



Food and Agriculture Organization  
of the United Nations

# Strengthening the veterinary capacity in rabies diagnosis – FAO's support



Angelique Angot, Food and Agriculture Organization of the United Nations (FAO-UN)

# Improvement of rabies diagnostic in Africa under FAO projects since 2012 to 2022

- Rehabilitation of lab facilities (Guinea, Liberia, SL)
- Procurement of equipment, reagents and consumables
- Various trainings (IATA, QA/BBS and sampling and sample management, lab diagnostic techniques..)
- Improvement of BSS measures
- Installation of LIMs for sample management and results sharing
- On site Trainings on FAT, RT-PCR and DRIT in Burkina Faso, Cameroon, Guinea, Liberia, and RDC
- Regional training on rabies diagnosis in Central Africa in Dec 2021 (FAO TCP)
- Participation of proficiency testing exercises
- Rabies vaccination for lab technicians and field officers
- SARE assessment in many countries
- Sample shipment services for Virus genotyping



# Key achievements

## Confirmatory diagnostic

- All the veterinary labs, including some district labs have the capacity to confirm rabies (DFA, DRIT, PCR)
  - Detection in all the countries
  - Shortened turnaround time for better service delivery
  - Used of molecular techniques
- LIMs installed in all the national labs and functional:
  - Better samples management/traceability and timely reporting
  - **Improved service delivery under the OH approach.**

Rabies cases tested in 2022		
Country	N° tested	N° positive
BF	36	34
CM	17	13
CDI	16	13
DRC	5	5
Ghana	79	73
Guinea	84	79
Liberia	7	2
Mali	26	25
Nigeria	xxx	151
Niger	7	2??
Senegal	13	9
SL	14	10

# Proficiency tests

- Organized by FAO in collaboration with the FAO reference centre for rabies (IZS Ve-Italy) since 2017
- Compliance with WOAHA international standards (DFA and RT-PCR)
- Rabies vaccination for lab technicians and field officers
- Identification gaps and troubleshooting missions



Improvement

# Key achievements

## Proficiency testing exercises

➤ All the veterinary labs including district labs participated to PTs-2022 with good scores

- Accuracy & reliability of test results
- Improvement in the quality of tests results →
- Increase diagnostic credibility

➤ Accreditation ISO 17025: for PZDs and TADS

(Kenya, Tanzania, Nigeria, Senegal and Cameroon)

- International recognition
- Confidence of clients

Countries	Name of the Laboratory
Burkina Faso	Laboratoire National d'Élevage (LNE)
Cameroon (1)	Laboratoire National Vétérinaire (LANAVET) Garoua
Cameroon (2)	LANAVET Annexe Yaoundé
Chad	Institut de Recherche en Elevage pour le Développement (IREDE)
DRC	Laboratoire Vétérinaire (Labovet) de Kinshasa
Ethiopia	Ethiopian Public Health Institute
Ghana	Accra Veterinary Laboratory
Guinea (1)	Laboratoire Central de Diagnostic Vétérinaire (LCVD) Conakry
Guinea (2)	Laboratoire Régional Vétérinaire de Kankan
Guinea (3)	Laboratoire Régional Vétérinaire de Labé
Ivory Coast	Laboratoire central vétérinaire de Bingerville (LCVB)
Kenya	Central Veterinary Laboratories- Kabete
Liberia	Leon Quist Ledlum Central Veterinary diagnostic Laboratory (CVDL)
Mali (1)	Laboratoire Central Vétérinaire du Mali, Bamako
Mali (2)	Laboratoire Regional Veterinaire de Kayes
Niger	Laboratoire Central de l'Élevage (LABOCEL)
Nigeria	National Veterinary Research Institute (NVRI)
Senegal	Laboratoire National de l'Élevage et de Recherches Vétérinaires (LNERV)
Sierra Leone	Central Veterinary Laboratory Teko, Freetown
Tanzania	Tanzania Veterinary Laboratory Agency, Temeke
Uganda	National Animal Disease Diagnostics and Epidemiology Centre

Lab	Procedure
CVL-Kenya	-AI (RT-PCR) -Rabies (rt-PCR) -Rabies (dFAT)
TVLA-Tanzania	-Rabies (rt-PCR) -Rabies (dFAT)
NVRI-Vom	FMD (ELISA); AI (qPCR)
LNERV-Dakar	PPR (ELISA)
LANAVET-Garoua	PPR (ELISA/PCR); CBPP (ELISA/PCR)

# Proficiency tests 2017/2022



2017

- 13 countries
- 14 labs
- 13 performing FAT
- 11 performing RT-PCR
- 6 both methods



