



# **Development of live attenuated Goat pox vaccine in Nigeria**

by

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# INTRODUCTION

- Goat pox (GTP) and Sheep pox (SPP) are transboundary diseases of sheep and goats caused by GTP virus (GTPV) and SPP virus (SPPV)
- GTPV and SPPV are members of Genus *Capripoxvirus* in the family *Poxviridae* and cross protected when used to vaccinate
- GTP causes considerable economic losses due to morbidity, mortality, depreciation of wool and skin quality and international trade restrictions
- GTP and SPP were first reported in Nigeria in 1971 and 1981 respectively and outbreaks are frequently reported with mortality up to 49%-64.4%
- Vaccination is the only means of prevention
- Hence, development of attenuated GTP vaccine for the control of the capripox virus diseases in Nigeria is therefore paramount

# Materials and Methods

## Isolation of the GTPV as vaccine candidate

- ✓ Attempted Isolation of GTPV was done using lamb testis primary cell line
- ✓ The GTPV isolate was inoculated in monolayer of African Green monkey kidney (VERO) cells to adapted and attenuated by serial passaging

## Molecular detection and Characterization

- Molecular detection of GPTV was done by PCR which amplifies the G-protein-coupled chemokine receptor (GPCR) and RPO30 genes
- Aliquots of harvest of the inoculated VERO cells at each stage of the passage were subjected to PCR
- The isolate (GTPV4) was phylogenetically characterized in CIRAD-emvt Montpellier, France, by Le Goff *et al.*, 2009

# Materials and Methods...

## **Immunogenicity and Potency**

- The harvest was freeze dried and titrated, while Immune response to the GTPV vaccine was carried out by vaccination of Lab goats (6-8 months old)
- Sera samples were collected before and after vaccination
- Detection of protective antibodies to GTPV was carried out by Agar Gel Immunodiffusion Test and serum neutralization test

## **Sterility, Safety and stability**

- Sterility tests was carried out
- Lab goats were inoculated with 10 times the OIE recommended field dose( $\log_{10} 2.5 \text{ TCID}_{50}$ ) of the vaccine
- The lyophilized GTP vaccine was stored in at  $-20^{\circ}\text{C}$  for 18 months

# Results

- The GTPV strain designated GPTV4 used for development of the vaccine was isolated from indigenous goat during an outbreak in Nigeria
- The GPTV4 was adapted to VERO after serially passaging (40 times) with 75-80% cytopathic effect (CPE) recorded in 5-7 days post inoculation

