Joint FAO/IAEA Centre
Nuclear Techniques in Food and Agriculture

PPR diagnostic support from FAO/WOAH Reference Centre to countries in Central Asia

William G. Dundon

Joint FAO-IAEA Centre
International Atomic Energy Agency,
Vienna, Austria

FAO/IAEA Joint Center

AGES

The Animal Production and Health Laboratory (APHL) assists Member States to improve livestock productivity through the efficient use of locally available feed resources, adequate management practices and breeding programmes for indigenous and upgraded animals, and **diagnostic tools and prophylactic measures for the control and prevention of animal and zoonotic diseases**.

The Animal Production and Health Laboratory (APHL) is a WOAH Collaborating Centre for ELISA and Molecular Techniques in Animal Disease Diagnosis

APHL ACTIVITIES on PPR

Research and Innovation (molecular techniques)

- Molecular and serological assays;
- Genome Sequencing
- Molecular epidemiological studies

Virus Biobank – BLS3 facility (AGES- Mödling)

Capacity building and technology transfer (Through specific mechanisms)

- TCPs
- CRPs
- On-site training
- Fellowship training
- Group trainings

Services

- Service (ring trials, shipment)

Training courses in collaboration with the PPR-Secretariat

Experts/Consumables

Title	Year	Venue
Diagnosis of PPR and Respiratory Diseases of Small Ruminants	2023	Georgia
Detection and differential diagnosis of PPR in Small Ruminants	2023	Tanzania
PPR Laboratory Diagnosis Workshop	2023	Jordan
Laboratory Diagnosis of PPR in Wildlife	2024	On-line
Laboratory training methods for Peste de Petits Ruminant (PPR) Diagnosis	2024	Nigeria

Jordan 2023

Georgia 2023

Nigeria 2024

Trainings on PPR

Topics covered

- Peste de Petits Ruminants Laboratory diagnosis
- Rapid field detection (Dip-stick)
- Antigen capture
- cELISA (ID-Vet, AU-PANVAC)
- Multi-target approach for PPRV detection
- Multiplex Respiratory pathogens detection (differential diagnosis)
- Molecular characterization and epidemiology of PPRV

Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

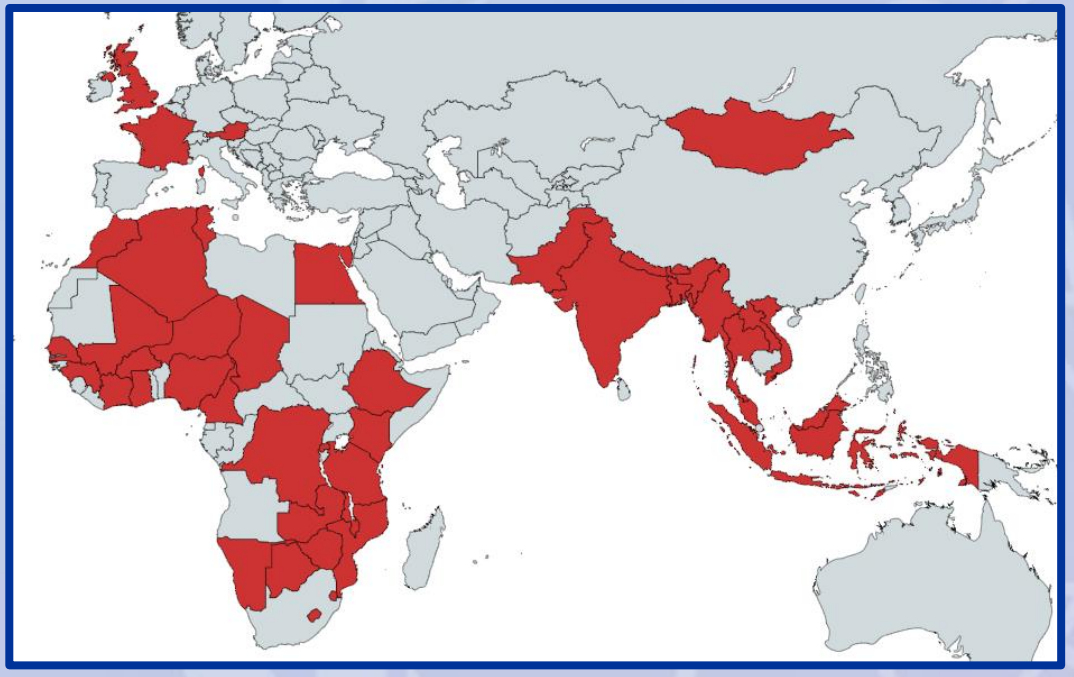
Harmonizing approach to PPR and small respiratory diseases laboratory diagnoses