2020

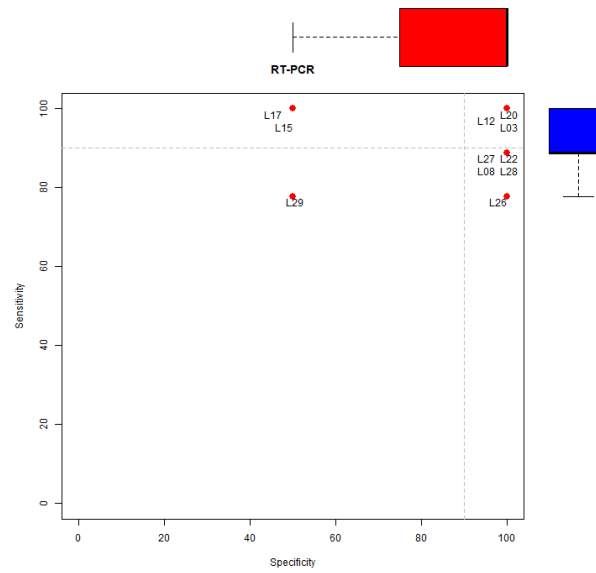
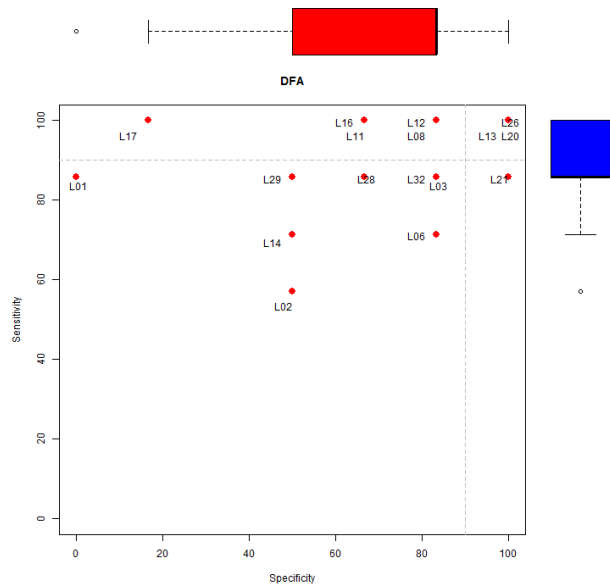
- 12 countries
- 15 labs
- 13 performing FAT
- 8 performing RT-PCR
- 6 both methods



2022

- 16 countries
- 20 labs
- 17 performing FAT
- 11 performing r/RT-PCR
- 9 both methods

# Proficiency tests 2017/2022



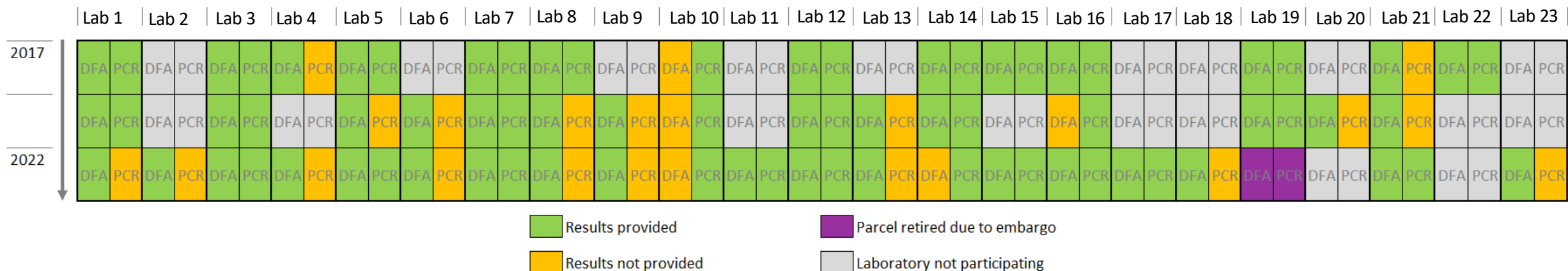
2022

- 16 countries
- 20 labs
- 17 performing FAT
- 11 performing r/RT-PCR
- 9 both methods

Laboratories performed better and gave more homogeneous results when using molecular methods compared to DFA test.

