiologia (4-5 de febrer) i les XII Jornades de Porcí de la UAB (10-12 de febrer) es celebraran a la Facultat de Veterinària de la UAB.	18-01-2010 Bioinformatics prediction for determining epitopes of porcine reproductive and respiratory syndrome virus (PRRSV) Researchers of the CReSA have described for the first time (Vaccine) antigenic sites of PRRSV that are recognized by T cells, using bioinformatics tools and later immunological analysis. All these information is relevant for the design of newer and better vaccines.
29-01-2010 Invasion of endothelial cells by systemic and nasal strains of <i>Haemophilus parasuis</i> Invasion of endothelial cells is a virulence mechanism of <i>H. parasuis</i> that may be related to the ability of some strains to cause meningitis. This is one of the conclusions obtained by Dr	20-01-2010 CReSA participates in a Latin American Network for improving pig production 109 researchers from 14 countries will take part in this network funded by CYTED and intended for improving pigmeat production through innovative, sustainable production systems.	11-01-2010 The Scientific Advisory Board of the CReSA is created The Scientific Advisory Board will act 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

SINC Platform

Improved vaccine formula for Glässer's disease

23.12.2010

The bacteria *Haemophilus parasuis* exclusively affects swine and is transmitted by direct contact or the air. This is a serious problem for the animal industry and, due to the different variants of the bacteria, involves difficulties for vaccinating herds. A new study has discovered that trimeric self-transporters of *H. parasuis* could form part of more efficient vaccines in the future.

Certain immunity shown of pigs to H1N1 virus

12.11.2010

Scientists at the CReSA have produced a study that shows the reach of the human virus H1N1 to pigs that have been previously infected by circulating swine flu viruses. Thanks to this study published in the journal *Virus Research*, answers are found for important matters that are threatening the pig sector in Europe.

Circulating viruses of avian flu detected in wild birds in Catalonia

04.11.2010

CReSA researchers are participating in a study that shows the existence of the avian flu virus in wild birds in Catalonia. The result appear in the journal *Virus Research*, and show that no high pathogen virus has been detected in these birds.

Circulating viruses of avian flu analysed in wild birds in Catalonia

27.10.2010

The journal *Virus Research* has recently published a study that involved the participation of CReSA researchers and which has shown that circulating viruses of avian influenza in wild birds in Catalonia are phylogenically related to Eurasian viruses. The study has set new standards in the detection and analysis of different subtypes of the bird flu virus in Spain originating from natural hosts, wild birds.

Bioinformatic tools and immunology essays combined for the first time in a domestic species

20.01.2010

Researchers from the CReSA have described for the first time antigenic regions of the porcine reproductive and respiratory syndrome virus (PRRSv) recognised by T cells, through the application of bioinformatic tools and an immunology analysis. The results increase knowledge of the cellular immune response to the virus.

CReSA students: future researchers

The CReSA is investing in the training of young people.

VIDEO

Workshops on avian and swine flu: current situation and future perspectives

EVENT



Activities for students

Escolab 2010

From February to May 2010, CReSA offered visits within the initiative Escolab 2010. In total, 353 secondary level students from 15 different schools have been able to know the center:	Secondary education (20 students)	21 April 2010 IES Roger de Llúria (Barcelona)
02 February 2010 Escola Pia de Caldes (Caldes de Montbui) Secondary education (25 students)	03 March 2010 Col·legi Sant Gabriel (Viladecans) Secondary education (10 students)	Superior grade formative course (19 students)
03 February 2010 Escola Lestonnac (Barcelona) Secondary education (25 students)	10 March 2010 IES Ramón Casas i Carbó (Palau Solità) Secondary education (32 students)	27 April 2010 Escola Municipal del Treball (Granollers) Superior grade formative course (30 students)
09 February 2010 Escola Municipal del Treball (Granollers) Secondary education (10 students)	17 March 2010 Escola Municipal del Treball (Granollers) Superior grade formative course (20 students)	28 d'April 2010 Escola Municipal de Treball (Granollers) Superior grade formative course (17 students)
10 February 2010 IES Terra Roja (Santa Coloma de Gramenet) Secondary education (17 students)	25 March 2010 IES Miquel Martí i Pol (Cornellà) Superior grade formative course (26 students)	12 de maig 2010 Escola Infant Jesús (Barcelona) Batxillerat (43 students)
17 February 2010 IES Banus (Cerdanyola Vallès)	07 April 2010 Escola Pérez Iborra (Barcelona) Secondary education (27 students)	25 April 2010 Escola Municipal del Treball (Granollers) Superior grade formative course (30 students)



Program Argó

The Program Argó UAB offers the possibility to know centers of research, projects

and investigators of the UAB. In 2010, 4 students took part of this program under super-

vision of Virginia Aragón, Marta Cerdà and Mònica Pérez.