- Distribution of laboratory SOPs from international reference laboratories or from the Animal Production and Health Laboratory (CJN, FAO/IAEA)
- Distribution of positive PPRV RNA controls upon request
- Inter-laboratory comparison test for PPRV (Serology and Molecular)

Interlaboratory Comparison Test - 2024

Country
Guinea
Uzbekistan
Georgia
Malawi
Rwanda
Zimbabwe
India
Pakistan
Nigeria
Algeria
Azerbaijan
Morocco Meknes
Morocco Marrakech
Bangladesh
Botswana
Burkina Faso I
Armenia
France (CIRAD)
Chad
Côte d'Ivoire
DRC
Eswatini
Ethiopia (AHI)
Ethiopia
Ghana
Indonesia (Harimurti)
Tanzania (Arusha)
Kenya
Lao P.D.R.
Lesotho
Malaysia I
Mali
Mongolia
Morocco (Rabat)

Country
Mozambique
Myanmar (Yangon)
Myanmar (Mandalay)
Namibia
Nepal
Niger
Senegal
Sri Lanka
Thailand (NIAH)
Tunisia
Tanzania
Viet Nam
Zambia
Austria
UK
Cameroon Garoua
Cameroon Douala
Cameroon Yaounde
Cameroon Bafoussam
Burkina Faso II
Malaysia II
Morocco Casablanca
Morocco (Tangier)
Bhutan
Egypt
Bangladesh II



Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

APHL R&D ACTIVITIES ON PPR: Differential diagnosis

PLOS ONE

RESEARCH ARTICLE

One-Step Multiplex RT-qPCR Assay for the Detection of *Peste des petits ruminants virus*, *Capripoxvirus*, *Pasteurella multocida* and *Mycoplasma capricolum subspecies (ssp.) capripneumoniae*

Tirumala Bharani Kumar Settypalli[1]*, Charles Euloge Lamien[1], Joachim Spergser[2], Mamadou Lelenta[1], Abel Wade[3], Esayas Gelaye[1,4], Angelika Loitsch[5], Germaine Minoungou[6], Francois Thiaucourt[7], Adama Diallo[1,7]