# Proficiency testing – a way to support CVLs over the years

Overall statistics	PT exercise	DFA	Conventional RT-PCR
Concordance (%)	2017	91.00	98.89
	2020	85.3	89.6
	<b>2022</b>	<b>79.81</b>	<b>90.00</b>
Overall sensitivity (%)	2017	92.00	98.15
	2020	86.5	87.5
	<b>2022</b>	<b>88.39</b>	<b>92.22</b>
Overall specificity (%)	2017	90.00	100.00
	2020	82.7	95.8
	<b>2022</b>	<b>69.79</b>	<b>85.00</b>
Fleiss' kappa	2017	0.70	0.95
	2020	0.42	0.60
	<b>2022</b>	<b>0.40</b>	<b>0.60</b>





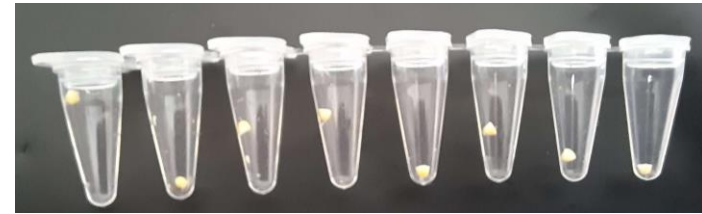
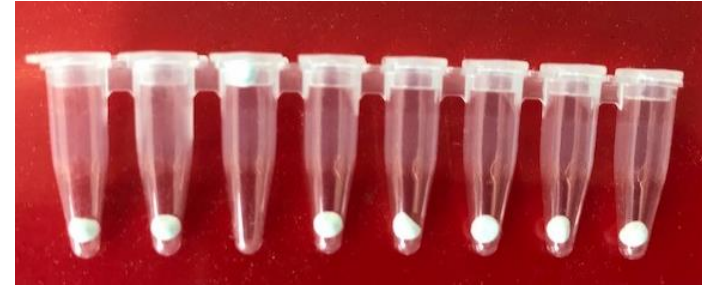
# Evaluation of freeze-dried kits

*Need to overcome technical issues linked to the electricity supply in tropical and sub-tropical areas → freeze-dried kits*

- What to evaluate:



- Is it cost saving ?
- Is it friendly for the end-user ?
- Does it have acceptable performances ?

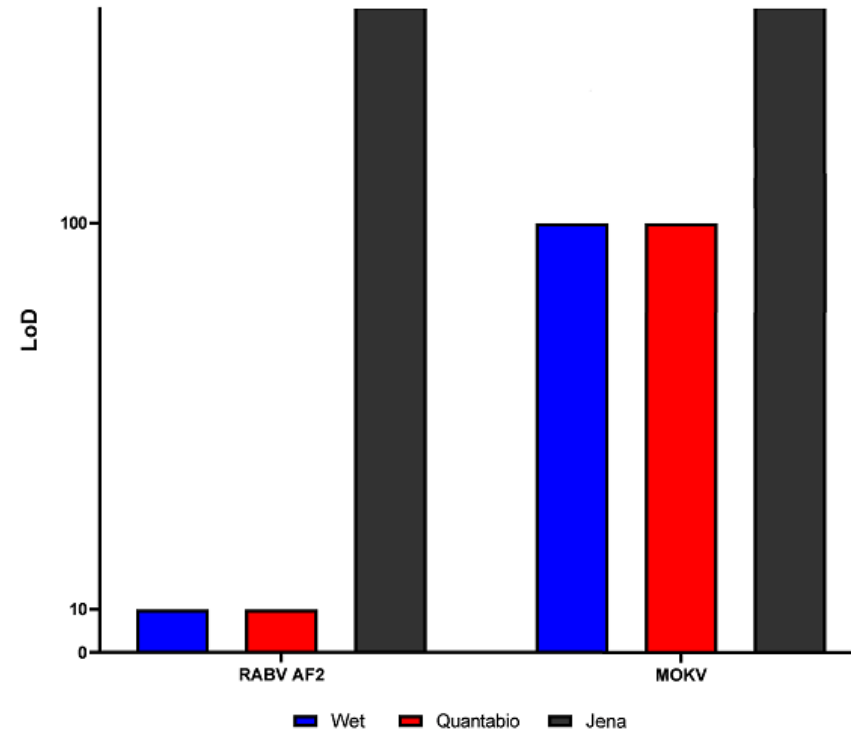
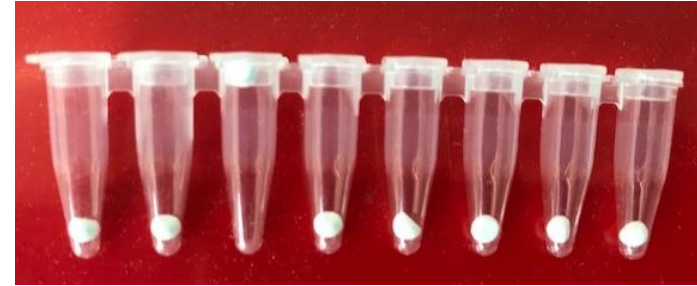


