FAO / IAEA CENTRAL LABORA TORY: ANIMAL PRODUCTION AND HEALTH LABORATORY (APHL)

World Organisation for Animal Health

APHL: an OIE Collaborating Centre

IAEA Joint FAO/IAEA Programme

OIE COLLABORATING CENTRE

Mandate

Collaborating Centres of the OIE shall have as their mandate:

-to operate as a centre of research, expertise, standardisation and dissemination of techniques within their sphere of competence;

-to propose or develop any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases,

- to place expert consultants at the disposal of the OIE.

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In addition they may, within their sphere of competence :

- provide scientific and technical training to personnel from OIE Member Countries and Territories;
- organise scientific meetings on behalf of the OIE;
- coordinate scientific and technical studies in collaboration with other laboratories or organisations;
- publish and disseminate any information in their sphere of competence that may be useful to OIE Member Countries and Territories.

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Statement made by the Director General of FAO, Mr Jacques Diouf, at a Conference In Early 2010

-The world population is expected to reach 9.1 billion in 2050
- We now have more than 1 billion people in the world who are suffering from hunger, 105 million people more than in 2008

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This is a Strong argument for the Relevance of our Objective:

CONTRIBUTE to ensuring FOOD SECURITY in a Sustainable Manner in Member States through Capacity Building and Development of Tools to Improve:
-Breeding and feeding Strategies
- Control of Important Infectious Animal Diseases

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Which MS are targeted?

J. D. Statement: "Food production will have to increase by 70% worldwide and to double in the Developing Countries if we are to meet food requirements".
So our targeted MS are those which are struggling to ensure Food Security: Latin America, Asia and Africa

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An Example: AFRICA

FAO ADG-AG at the ALIVE Meeting in Ethiopia (April 2010):

"Since 2009 in sub-Saharan Africa, over 269 million people are malnourished and 30 percent of the population suffers from hunger.

-Since the 1970s, agricultural imports have continued to outpace exports. Africa is becoming a larger net importer of food commodities.

- Each year it spends 33 billion US dollars on agricultural imports, mostly foodstuffs, while its exports have stood still at 14 to 15 billion US dollars"

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The Right to Food is the Right to feed Oneself in dignity

It is the right to have continuous access to the resources that enable you to Produce Enough Food to not only Prevent Hunger, but also to Ensure Health and Well-being.

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Our Activities are based on THREE PILLARS:

- Providing Support to TCP and CRP
- Conducting R&D To Prepare FUTURE demand and FUTURE use of the OUTPUTs
- BUILDING CAPACITY in MS with the vision of making sustainable the transfer of technologies

So the new vision is not to provide diagnostic kit nor diagnostic service but to develop and transfer technologies for MS use

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APHL is the FAO/IAEA Central Laboratory for ELISA and Molecular Techniques in Animal Disease Diagnosis

Application of Nuclear and nuclear related techniques in **APPLIED RESEARCH** to Develop Tools for the Control of Transboundary Animal Diseases (TADs)

Application of Nuclear and nuclear related techniques in **APPLIED RESEARCH** For The Preservation of Animal Genetic Resources

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APHL is the FAO/IAEA Central Laboratory for ELISA and Molecular Techniques in Animal Disease Diagnosis

Ensure Transfer of Technologies to FAO-IAEA MS after Adaptation, Evaluation and Standardization

Contribute to Capacity Building in MS Veterinary Laboratories

Provision of Services upon Request: Advice on technologies to be Used, Reference sera for diagnostic tests and Reference DNA Bank for Genetic studies

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CRP-D3.10.25 - Gene-based technologies in livestock breeding: Characterization of small ruminant genetic resources in Asia (2004–2009)

Resource population with crosses (Red Masaai - resistant and Dorper – susceptible, to gastrointestinal parasites)

↓

26 sheep chromosomes mapped with 150 DNA microsatellite markers

↓

Quantitative Trait Loci (QTL) identification

↓

Marker Assisted Selection (MAS) programmes implementation in order to achieve the introgression of this characteristic in indigenous breeds