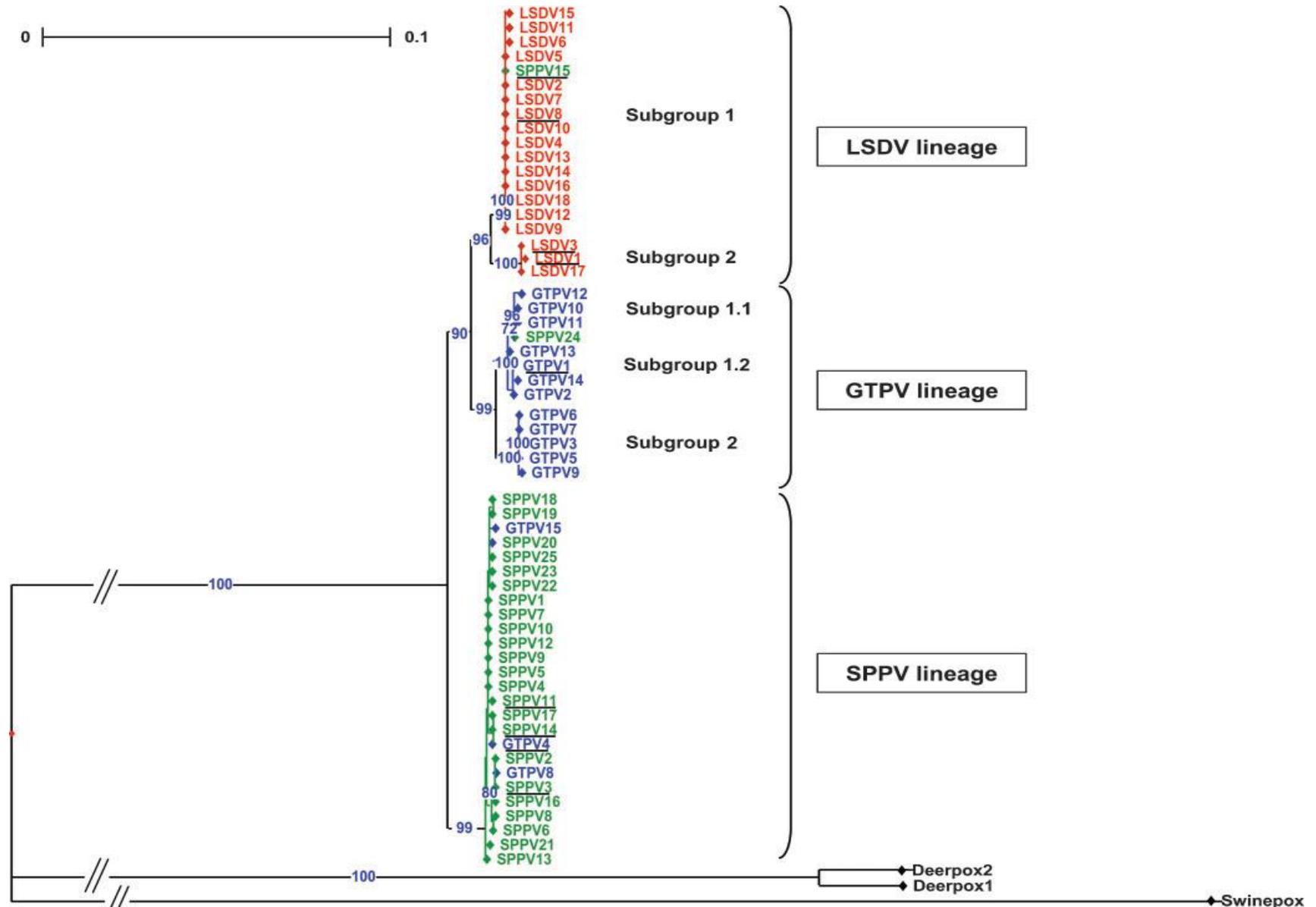


**Fig 1:** Characteristic CPE of GTPV4 in VERO cells

# Results....

- Harvests of cell culture were subjected to PCR detected the GPTV
- Molecular characterization of the isolated GTPV4 was phylogenetically analysis with alignment of the virus to the SPPV cluster.
- Furthermore, amino acid specificity showed the GTPV had specific signature at positions 6, 10, 11 and 12 but had a SPPV profile at the other positions

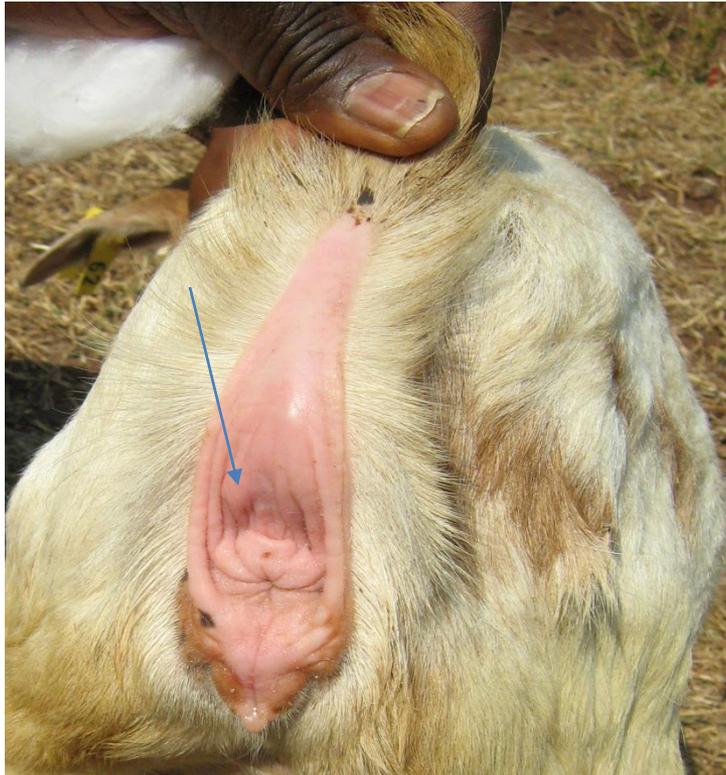
# Results...



**Fig 2:** Phylogenetic tree of the GTPV and other capripoxviruses based on the alignment of the nucleotide sequences (6976–8118) of the GPCR gene.

# Results...

- All goats developed subcutaneous *swellings* at site of inoculation after 2-4 days post vaccination indicative of successful immunization



**Fig 3:** A subcutaneous nodule, at the site of inoculation of the vaccine in one of the goats

# Results...

- The swellings were no longer detectable approximately 8 days after vaccination
- The animals vaccinated with GTP vaccine had normal parameters with weight gain similar to controls
- Goats challenged with 10 times the recommended field dose of the vaccine developed moderate local skin reactions with pyrexia
- Protective level of antibodies against GTP were detected in vaccinated goats for one year
- Titers ( $\log_{10} 4.5 \text{ TCID}_{50}$  per ml) of stored lyophilized GTP vaccines were stable for 18 months

# DISCUSSION

- Nigeria has 42million sheep and 73 million goats (FAOSTAT, 2016), and these animals are major sources of livelihood of rural dwellers in Nigeria
- SPP and GTP are important diseases of small ruminants in Nigeria and control of these diseases can alleviate poverty in Nigeria
- The GTPV4 seem to be related to both SPPV and GTPV, a whole genome sequencing will resolve this confusion
- Laboratory trial using goats showed that the GTP was safe and protective against GTP
- The GTP vaccine in this study has the potential to protected against both SPP and GTP although no field trial has been carried out.

# Conclusions

- The GPTV4 is closely related to both GTPV and SPPV
- GPTV4 elicit immunologic responses in goats and it is safe
- The vaccine has potential of protecting against SPP and GTP in small ruminants

**THANK YOU FOR LISTENING**