



Lumpyskin Disease Vaccine: Awareness, Availability and Accessibility to Small-Holder Farmers in Midlands Zimbabwe

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Abstract

A cross-sectional survey was conducted to assess small holder cattle owners' awareness, availability and accessibility of the vaccine against Lumpy skin disease. This knowledge from the farmers provides an insight into the causes of the recurrent outbreaks in the Midlands province and perhaps throughout Zimbabwe. A total of 108 farmers were involved in the study, an interviewer-administered questionnaire was used to collect data on the vaccine handling, storage and administration practices as well as the accessibility and availability of the LSD vaccine. Findings from this study show that although most farmers (83.3%) have a basic knowledge of vaccine handling, storage and administration they still face problems due to unavailability and inaccessibility of the LSD vaccine. The vaccine is expensive (average \$2.00/dose), and most farmers cannot afford to vaccinate their cattle annually due to low income (average \$82.00/month). Vaccination is the mainstay of LSD prevention and unavailability of the vaccine may result in outbreaks occurring during every rainy season. Measures should be taken to ensure that the vaccines are made available and accessible to smallholder farmers at affordable prices; this can abate the annual Lumpyskin disease outbreaks in Zimbabwe.

Keywords: Lumpyskin disease; Vaccine; Awareness; Availability; Accessibility; Affordability

Abbreviations

CVL: Central Veterinary Laboratory; DNA: De-Oxyribonucleic Acid; DVS: Department of Veterinary Services; EEV: Extracellular Enveloped Virions; EU: European Union; GPCR: G-Protein Coupled Receptor; ITRs: Inverted Terminal Repeat; LAVs: Live Attenuated Vaccines; LSD: Lumpy Skin Disease; LSDV: Lumpy Skin Disease Virus; Mrna: Messenger Ribonucleic Acid; OIE: World Organization of Animal Health; ORF: Open Reading Frames; TCID50: Median Tissue Culture Infectious Dose; VMGD: Veterinary

Introduction

Lumpy Skin disease (LSD) is a re-emerging trans-boundary arthropod borne viral disease of cattle and buffaloes caused by the Lumpy Skin Disease (LSDV) or Neethling virus, a capripox-

virus belonging to the Poxviridae family. The Lumpy skin disease virus is transmitted by direct contact as well as biting flies of different species. The disease was first described in Zambia in 1929 and has since spread throughout most of the world with outbreaks documented in Turkey, Russia, and the EU from 2015 [15]. Lumpy Skin Disease is endemic in most African countries, especially in Southern Africa. Outbreaks tend to occur during the warm and wet season and the months following the rainy season; this may be because there is increased arthropod activity during these climatic conditions [4]. A study by Mafirakureva (2016) [8] indicated that in Zimbabwe the frequency of reported outbreaks is highest in March and April, and the lowest reported cases occur in November. These outbreaks are accompanied by high morbidity and low mortality which are dependent upon the breed and immunological

status of the cattle population and the insect vectors involved in transmission [13]. Clinically LSD is characterized by pyrexia, superficial lymphadenopathy, oculonasal discharge, and generalized firm flat-topped papules and nodules about 0.5–5.0 cm diameter all over the body including the head, neck, udder, scrotum, perineum, and buccal cavity [17]. Mortality from LSD may be as low as 10% and below [22] but the varying morbidity has major consequences which translate to huge economic losses, these include sterility and infertility in both sexes, loss of draught power, abortion, reduction in milk yield, and permanent hide damage [11]. Movement restrictions imposed on animals during disease outbreaks also lead to loss of market opportunities.

Lumpy skin disease outbreaks are reported almost every year in Zimbabwe, and the temporal and spatial distribution of the disease indicates that the disease is spreading throughout the country with areas formerly free from LSD now experiencing more outbreaks [16].