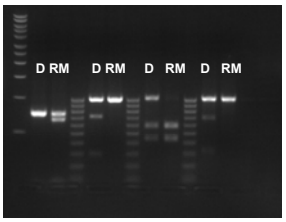
↓

APHL: Genotyping of 4 sheep chromosomes (from 26) and data analysis

Red Masaai (resistant) X Dorper (susceptible)

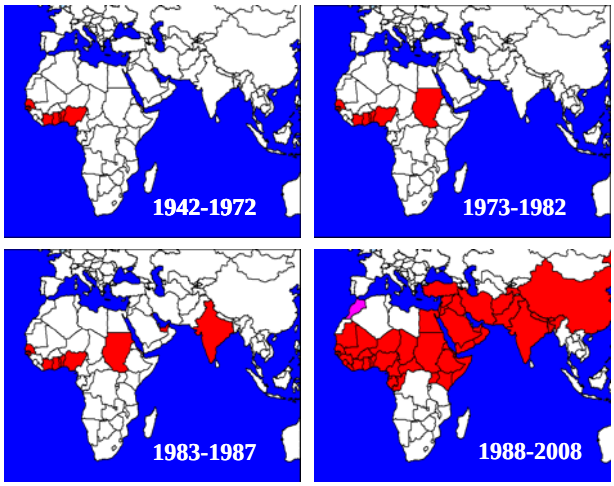
CRP-D3.10.25 - Gene-based technologies in livestock breeding: Characterization of small ruminant genetic resources in Asia (2004–2009)

Development of a test to detect genetic markers associated with nematode resistance in small ruminant



Red Masaai (resistant) X Dorper (susceptible)

Diagnostic and Molecular Epidemiology of Peste des Petits Ruminants (PPR) Disease



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Diagnostic and Molecular Epidemiology of Peste des Petits Ruminants (PPR) Disease

Mapping Poverty and Livestock in the Developing World

A report commissioned by the
UK Department for International Development,
on behalf of the Inter-Agency Group of Donors Supporting Research
on Livestock Production and Health in the Developing World

P.K.Thornton, R.L.Kruska, N.Henninger, P.M.Kristjanson,
R.S.Reid, F.Atieno, A.N.Odero and T.Ndegwa

International Livestock Research Institute, PO Box 30709,Nairobi,Kenya
2002

www.ilri.org

ISBN 92-9146-111-3

ENTER

Credits

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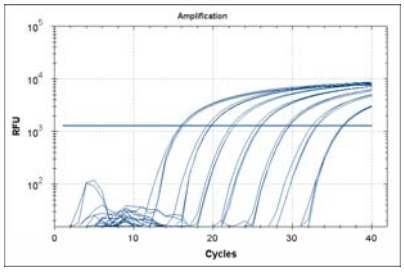
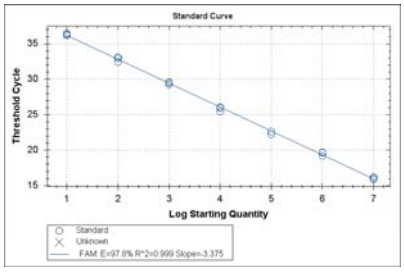
CRP-D3.20.21: Development of PPR Diagnostic test

Detection of PPRV by TaqMan MGB real time PCR





The amplification plots were realized on 10-fold serial dilutions (10^7 to 10^1 copies) assayed in triplicate using a plasmid containing the PPRV N gene.

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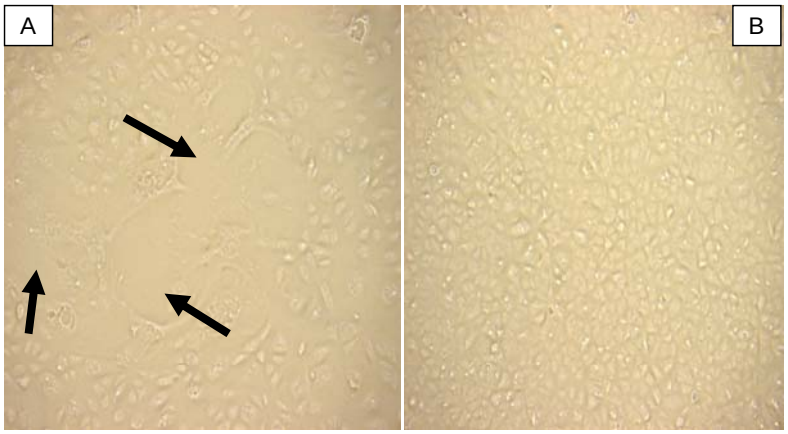
Development of PPR Diagnosis Test: Production of CV1 Cell line expressing Ruminant SLAM



