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Risk-based control of peste des petits ruminants in Uganda

Joseph Nkamwesiga, Fedor Korennoy, Paul Lumu, Peninah Nsamba, Frank Nobert Mwiine, Kristina Roesel, Barbara Wieland, Andres Perez, Henry Kiara and Dennis Muhanguzi

Key messages

- Peste des petits ruminants (PPR) can kill up to 90% of the infected animal population, especially when the disease appears for the first time. However, effective vaccines that protect small ruminants for at least three years, are available.
- PPR is rapidly spreading to new areas. At least 68 of Uganda's 135 districts (50%) are currently at risk of PPR outbreaks, posing a risk to the country's 18 million small ruminants, most of which are unvaccinated.
- PPR spread is related to activities such as animal trade for restocking purposes, communal grazing and watering as well as socio-cultural practices among others.
- More funding is need for timely prevention, detection and response to PPR outbreaks in line with Uganda's national PPR control strategy which is currently at stage 2 (control).

Background–PPR and why it matters

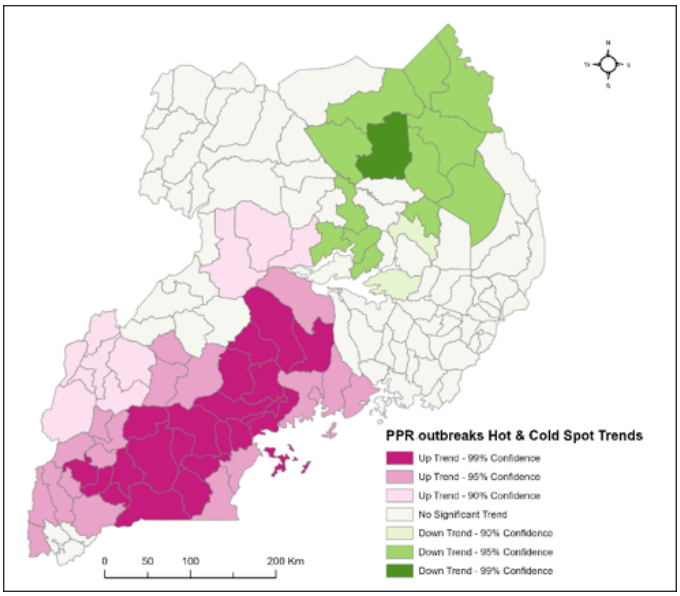
Peste des petits ruminants (PPR), also known as sheep and goat plague, is a transboundary disease that causes global annual economic losses of between USD 1.5 and 2.0 billion through direct death of animals, losses in production and lost opportunities in international trade. It is highly contagious and affects small ruminants in over 70 countries across Africa, the Middle East and Asia.

In recognition of PPR's negative socioeconomic impact, the World Organisation for Animal Health (WOAH, previously OIE) and the Food and Agriculture Organization of the United Nations (FAO) launched the PPR Global Control and Eradication Strategy (PPR GCES) in 2015. It is anticipated that affected countries

(or regions) will develop and implement the progressive control pathway for PPR (PCP-PPR) and eradicate the disease by the year 2030 (FAO and WOAH 2015). The strategy is built around four stages corresponding to a combination of decreasing levels of epidemiological risk and increasing levels of prevention and control. The stages range from stage 1 (assessment of the epidemiological situation), to stage 2 (control), stage 3 (eradication) and stage 4 (post-eradication) when a country can provide evidence that there is no virus circulation and it is ready to apply for the status 'free from PPR' (FAO and WOAH 2015).

To be able to achieve the 2030 PPR GCES, PPR endemic regions (or eco-zones) and individual countries need to fully understand PPR eco-epidemiology (FAO and WOAH 2015). Uganda has committed to the strategy and is currently at stage 2 of this PPR-GCES. The country has a PPR-GCES-aligned PPR national control strategy that is now approved and pending online publication. regarding technologies, commodity prices, and climate information services (Asenso-Okyere & Mekonnen 2012; Evans 2018). Leveraging technology offers avenues to address constraints with traditional data collection approaches including the need to provide timely feedback to communities where the information is collected (Adewopo et al. 2021).

Figure 1 : Map showing space-time PPR hotspots and their trends across Uganda.



PPR in Uganda

PPR was first detected in Uganda in 2007 in an outbreak that killed 500,000 small ruminants with estimated losses of up to USD 15 million (Luka et al. 2012; Mulindwa et al. 2011). The country's 18 million small ruminants are at risk of PPR which is spread through human activities such as animal movements for purposes of breeding, social functions, livestock trade; returning unsold livestock to the flocks without observing quarantine measures and communal animal husbandry practices such as sharing water sources (FAO 1999; Fournié et al. 2018).

The available PPR control measures include vaccination, animal movement restrictions (quarantine), good biosecurity measures such as proper carcass disposal, and proper management practices that restrict chances of direct contact between flocks, among others.