Control of LSD is mainly by vaccination with live attenuated vaccines which are commercially available or with sheeppox or goatpox vaccine which offer cross-protection because of antigenic homology [19]. Restriction of cattle movement during an outbreak and arthropod control can also help to reduce the incidence of LSD. The occurrence of outbreaks of the disease with increased frequency and in new areas could be indicators that the measures may not be effective in controlling the disease. The failure of control could be due to viral factors such as antigenic drift, vaccine failure due to improper shipping and handling, or unavailability of the vaccine and host associated factors including physiological state of the animal, age and immune history. The aim of this study was to assess the LSD vaccine awareness, handling, and use among the livestock farmers in the Midlands province and to establish whether the cause of recurring LSD outbreaks in Zimbabwe is a result of unavailability, inaccessibility, or a break in the shipping, handling, and administration of the LSD vaccine.

Materials and Methods

A cross-sectional survey was conducted to assess cattle owners' vaccine awareness, handling, and storage practices as well as availability and accessibility of the vaccine against Lumpy skin disease. A cross-sectional study was most appropriate for the determination of the level of vaccine awareness amongst livestock farmers because it is the most appropriate for population-based surveys and it gives a descriptive assessment of the views and experiences of many different individuals at a given point in time [17]. This study

was limited to the Midlands province of Zimbabwe, particularly the Gokwe South district. The study area was selected for convenience due to the recurrent outbreaks of LSD reported in the area in the past 5 years. The Midlands province is one of the provinces most affected by LSD, outbreaks are reported annually [8]. There was an on-going LSD outbreak when the study was conducted. Gokwe south was also selected for study because of the growing numbers of smallholder livestock farmers in a place that was previously a communal reserve. Ease of access also contributed to the selection of the Gokwe South district as the study location.

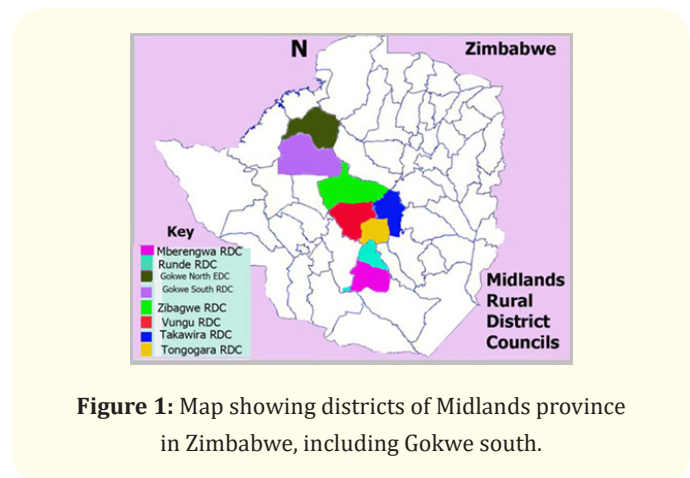


Figure 1: Map showing districts of Midlands province in Zimbabwe, including Gokwe south.

An interviewer-administered questionnaire was used to interview 71 livestock farmers from 3 villages (Chimunyu, Chinyenyetu, and Sidaka) within the Gokwe South district and an additional 37 farmers from other parts of the Midlands province on LSD occurrence, and its associated impacts. The questionnaire included demographic details, source, and level of income as well as key variables that affect the farmers' ability to access, handle, store and use the LSD vaccine. Livestock management practices, and knowledge of and history with LSD [12].

A total of 30 VMGD owners and vaccine suppliers were also randomly selected to provide information on vaccine cost, cold chain maintenance as well as the availability of the LSD vaccine. All the information was carefully recorded in a designed format.

The data collected was analysed using IBM SPSS version 20.

Results and Discussion

Out of a total of 108 respondents, 90 (83.3%) were males aged between 41 and 50 years (63.9%). The highest level of education attained by most of the farmers (85.2%) who took part in the sur-

vey was secondary education. 84% of the farmers had herds of between 10 and 30 cattle. A large proportion of the interviewed farmers expressed basic knowledge of cattle disease management and control through vaccination as well as some knowledge on vaccine handling, storage, and administration. The hot wet season was cited by all the farmers as the season during which most livestock diseases occur and the most common means of disease control is antibiotics which are administered routinely, particularly tetracyclines and penicillin. Dipping is also done routinely although fly control was shown to not be very important among the interviewed farmers. 76 of the 108 (70%) farmers claimed to do routine vaccinations yearly while the other 31(28%) claimed to vaccinate “as and when the vaccines were available”.