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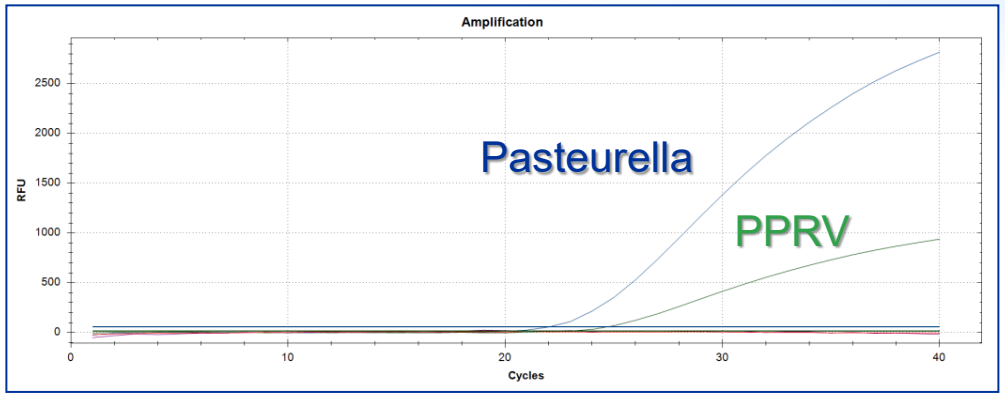
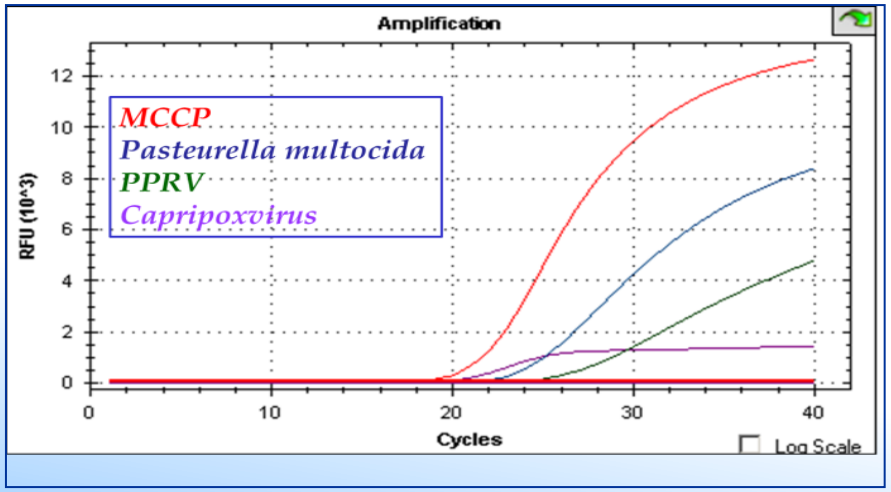
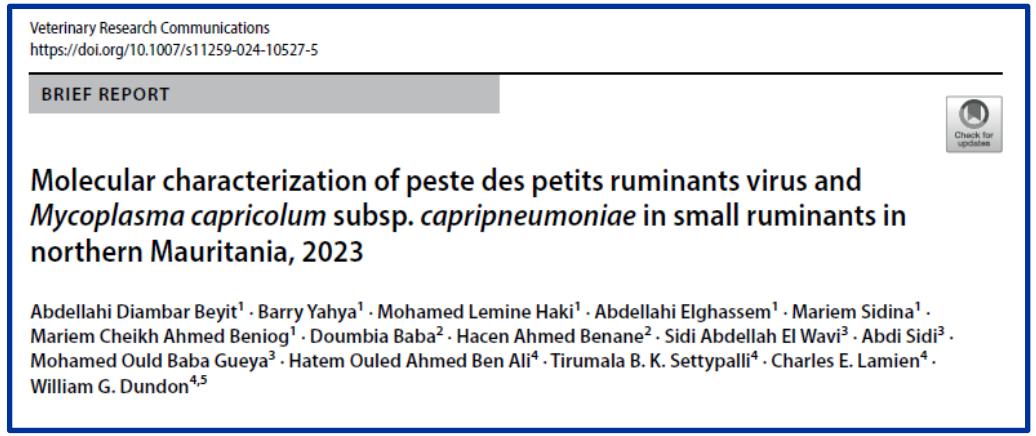


Detection of co-infection in swab sample collected from a goat in Burkina Faso





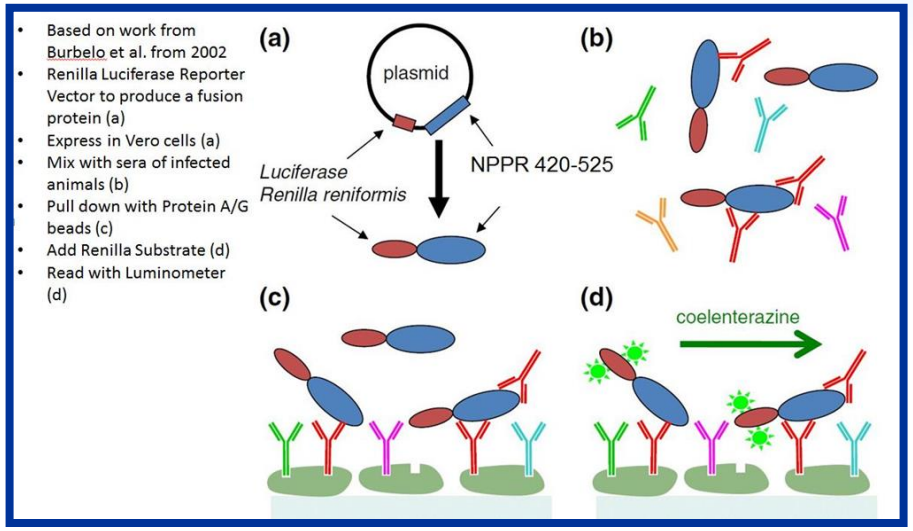
Veterinary Research Communications
https://doi.org/10.1007/s11259-024-10527-5