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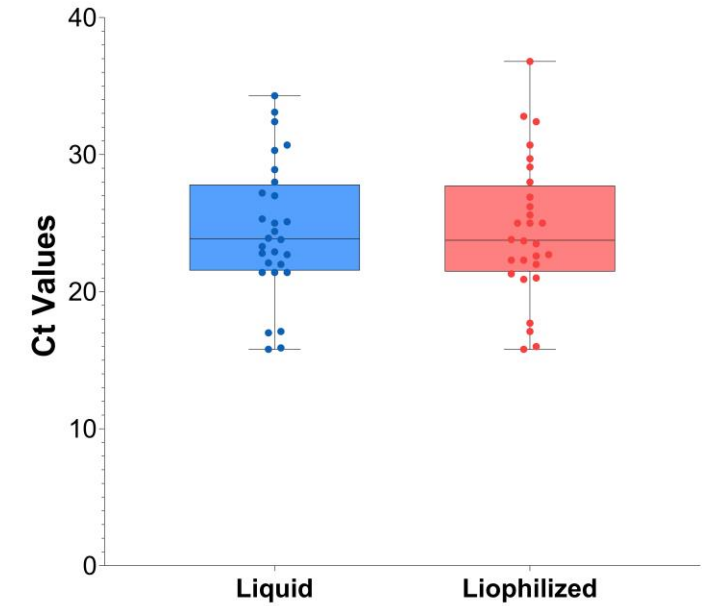
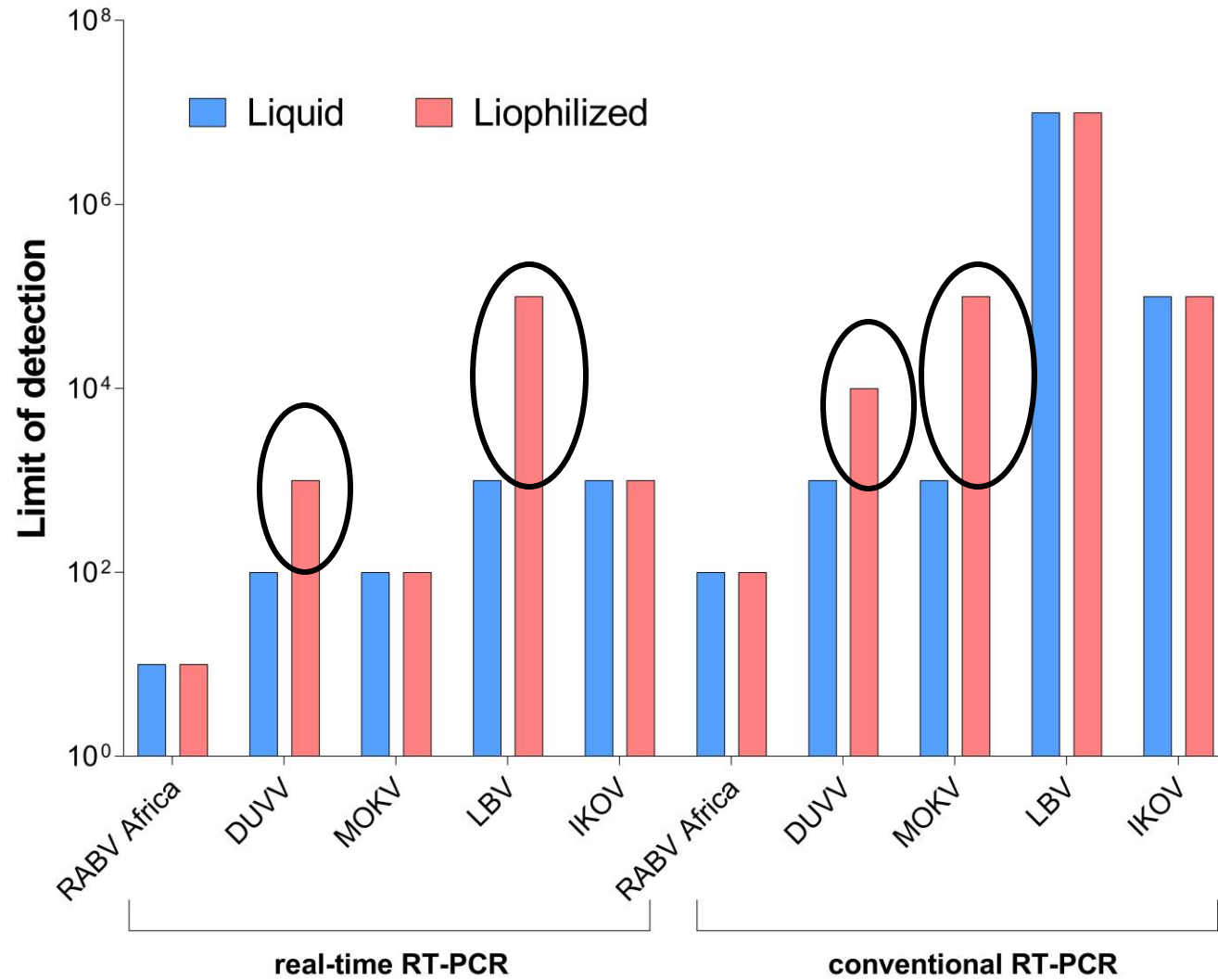
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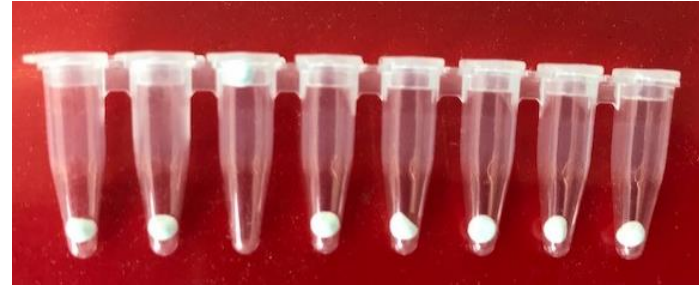