Knowledge of vaccine handling and storage is very common, 83% knew that all vaccines should be kept cold at all times before use, and a significantly high number believed that vaccines can be kept at room temperature before use. The same trend was observed with regards to LSD vaccine handling and storage, 83.3% of the farmers disagreed with the idea that the LSD vaccine does not need to be kept cold during transportation while nearly 11% believed the vaccine did not need to be kept cold during transportation. And 5.6% were not sure.

Storage of the LSD vaccine awaiting use also showed that most of the farmers (83.4%) are aware that the vaccine should be stored in a cold place before use. The farmers who disagreed with the idea of the LSD vaccine not needing cold storage for transportation also tended to believe that the vaccine needed to be stored in a cold place before use.

93.5% demonstrated knowledge that the LSD vaccines are administered by subcutaneous injection, and how regularly the LSD vaccinations should be done. Despite this knowledge, however, a large proportion of the interviewed farmers indicated that they had never vaccinated their cattle against LSD before or it was more than a year since they had last vaccinated their herds. 76.9% had never vaccinated their herds and 21.3% had not vaccinated in over a year.

The majority of the interviewed farmers (89%) have an average monthly income of between US\$50.00 and US\$150.00. Only 1 of the 108 (0.9%) farmers who took part in the survey indicated that they earned more between \$250.00 and \$450.00 per month.

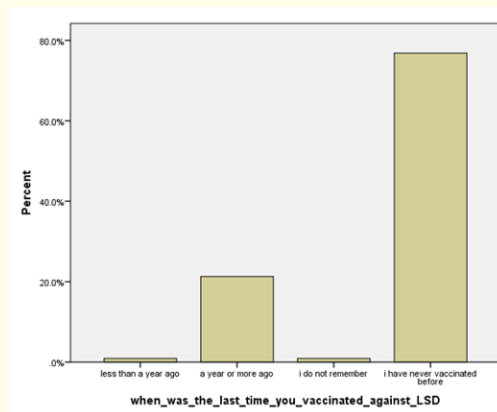


Figure 2: Period of last LSD vaccination.

The cost of vaccines ranges from US\$50.00-US\$100.00 for 50 doses depending on the supplier and the brand. The most expensive LSD vaccine though not readily available at a private establishment was being sold at US\$40.00 for 20 doses which translates to around US\$100.00 for 50 doses (the standard used for this study).

The shortest distance travelled by farmers to access veterinary supplies was 10-30km and the greatest distance was more than 100km either to the next town or to the provincial capital which is about 200km away from Gokwe south to access the vaccine. About 44% travelled over 100km to access the vaccine while another 38% travelled between 30 and 70km to access the vaccine. Notwithstanding the distance travelled by farmers, as shown below, the vaccine is only available sometimes at the VMGDs.

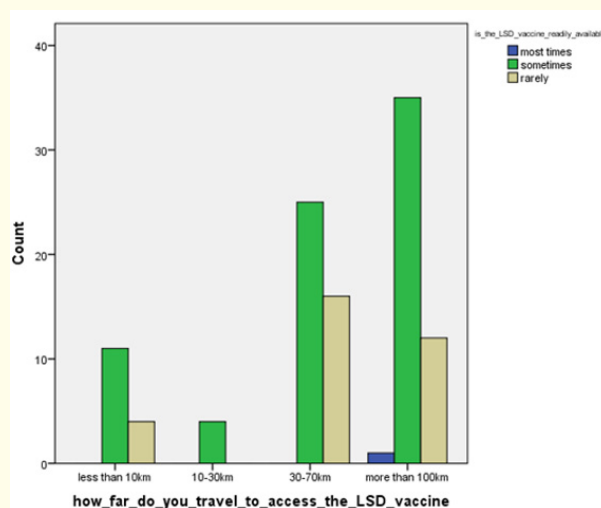


Figure 3: Distance traveled to access vaccine.