CHS cells (CV1 cells expressing the PPRV receptor: SLAM protein):
-Photo A: Syncytia indicated by the arrows in the cell layer infected with PPR suspected pathological sample. This virus cytopathic effect (cpe) appears 2 days after infection instead of 2-3 weeks for normal cells
-Photo B: Control cell, no syncytium detected.

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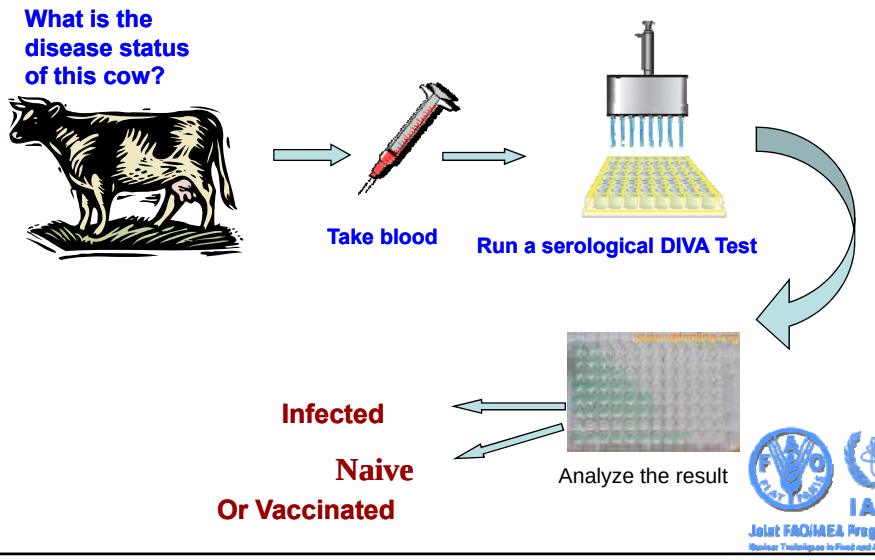
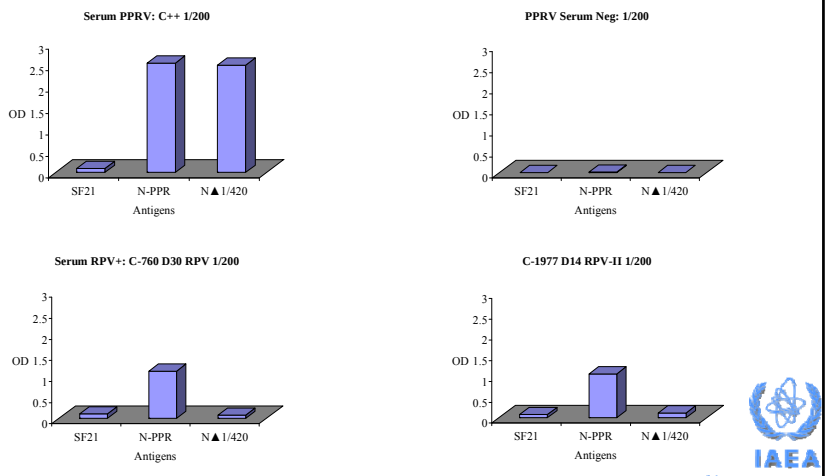
Future Need: Use of DIVA techniques in disease management