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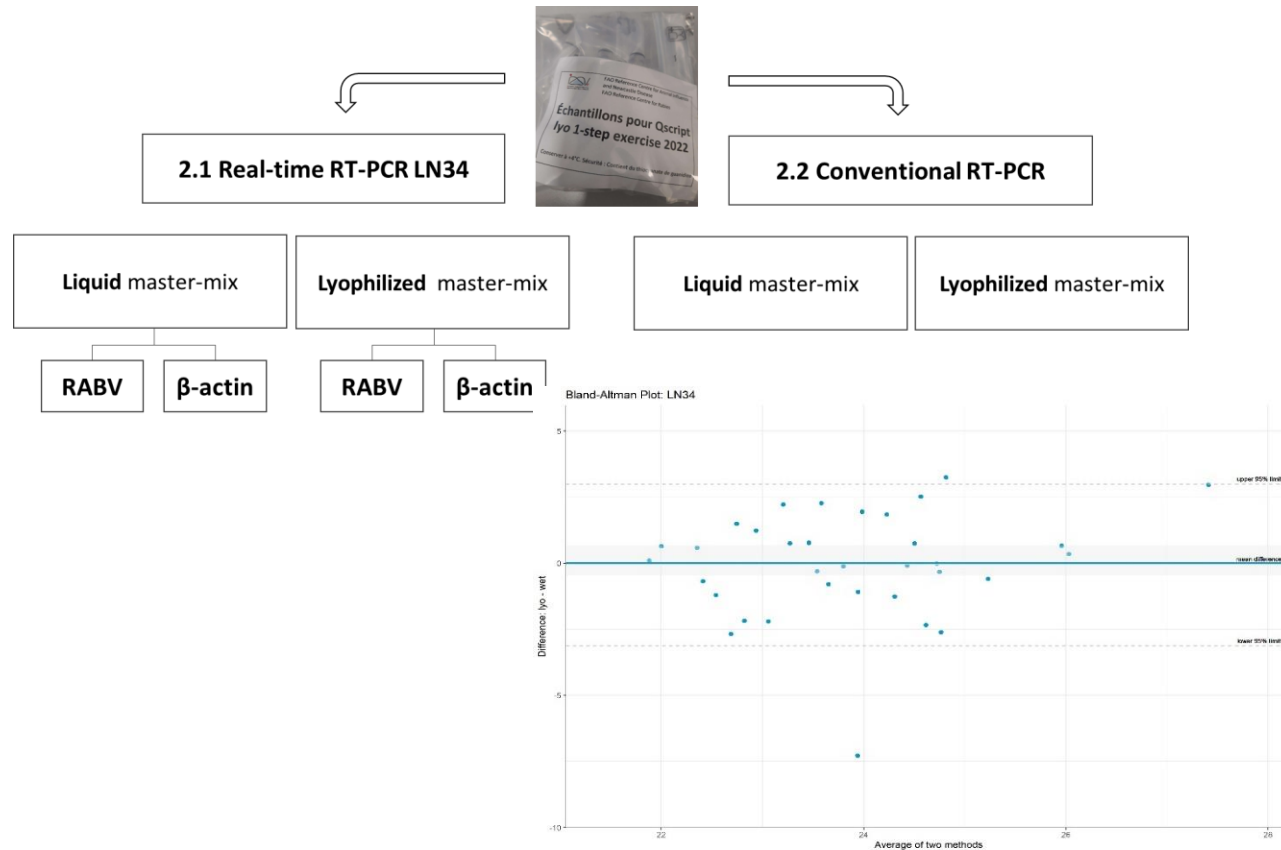
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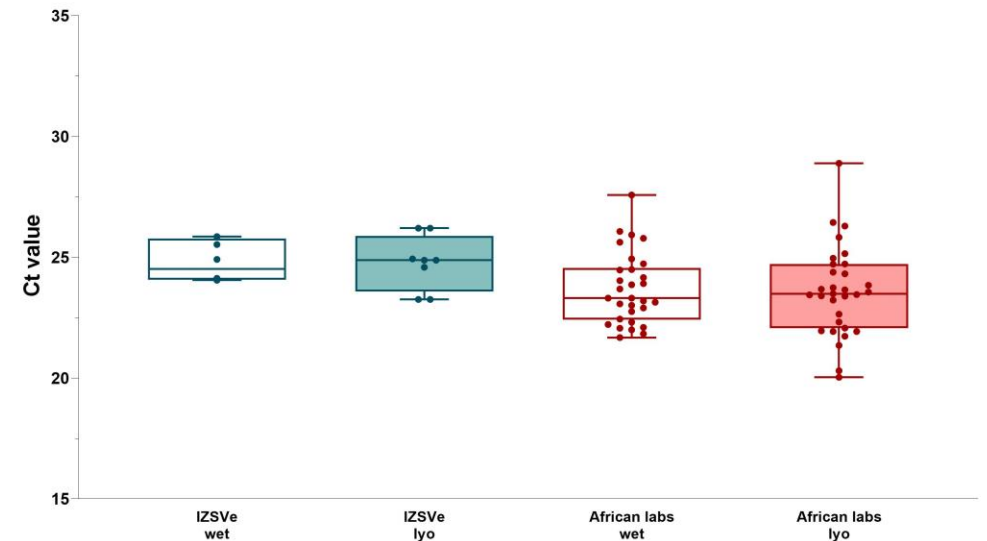
**YES! FOR RABIES DIAGNOSIS ONLY**