Science week 2010

On the occasion of the 15th edition of Science Week (15-29, November 2010), the CReSA received a total of 8 groups:	17 November 2010 IFPS Roger de Llúria (Barcelona) Secondary education (23 students)	25 November 2010 Col·legi Sant Ignasi de Sarrià (Barcelona) Secondary education (25 students)
15 November 2010 IES Parets (Parets del Vallès) Secondary education (28 students)	18 November 2010 Escola Municipal del Treball (Granollers) Superior grade formative course (14 students)	11 December 2010 Escola Daina Isard (Olesa de Montserrat) Secondary education (33 students)
16 November 2010 IFPS Roger de Llúria (Barcelona) Secondary education (34 students)	22 November 2010 IES Parets (Parets del Vallès) Secondary education (28 students)	21 December 2010 Superior grade formative course Escola Municipal Treball (Granollers)

Divulgation

CReSA TV

This year, the CReSA opened its own digital channel called CReSA TV on its website. This section includes videos recorded thanks to 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.

CReSA students: future researchers

CReSA invests in the training of professionals from various fields of research. They speak about the studies they have done, the qualities needed to investigate, the motivations and the future.

We learn about the researchers of the future.

Do you know about flu?

Every year we hear about flu. In 2009, the influenza pandemic filled the front pages of newspapers. But what is flu? Do you know it well? And most importantly, what is the cause? The following report analyzes the virus in depth thanks to the knowledge of three CReSA researchers and updates the activities of the center.

Biosecurity for research

The CReSA is a recognized animal health research center. The CReSA building came into operation in 2005 and consists of two clearly differentiated areas: level 2 bio-safety laboratories and level 3 biocontainment unit. This biocontainment unit enables the research team to carry out research into highly pathogenic agents.

Mosquito-borne diseases

Dengue. Yellow fever. Rift Valley fever, West Nile fever ... These diseases are caused by viruses and are transmitted between animals and humans through mosquito bites. In recent years, they have emerged or reemerged in different parts of the world. These diseases are exotic and distant from us. But are they really as distant as we think?

Foodborne diseases

Salmonella, Campylobacter ... These bacteria cause disease in animals and food toxicoinfections in humans. This video shows the origin of these diseases, how to control them and what research is being done by the CReSA to better understand these bacteria.



CRESA DIGITAL: 433 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. Therefore, the CReSA has created CReSADIGITAL, a news bulletin that offers a summary of the most important news, studies, publica-

tions 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.

3 bulletins were published in 2010:

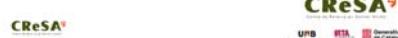
CReSADIGITAL 13
May 2010

CReSADIGITAL 14
Setember 2010

CReSADIGITAL 15
December 2010

Annual reports

- Annual Reports 2009
- Encàrrecs de Serveide la Generalitat de Catalunya 2009



Oral communications

Rodríguez-González E. **Centros de investigación: factorías educativas para estudiantes. V Congreso de Comunicación Social de la Ciencia (10-13 March, Pamplona).**

Materials and brochures



Transfer

ACC1Ó

Revisió i evaluació de la cartera científicotecnològica del CReSA

IP CReSA: Elisabet Rodríguez

This project was carried out in order to review and evaluate the portfolio of

knowledge accumulated at the CReSA with possibilities of being commercialized. KIMBCN was the consultancy in charge of this project. Eleven technologies were identified and one of these (principal researcher: Ignacio

Badiola) was selected to develop a complete technical roadmap (time to market, possible clients or partners and recommendations).



Associations and networks

Consell Català de la Comunicació Científica (C4)



Associació Catalana de Comunicació Científica (ACCC)



Plataforma Vet+*i*



CReSA as an exhibitor

Expoaviga 2010 (June 8-10, Barcelona)

IPVS 2010 (July 18-21, Vancouver)

Meeting with companies
COPIT-PRUAB (November
19, Bellaterra, Fernando
Rodríguez)

Fòrum Biocat 2010
(December 2, Barcelona)



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