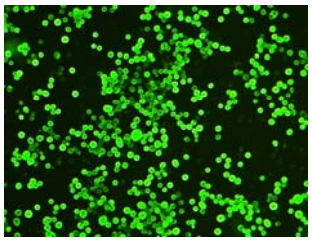


Development of PPR and Rinderpest Marker Vaccines

Using C-terminus aa Seq. 421-525 (N▲1/420) of N PPRV for iELISA



CRP-D3.20.21-DIVA: Test to differentiate FMD infected from vaccinated animals



Expression of Recombinant FMD 3ABC/NSP by Baculovirus in Insect Cells

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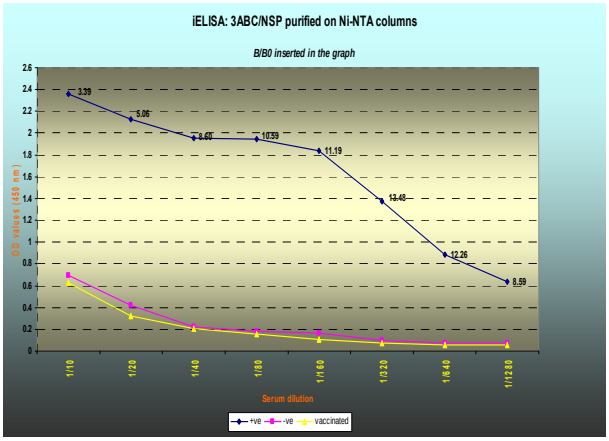
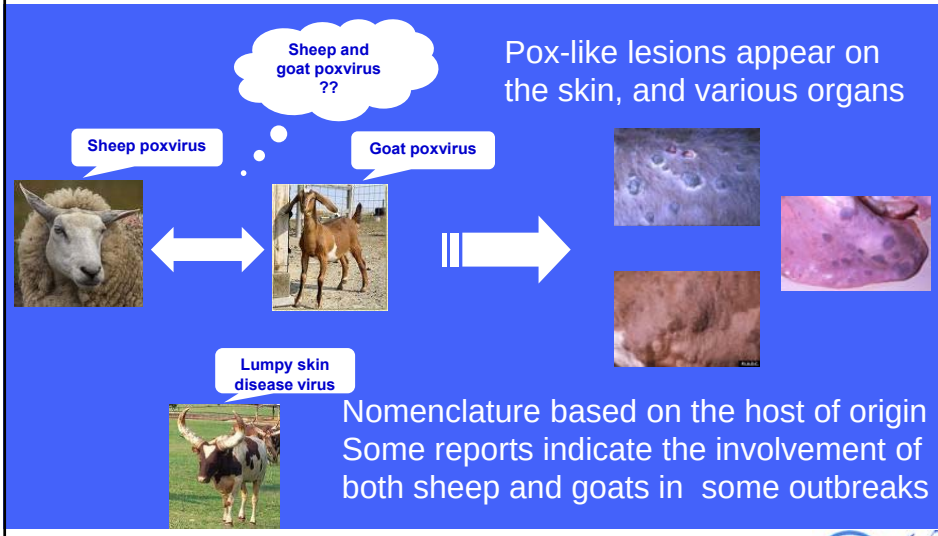
Indirect ELISA for the detection of anti 3ABC/NSP antibodies in CATTLE



The Genus *Capripoxvirus* (CaPV): *sheep poxvirus* (SPPV), *goat poxvirus* (GTPV) and *lumpy skin disease virus* (LSDV)



Pox-like lesions appear on the skin, and various organs

Nomenclature based on the host of origin
Some reports indicate the involvement of both sheep and goats in some outbreaks

Infections cannot be distinguished clinically or serologically

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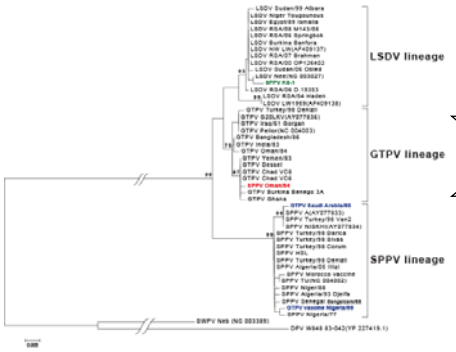
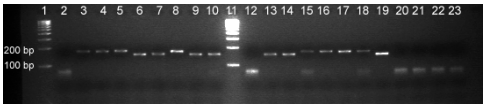
Molecular Epidemiology and Genotyping tools for Capripoxviruses