# From the Reference Centre to the end users



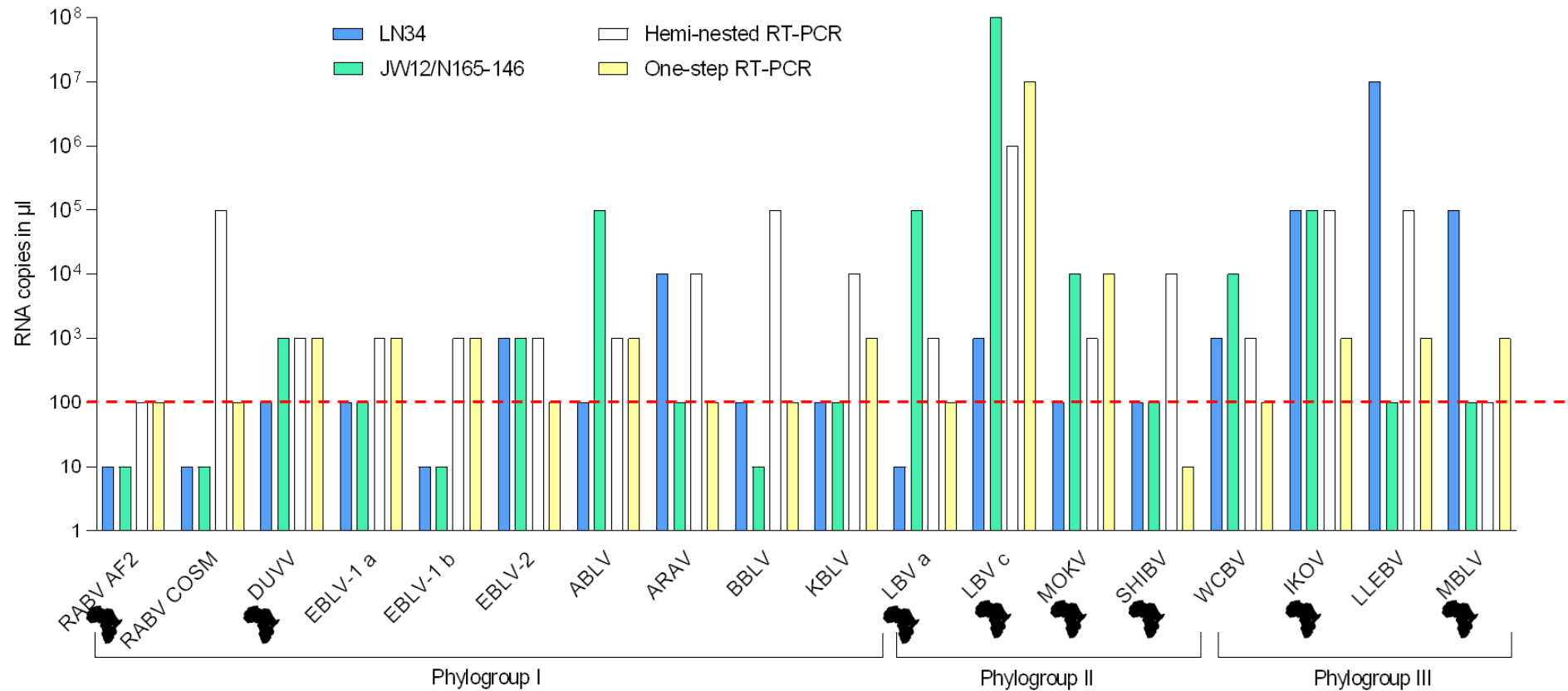
*Lyophilized format successfully implemented in 4 CVLs in Sub-Saharan Africa thanks to an inter-laboratory reproducibility test*