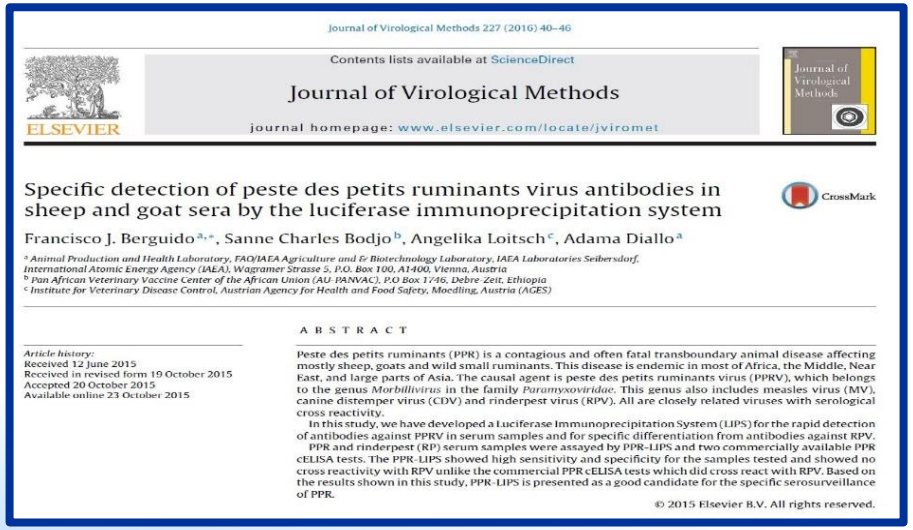
BRIEF REPORT

Molecular characterization of peste des petits ruminants virus and *Mycoplasma capricolum* subsp. *capripneumoniae* in small ruminants in northern Mauritania, 2023

Abdellahi Diambar Beyit[1] · Barry Yahya[1] · Mohamed Lemine Haki[1] · Abdellahi Elghassem[1] · Mariem Sidina[1] · Mariem Cheikh Ahmed Beniog[1] · Doumbia Baba[2] · Hacen Ahmed Benane[2] · Sidi Abdellah El Wavi[3] · Abdi Sidi[3] · Mohamed Ould Baba Gueya[3] · Hatem Ouled Ahmed Ben Ali[4] · Tirumala B. K. Settypalli[4] · Charles E. Lamien[4] · William G. Dundon[4,5]

Luciferase Immuno Percipitation System (LIPS)





Journal of Virological Methods 227 (2016) 40–46

Contents lists available at ScienceDirect

Journal of Virological Methods

journal homepage: www.elsevier.com/locate/jviromet

Specific detection of peste des petits ruminants virus antibodies in sheep and goat sera by the luciferase immunoprecipitation system

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ABSTRACT

Peste des petits ruminants (PPR) is a contagious and often fatal transboundary animal disease affecting mostly sheep, goats and wild small ruminants. This disease is endemic in most of Africa, the Middle, Near East, and large parts of Asia. The causal agent is peste des petits ruminants virus (PPRV), which belongs to the genus *Morbillivirus* in the family *Paramyxoviridae*. This genus also includes measles virus (MV), canine distemper virus (CDV) and rinderpest virus (RPV). All are closely related viruses with serological cross reactivity.

In this study, we have developed a Luciferase Immunoprecipitation System (LIPS) for the rapid detection of antibodies against PPRV in serum samples and for specific differentiation from antibodies against RPV. PPR and rinderpest (RP) serum samples were assayed by PPR-LIPS and two commercially available PPR cELISA tests. The PPR-LIPS showed high sensitivity and specificity for the samples tested and showed no cross reactivity with RPV unlike the commercial PPR cELISA tests which did cross react with RPV. Based on the results shown in this study, PPR-LIPS is presented as a good candidate for the specific serosurveillance of PPR.