From sequencing

Creating friendly usable tools for strains differentiation

To Classical PCR



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Future Need: Molecular Epidemiology for Disease Management

-Increase of Human Movement

-Intensification of Animal and Animal Products Trade

-Climate Change with the consequence of Pathogen Vector Distribution

All Are Factors Contributing to Contagious Disease Extension for Effective Disease Management
Need Tools for Tracing the Movement of Pathogen: Molecular Epidemiology

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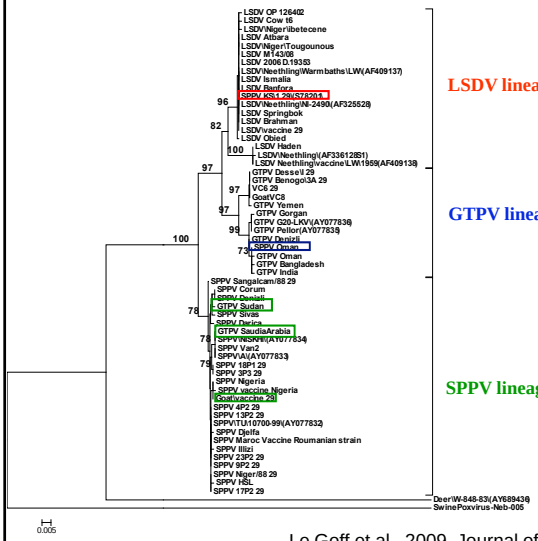
Phylogenetic analysis of the CaPVs G-protein-coupled chemokine receptor (GPCR) gene

GTPV, SPPV and LSDV cluster separately



LSDV lineage

GTPV lineage

SPPV lineage

SPPV KS1 in LSDV group

SPPV Oman was located in GTPV

GTPV Sudan, Saudi Arabia GTPV Vaccine Nigeria were located in the SPPV

Le Goff et al., 2009, Journal of General Virology

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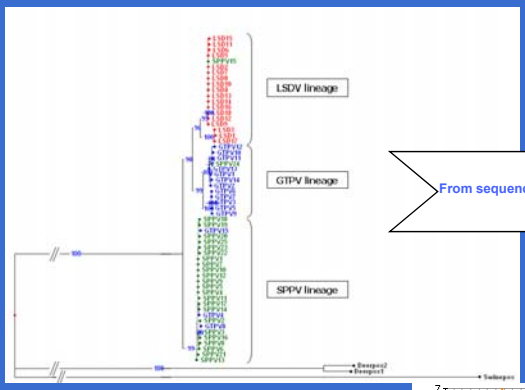
Realtime PCR Capripox



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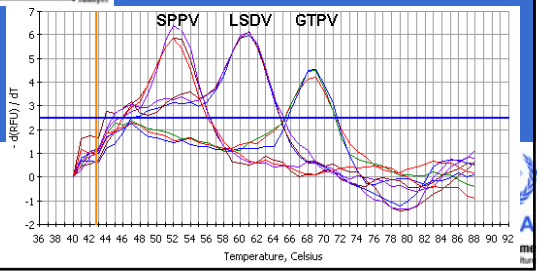
Creating friendly usable tools for strains differentiation

To qPCR



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In addition they may, within their sphere of competence :

- **coordinate scientific and technical studies in collaboration with other laboratories or organisations;**

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Research with extra-budgetary funds

1) Development of PPR and Rinderpest MARKER VACCINES with COMPANION TESTS (MARKVAC): EC-FUNFED PROJECT (2005-2009)

- **CIRAD-EMVT (France) :**
- **IAH (UK)**
- **RVC (UK)**
- **IBET (Portugal)**
- **LCV (Mali)**
- **NVI (Ethiopia)**

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- provide scientific and technical training to personnel from OIE Member Countries and Territories;