PPR risk profiling - findings

Using available data from PPR outbreak reports confirmed by NADDEC over a 14-year period since PPR was first reported in Uganda in 2007, Researchers from the International Livestock Research Institute (ILRI) and the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC), investigated the most likely conditions and points in time, that enable disease occurrence in the districts where at least one PPR outbreak has occurred.

From 2007 to 2020, a total of 221 PPR passive surveillance reports were recorded at NADDEC of MAAIF. Of these, 172 reports were confirmed as PPR outbreaks and covered about 40% (55/134) of districts in Uganda (Nkamwesiga et al. 2022).

The study found that PPR was most common among districts with high numbers of small ruminants and in areas that receive little rainfall per year. Areas with many cattle were also at high risk of having PPR outbreaks because cattle keepers in Uganda often keep small ruminants as well. As cattle density in an area increases, and thus small ruminant density, the more the likelihood of animal congregation that improves chances of contact between flocks. Livestock keepers from districts that receive very little rainfall per year are likely to participate in long distance trekking of their animals in search of pasture and water and thus increasing chances of meeting PPR infected flocks.

However, mass vaccination campaigns that have been promoted in some areas such as the Karamoja sub-region have reduced chances of PPR outbreak occurrence. Central and southwestern districts were found to be most at risk of new PPR outbreaks because of significant animal movements and limited vaccination efforts in these regions (Figure 1); however, further investigations regarding this observation are needed. A list of districts that require urgent attention was generated from this study (Table 1).

Table 1: Uganda district clusters with significant (90–99%) PPR trend categories.

PPR trend category (% confidence level)	Uganda district (2019)	Subregion (number of districts)
Downtrend (99)	Agago	Acholi (1)
Downtrend (95)	Kaabong, Karenga, Kotido, Abim, Napak, Kaberamaido, Kapelebyong, Lira, Kwania, Dokolo, Kitgum, Pader	Karamoja (5) Teso (2) Lango (3) Acholi (2)
Downtrend (90)	Amuria, Serere	Teso (2)
Uptrend (90)	Kabarole, Masindi, Bunyangabu, Kyenjojo, Kasese, Kamwenge, Ntoroko, Bundibugyo, Kiryandongo, Apac	Western (9) Lango (1)
Uptrend (95)	Kampala, Wakiso, Mukono, Masaka, Buikwe, Mubende, Nakasongola, Kyotera, Rukungiri, Kanungu, Ibanda, Rubirizi, Kisoro, Ntungamo, Mitooma, Buhweju, Kitagwenda, Kyegegwa, Kibaale	Central (8) Southwestern (8) western (3)
Uptrend (99)	Kalangala, Luwero, Bukomansimbi, Mpigi, Lwengo, Lyantonde, Ssembabule, Butambala, Nakaseke, Kiboga, Gomba, Kasanda, Mityana, Kalungu, Rakai, Mbarara, Kiruhura, Sheema, Bushenyi, Isingiro, Rwampara, Kazo	Central (15) Southwestern (7)

Inter-district and cross-border small ruminant movement facilitated by longer road stretches and animal mixing increased PPR virus spread and subsequently outbreaks from its initial Karamoja focus to the central and southwestern areas of Uganda. Water points during dry seasons were identified as one of the key risks for PPR transmission.

Conclusion and recommendations

Considerable vaccination coverage should be prioritized to attain the required herd immunity among small ruminants in the new hotspot areas and block further transmission to 95%-99% uptrend hotspots that were previously free from PPR. When implemented correctly, vaccination remains the most viable PPR control method in Uganda. Findings from our work can be used to support the design and implementation of a PPR control plan, focusing on those areas that are most at risk of PPR outbreaks as well as the timing of such control measures. Our study listed and categorised districts that are at risk of PPR outbreaks. This data can facilitate improvement in disease reporting in emerging hotspot areas since farmers will be able to predict when PPR outbreaks are likely to occur. The list has been presented to the National PPR steering committee in Uganda. Prioritize and operationalize coordination with neighbouring countries to ensure that only vaccinated animals move across national borders.

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Further reading

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Authors
Joseph Nkamwesiga works for Freie Universität Berlin, Germany, and the International Livestock Research Institute (ILRI). Fedor Korennoy work for the Federal Center for Animal Health Russia. Paul Lumu works for the Ministry of Agriculture Animal Industry and Fisheries, Uganda. Peninah Nsamba, Frank Nobert Mwiine and Dennis Muhanguzi, work for Makerere University, Uganda. Kristina Roesel and Henry Kiara work for ILRI. Barbara Wieland works for the Institute of Virology and Immunology (IVI), Switzerland, and the Department of Infectious Diseases and Pathobiology (DIP), Vetsuisse Faculty, University of Bern, Switzerland. Andres Pezez works for the University of Minnesota, United States.

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Contact
Joseph Nkamwesiga
ILRI, Uganda
J.Nkamwesiga@cgiar.org