- **Validated using field and experimental sera**
- Can be used for multiple species
- **LIPS** is as sensitive cELISA
- Uses 1µl per reaction (useful for wildlife screening)

APHL R&D ACTIVITIES ON PPR: viral isolation

APHL developed and distributed CV1 Cell line expressing sheep SLAM to facilitated viral isolation

Journal of Virological Methods 173 (2011) 306–313

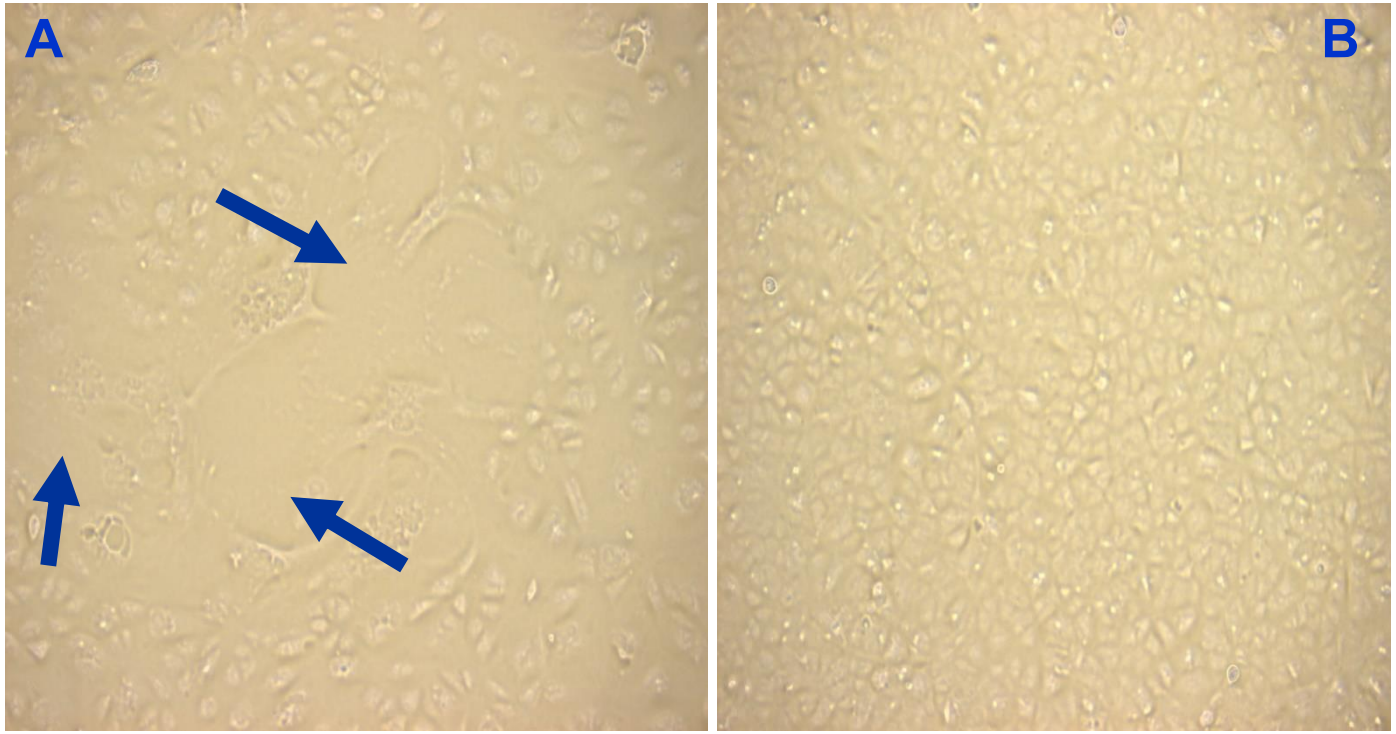
Contents lists available at ScienceDirect

Journal of Virological Methods

journal homepage: www.elsevier.com/locate/jviromet

Monkey CV1 cell line expressing the sheep–goat SLAM protein: A highly sensitive cell line for the isolation of peste des petits ruminants virus from pathological specimens