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Capacity building through TC-funded and Extra-bugetary projects

Fellows Training at IAEA laboratory

Group Training courses carried out in IAEA laboratory

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Capacity building through Long term training for a degree: PhD

Charles BODJO: PhD granted in 2007

Abdalla TRAORE PhD planned for 2010

Caroline ADOMBI PhD planed for 2010

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8 potential virulence genes in SPPV

SPPV A	GB	TU	Niskhi	Djelfa	Denizli	Corum	Mar	GTPV SA	Ortholog Group Name
SPPV-A-002	2	x	x	x	x	x	27.9	X	Virulence factor (Cop-B9R)
SPPV-A-003	3	x	x	x	x	x	24	X	IL-10
SPPV-A-004	4	x	x	x	x	x	49	X	IL-1 receptor (LSDV-N-006)
SPPV-A-007	7	x	x	x	x	x	54.7	X	Alpha-amanitin sensitivity
SPPV-A-017	17	x	x	54.2	x	x	X	X	Ribonucleotide Reductase small subunit
SPPV-A-080	79	x	x	57.6	x	x	X	x	NTPase, DNA replication
SPPV-A-084	83	x	x	x	34.8	x	X	X	mutT motif/NPH-PPH/RNA levels regulator
SPPV-A-092	91	x	x	x	x	x	X	11.8	Core protein (Cop-A4L)
SPPV-A-097	96	x	x	x	54.9	x	X	X	Membrane protein (Cop-A9L)
SPPV-A-115	113	x	x	x	x	39.3	X	X	IMV MP/Virus entry (Cop-A28L)
SPPV-A-127	124	x	x	x	x	x	44	X	Unknown (MYX-L-m130R)
SPPV-A-128	125	x	x	x	x	x	48	X	Unknown (LSDV-130)
SPPV-A-141	138	x	58.8	x	x	x	X	X	Ankyrin (SPV-N-144)
SPPV-A-149	146	x	x	x	x	x	27.9	X	Virulence factor (Cop-B9R)

8 genes in SPPV are likely to affect the virulence because there are highly disrupted in only vaccine strains and well conserved in virulent field strain.

Ankyrin repeat gene (SPPV-A 138) highly disrupted only in the vaccine strain SPPV NISKHI. 7 genes are highly disrupted the Morocco vaccine strain but are well conserved in all the others viruses including the NISKHI vaccine strain:.

The full genome sequencing of the Marocco vaccine strain has revealed the existence of 7 other potential genes for attenuation.

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In addition they may, within their sphere of competence :

- **Organise scientific meetings on behalf of the OIE;**

OIE Procedure for the Validation and Certification of Diagnostic Assays: 2002, 2003 and 2010

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Collaborating Centres of the OIE shall have as their mandate:

- **Validation Transfer of RP ELISA for RP seromonitoring and Serosurveillance of RP**
- **Validation of CBPP ELISA test which, now the OIE Recommended animal Trade**

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OIE COLLABORATING CENTRE

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Collaborating Centres of the OIE shall have as their mandate:

- **to place expert consultants at the disposal of the OIE.**

Head of APHL invited to each meeting of the IAEA BSL

Head of APHL invited to different Ad hoc Groups

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Search for suitable target for genotyping

Journal of General Virology (2009), **90**, 1967–1977 DOI 10.1099/vir.0.010686-0

Capripoxvirus G-protein-coupled chemokine receptor: a host-range gene suitable for virus animal origin discrimination

Christian Le Goff,[1]† Charles Euloge Lamien,[2]† Emna Fakhfakh,[3] Amélie Chadeyras,[1] Elexpeter Aba-Adulugba,[4] Geneviève Libeau,[1] Eeva Tuppurainen,[5] David B. Wallace,[6,7] Tajelser Adam,[8] Roland Silber,[9] Velý Gulyaz,[10] Hafsa Madani,[11] Philippe Caufour,[1] Salah Hammami,[3] Adama Diallo[2] and Emmanuel Albina[1]

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Search for suitable target for genotyping

Accepted Manuscript

Title: Use of the *Capripoxvirus* homologue of *Vaccinia virus* 30 kD RNA polymerase subunit (RPO30) gene as a novel diagnostic and genotyping target: development of a classical PCR method to differentiate *Goat poxvirus* from *Sheep poxvirus*.