# Optimizing molecular protocols and assessing the sensitivity of the available tests

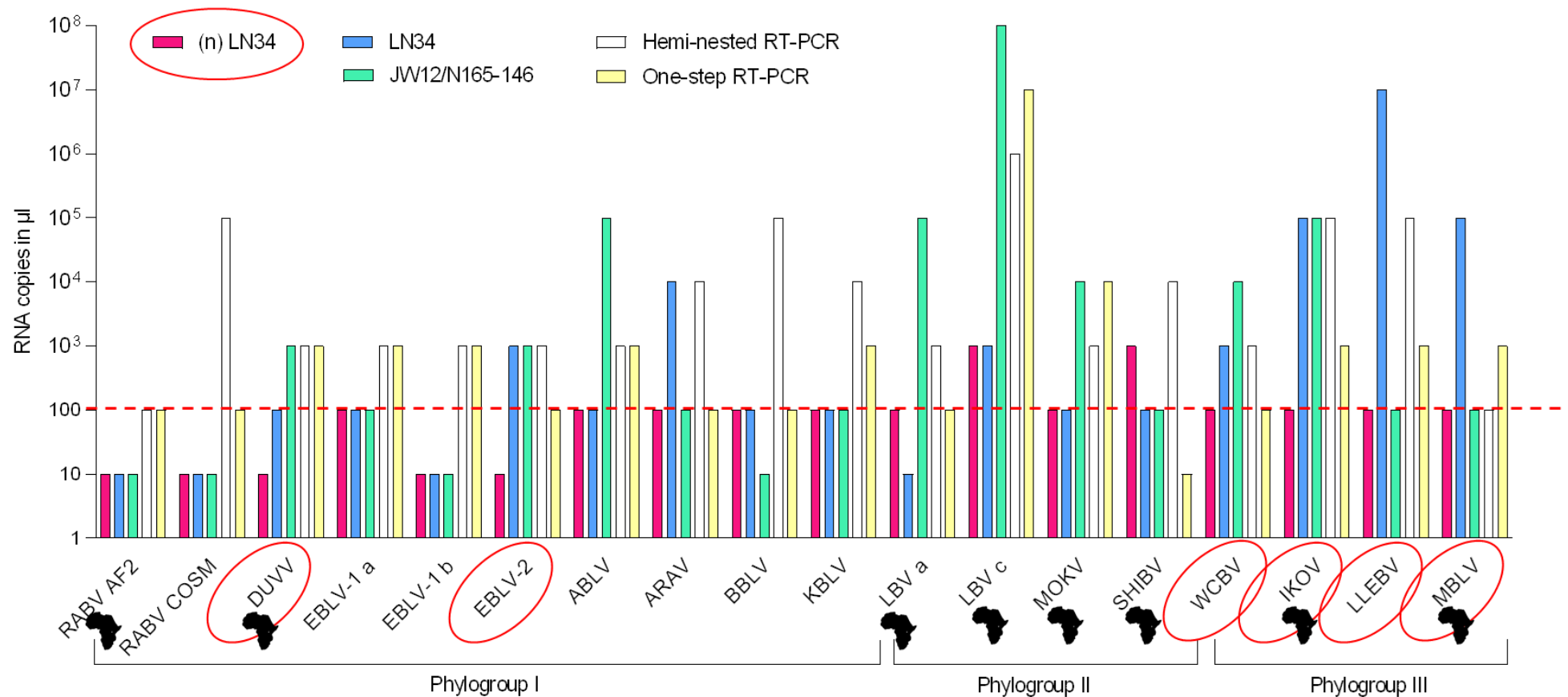
## How did they perform?