Caroline Mélanie Adombi[a], Mamadou Lelenta[a], Charles Euloge Lamien[a], David Shamaki[b], Yao Mathurin Koffi[c], Abdallah Traoré[d], Roland Silber[e], Emmanuel Couacy-Hymann[c], Sanne Charles Bodjo[a], Joseph A. Djaman[f], Antony George Luckins[a], Adama Diallo[a,*]



PPRV *in vitro* Isolation

Cell lines for the improved isolation of PPRV from diagnostic samples

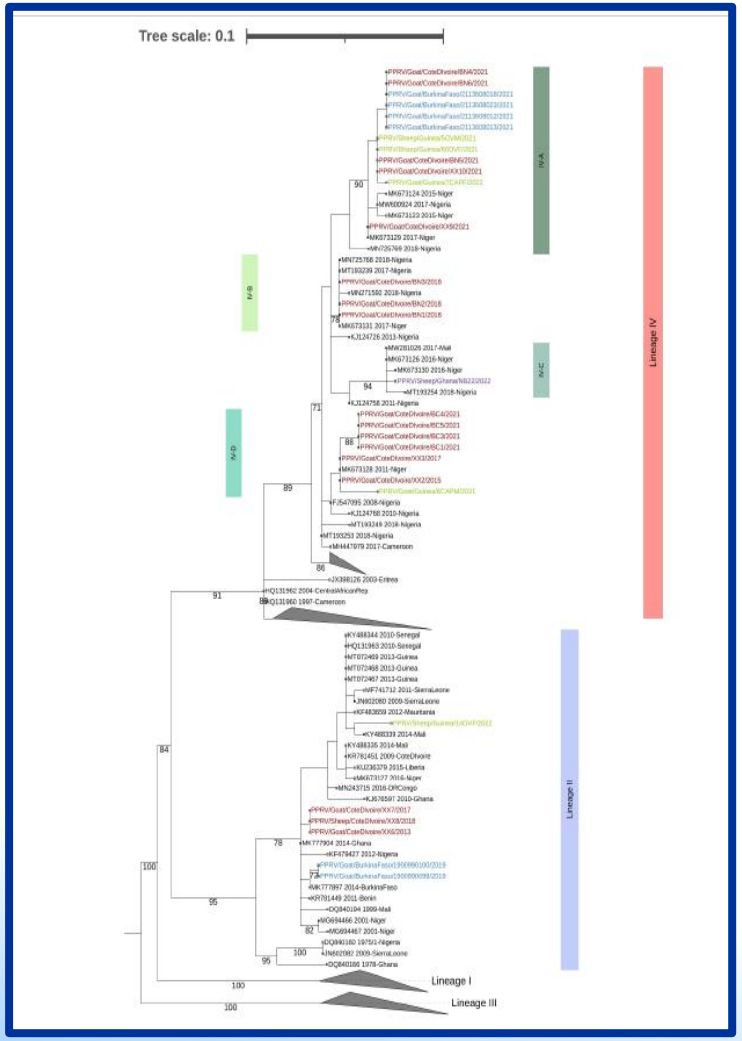
Table 2
Results of the PPRV isolation trial on cell culture from the pathological specimens that were tested PPRV positive by classical and quantitative RT-PCR. CHS-20, CV1 and Vero were used in this trial.

Tissue	Sample ID	PPRV RT-PCR result on tissue sample	Virus isolation[a]			Detection of PPRV in cell culture supernatant (RT-PCR)		
			CHS-20	CV1[b]	Vero[b]	CHS-20	CV1	Vero
Lung	NIG/08-03	+	3 days	N	N	+	–	–
	NIG/08-17	+	8 days	N	N	+	–	–
	NIG/08-27	+	2 days	N	N	+	–	–
	NIG/08-43	+	2 days	N	N	+	+	+
	CIV/09-OVP	+	N	N	N	–	–	–
	CIV/09-01P	+	1 day	N	N	+	+	–[c]
	CIV/09-02P	+	2 days	N	N	+	–	–
Lymph node	NIG/08-04	+[d]	N	N	N	–	–	–
	NIG/08-10	+[d]	7 days	N	N	+	–	–
	NIG/08-30	+	3 days	N	N	+	–	–
	CIV/09-OVG	+	N	N	N	–	–	–
	CIV/09-01G	+	2 days	N	N	+	–[c]	–
Liver	NIG/08-20	+	N	N	N	–	–	–
	NIG/08-28	+	5 days	N	N	+	–	–
	NIG/08-44	+	8 days	N	N	+	–	–
	CIV/09-OVF	+	N	N	N	–	–	–
	CIV/09-01F	+	N	N	N	–	–	–
	CIV/09-02F	+	4 days	N	N	+	–	–
Spleen	NIG/08-11	+[d]	10 days	N	N	+	–	–
	NIG/08-18	+	10 days	N	N	+	–	–
	NIG/08-22	+	8 days	N	N	+	–	–
	NIG/08-29	+	7 days	N	N	+	–	–
	CIV/09-OVR	+	N	N	N	–	–	–
	CIV/09-01R	+	N	N	N	–	–	–
	CIV/09-02R	+	N	N	N	–	–	–
Kidney	CIV/09-02N	+	N	N	N	–	–	–