Authors: Charles Euloge Lamien, Christian Le Goff, Roland Silber, David B. Wallace, Velý Gulyaz, Eeva Tuppurainen, Hafsa Madani, Philippe Caufour, Tajelser Adam, Mehdi El Harrak, Antony George Luckins, Emmanuel Albina, Adama Diallo

PII: S0378-1135(10)00474-8
DOI: doi:10.1016/j.vetmic.2010.09.038
Reference: VETMIC 5054

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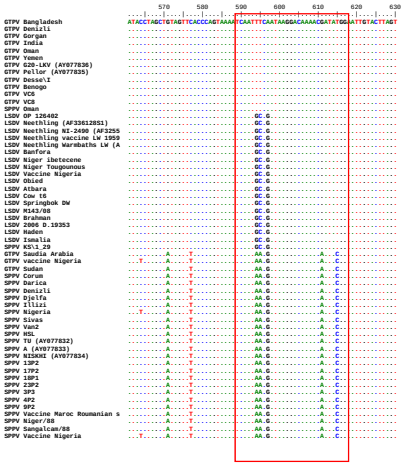
Nuclear Techniques in Food and Agriculture

Dual hybridization probes real time PCR (FRET) for CaPVs genotyping

Primers were designed to amplify a 200 bp fragment on the CaPV GPCR gene and probes were designed to bind within this PCR product



FRET acceptor: matches 100% with GTPV, 3 mismatches with LSDV and 5 with SPPV

Lamien et al., 2010, Journal of Virological Methods

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Nuclear Techniques in Food and Agriculture

Example of Request from MS

-Country I: « Despite of Vaccination of Sheep of our local Produced vaccination, We have Sheeppox Outbreak in some Vaccinated Flocks »

-Country II: « We Produce a Capripox Vaccine that We Use for Sheep, Goats and Cattle. From time to time, 3-6 months after vaccination, we have capripox outbreak in the vaccinated Flocks »

-Country III: Contagious Pulmonary Disease in Camels, PPR Antigen Has been Detected by Immunocapture. Camels is not a usual host for PPRV.

Recognition of the APHL Input in R&D and Capacity Building

EUROPEAN COMMISSION
RESEARCH DIRECTORATE-GENERAL

Directorate E - Life Sciences : Biotechnology, agricultural and food research
Security of Food Production Systems

Brussels, 07 June 2006
DG RTD/E/3 - BAdem - D (2006) 523460
PCU : FP6-2004-SSP5-EVAL-COORD

Prof. Jabbar Ahmed
FZB
Parkallee 1-40
DE - 23845 Borstel

Framework Programme 6 - Call identifier: FP6-2005-SSP-5 A & B INFLUENZA
Proposal No 044462 - ConFluTech

Evaluation Summary Report

Proposal number: 044462

Mark: 4,0
Weight: 1,00

The objectives are sound and the approach will be effective in meeting the straightforward training goals identified in the proposal. The methodology and work plan are satisfactory. With such a wide range of participants there is expertise in all the areas related to the work plans. Members have the expertise to manage the project and to deliver the technical content of the proposed workshops and training courses. The activities follow the standards and validation procedures according to the OIE guidelines .
The consortium includes participants with a wide range of experience who are well known internationally and who have a good track record. The inclusion of the FAO / OIE / IAEA is a valuable
component of the proposal and will draw on their considerable experience in diagnostics, training and technology transfer.
There is good synergy between the partners which will enable the consortium to deliver effective training and technology transfer.

FAO/IAEA Animal Production and Health Laboratory (APHL)

– IAEA Laboratory

-FAO Laboratory

- OIE Collaborating Centre

International Organisation Laboratory without Any Commercial Interests

-All Research Ouputs are Free, Given to MS on request.

-Our Objective: To STRENGTHEN Animal Disease Diagnostic Capacities in MS

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THANKS

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