Limit of detection tested against 18 representative lyssaviruses

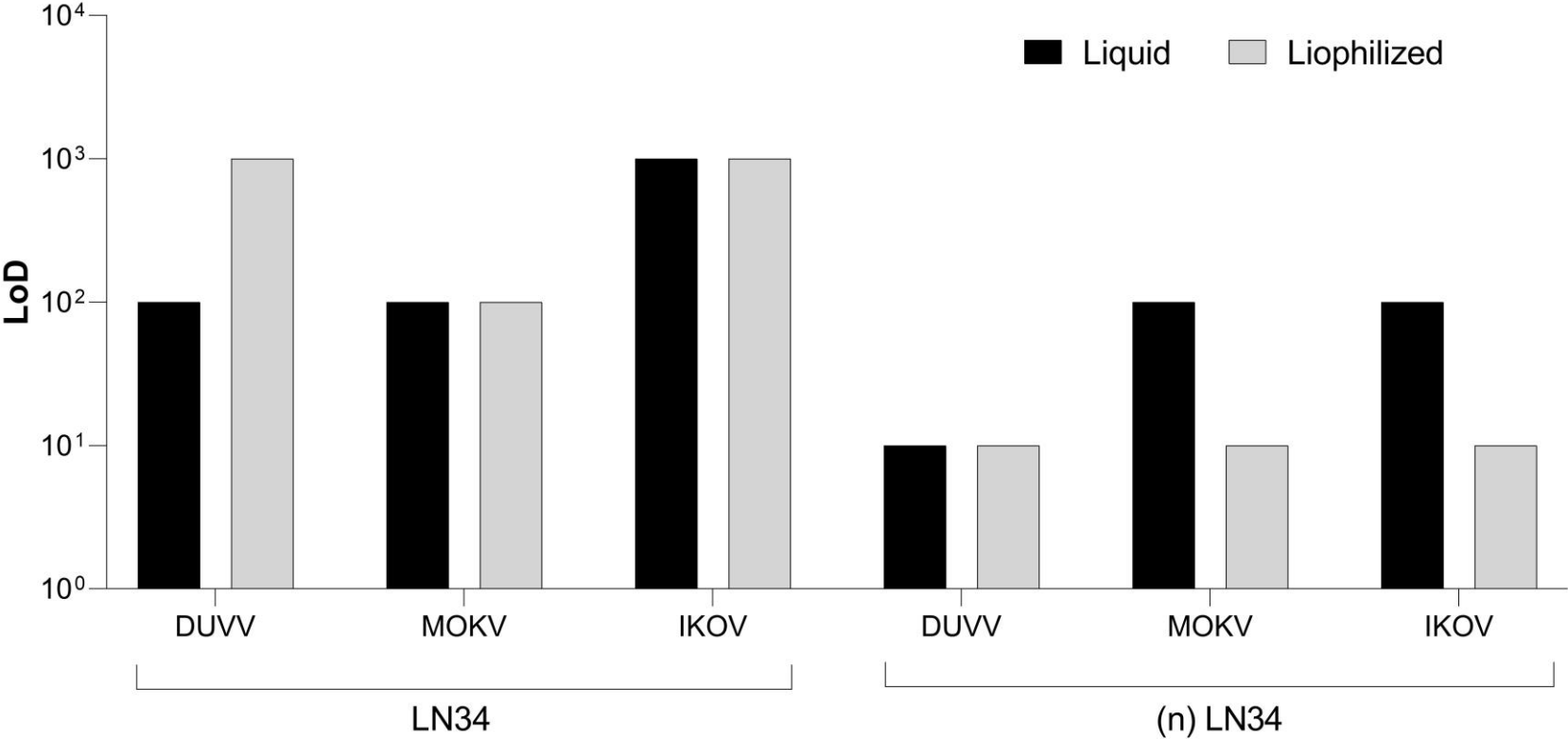


# Optimizing molecular protocols and assessing the sensitivity of the available tests

## Development of an improved (n)LN34 assay



# Optimizing molecular protocols and assessing the sensitivity of the available tests







Food and Agriculture  
Organization of the  
United Nations

SUSTAINABLE  
DEVELOPMENT  
GOALS

# THANK YOU

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## Acknowledgements:

USAID for financial support, FAO reference Centre for Rabies (IZSVe)