N – no CPE. Samples in bold were used in the RT-PCR shown in Fig. 3.

[a] Day post infection (dpi) on which the CPE was detected in the cell monolayer.
[b] Up to 4 blind passages were performed.
[c] Positive for the RNAs that were extracted from the cells at the time of the first blind passage.
[d] Positive in real time PCR only.

Support on the molecular epidemiology of PPRV



animals

MDPI

Communication

The Spread of Peste Des Petits Ruminants Virus Lineage IV in West Africa

Emmanuel Couacy-Hymann [1,†], Kouramoudou Berete [2,†], Theophilus Odoom [3,†], Lamouni Habibata Zerbo [4,†], Koffi Yao Mathurin [1], Valère Kouame Kouakou [1], Mohamed Idriss Doumbouya [5], Aminata Balde [2], Patrick Tetteh Ababio [3], Lalidia Bruno Ouoba [4], Dominique Guigma [4], Adama Dji-tombo Drobo [4], Mariétou Guitti [4], Sherry Ama Mawuko Johnson [6], David Livingstone Mawuko Blavo [6], Giovanni Cattoli [7], Charles E. Lamien [7] and William G. Dundon [7,*]

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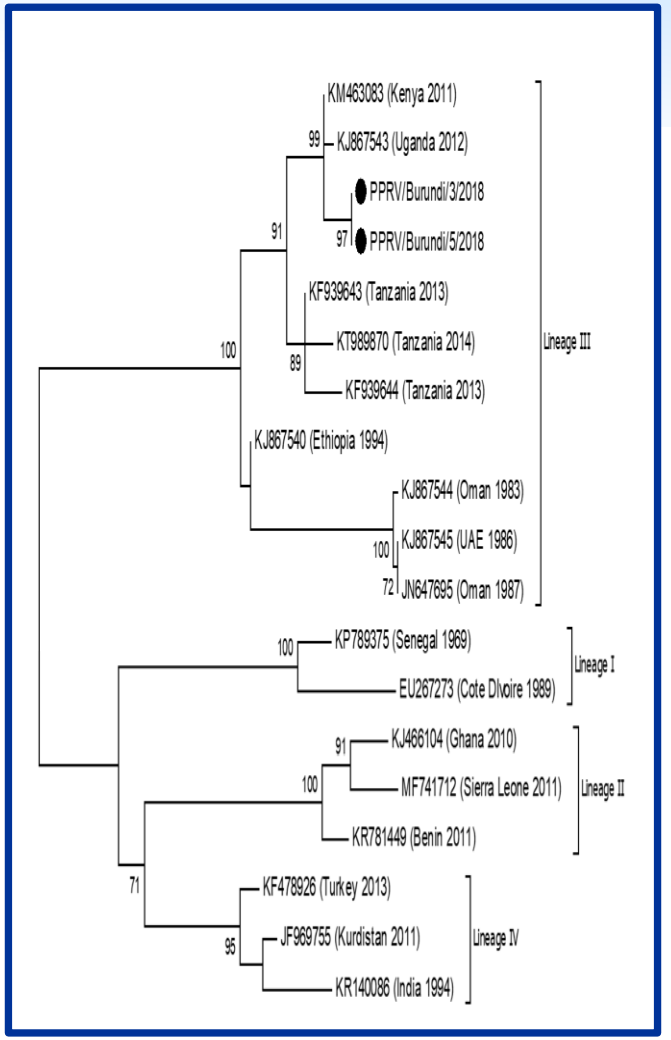
DOI: 10.1111/tbed.13255