This study was done for an outbreak which was reported between March and April 2021, after the main rainy in most parts of Zimbabwe including Gokwe south and the seasonal cycle of the outbreaks was confirmed by all farmers (100%) citing that most cattle diseases including LSD occur during or towards the end of the hot wet season. This agrees with what was reported by Mafirakureva (2016) [8] that an increase in total LSD cases occurs from January to May throughout Zimbabwe and this was attributed to an increase in the vector populations during this period, supporting the supposition that the major route of LSD transmission is by insect vectors. Even though most of the respondent farmers only had a secondary school education, a large proportion had a basic knowledge of vaccine handling, storage, and use, 83% of the farmers understood the importance of the cold chain. With regards to the LSD vaccine as this study was focusing on most farmers indicated that although they knew how to handle, store and even administer the vaccine they did not use the vaccine. 76.9% had never vaccinated their herds and 21.3% had not vaccinated in over a year. According to Heffernan and Misturelli (2000) [5], there are three important determinants of animal health intervention uptake among the poor which are accessibility, affordability, and acceptability. Access was defined as relating to both the physical distance between the farmer and the service provider as well as the delivery channel required for the service. The findings of this present study show that most farmers that were interviewed had to travel long distances to find the LSD vaccine and this could provide an explanation for the low numbers of farmers who vaccinate their cattle against LSD, hence the recurrent outbreaks. Access to the vaccine also encompasses the availability of the vaccine, most farmers even after traveling long distances at times more than 200km to access the vaccine; it is not always available (Figure 4).

Affordability as defined by Heffernan and Misturelli (2000) [5] measures the actual ability of a farmer to pay for a service. The average income among the interviewed respondents was US\$82.00 per month whereas the average cost of the LSD vaccine among the VMGDs that was explored was US\$60.00/50 dose (US\$1.20/dose) which is almost 75% of the farmer’s income and they cannot afford to vaccinate their cattle annually against LSD. The average daily spending of a Zimbabwean farmer is US\$3.00/day and this makes vaccination expensive.

These factors significantly reduce the acceptability of the LSD vaccine amongst farmers in low-income areas such as Gokwe south. Acceptability relates to the preferences of the poor as consumers, this results in limited choices and the farmers opt to vaccinate for diseases that have more affordable vaccines which are readily available such as Blackleg and Anthrax.

Conclusion

Although this study had some limitations, including the fact that a few villages were surveyed and the case definition for LSD was based only on clinical signs. Findings from this study gave an idea of the status of farmers’ level of awareness concerning important aspects of LSD. These attributes can be employed in preparing interventions to abate future outbreaks and improve disease control options for LSD. It was observed that whilst general awareness about LSD and livestock vaccination was high, the number of farmers who vaccinated against LSD was low and this was probably due to low availability, accessibility, and the high cost of the vaccines for LSD.

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Conflict of Interest

The authors declare no conflict of interest.

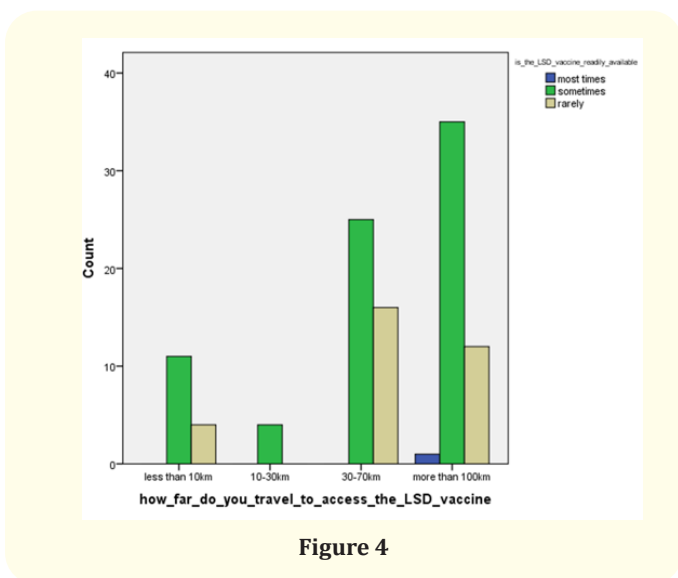


Figure 4

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