ORIGINAL ARTICLE

Transboundary and Emerging Diseases WILEY

Detection and molecular characterization of Peste des Petits Ruminants virus from outbreaks in Burundi, December 2017–January 2018

Alfred Niyokwishimira[1,2] | Jean de D. Baziki[3,4] | William G. Dundon[5] | Nick Nwankpa[3] | Cecilia Njoroge[3] | Hiver Boussini[6] | Henry Wamwayi[6] | Baboucarr Jaw[6] | Giovanni Cattoli[5] | Canésius Nkundwanayo[2] | Désiré Ntakirutimana[2] | David Balikowa[7] | Lionel Nyabongo[2] | Zhidong Zhang[1] | Sanne Charles Bodjo[3]



Support on the molecular epidemiology of PPRV - Publications

Year	Country	Publication
2014	Ghana	Dundon et al (2014) Virus Genes 49:497-501
2015	Kenya	Dundon et al (2017) Transboundary and Emerging Diseases 64:644-650
2015	Nigeria	Woma et al (2016) Transboundary and Emerging Diseases 63 :235-42
2016	Benin	Adombi et al (2017) Transboundary and Emerging Diseases 64:1037-1044
2016	Liberia	Boussini et al (2016) Tropical Animal Health and Production 48:1503-7.
2017	Mongolia	Shatar et al (2017) Archive of Virology 162:3157-3160
2018	Georgia	Donduashvili et al (2018) Emerging Infectious Diseases 24:1576-1578
2019	Burundi	Niyokwishimira et al (2019) Transboundary and Emerging Diseases 66:2067-2073
2019	Nepal	Pandey et al (2019) Virusdisease. 30:315-318
2019	Ethiopia	Rume et al (2019) Veterinary Microbiology 235:229-233
2019	DR Congo	Tshilenge et al (2019) Veterinary Microbiology
2019	Niger	Souley et al (2019) Transboundary and Emerging Diseases
2022	Ghana, Burkina Faso, Cote D'Ivoire, Guinea	Couacy et al (2023) Animals
2024	Mauritania	Beyit et al (2024) Vet Res Commun

Support to the molecular characterization of PPRV - Genomes

Year	Lineage	Country	GenBank
1969	I	West Africa	KP789375
1969	II	Benin	KR781450
2008	IV	Bangladesh	MG581412
2009	II	Côte d'Ivoire	KR781451
2010	II	Ghana	KJ466104
2011	II	Benin	KR781449
2011	II	Sierra Leone	MF741712
2011	III	Kenya	KM463083
2011	IV	Ethiopia	MK991798
2012	II	Nigeria	KR828814
2013	IV	Nigeria	KR828813
2014	IV	Ethiopia	MK991799
2015	II	Liberia	KU236379
2016	IV	Mongolia	KY888168
2017	III	Burundi	MK686066
2017	IV	Ethiopia	MK991800
2021	IV	Bhutan	N/A
2022	IV	Côte d'Ivoire	N/A
2022	IV	Nigeria	N/A
2022	IV	Ghana	N/A
2022	IV	Tunisia	N/A
2023	IV	Mauritania	OR500606
2024	IV	Nepal	PV167795

More information of Animal Production and Health

Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

Animal Production & Health Newsletter

https://www.iaea.org/about/animal-production-and-health-section
https://www.fao.org/agriculture/fao-iaea-nuclear-techniques/en/

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Contents

To Our Readers

Leveraging VETLAB Network to Strengthen ZODIAC: Regional Training on Environmental Surveillance, Phnom Penh, Cambodia
Clockwise from rop right:air sampling at Orussey live bird market; surface sampling; participants at bird market; and training at the Institute Pasteur Cambodge © Institute Pasteur Cambodge

https://www.iaea.org/publications/15956/animal-production-and-health-newsletter-no-82-june-2025

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Nuclear Techniques in Food and Agriculture

Animal Production and Health
Sub-programme

Thank You

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