

Research Application Summary

Assessment of the spatio-temporal bovine migratory routes and trans-boundary animal diseases infestation in Uganda

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Abstract

Livestock form an important part of Uganda's GDP with a big proportion of households deriving their livelihoods from the sector. However, pasture management and disease control especially Transboundary Animal Disease outbreaks have challenged productivity in the sector. Assessing animal movements and drivers, as well as economic impacts of TADs is necessary in order to generate well informed institutional responses and best TADs management options for better policy decisions. These issues are being studied in the western and eastern regions of Uganda. The study has only been initiated.

Key words: Animal movements, economic impact, pastoralism, Transboundary Animal Diseases

Résumé

L'élevage constitue une part importante du PIB de l'Ouganda, avec une proportion importante de ménages tirant leur subsistance du secteur. Toutefois, le contrôle de la gestion des pâturages et en particulier les maladies transfrontières des animaux sont des défis de la productivité dans le secteur. L'évaluation des mouvements des animaux ainsi que l'impacte économiques des maladies animales transfrontalières sont nécessaire afin de générer des bonnes réponses institutionnelles et les meilleures options de gestion des maladies animales transfrontalières (DAT) pour une bonne prise des décisions politiques. Ces questions sont étudiées dans les régions occidentale et orientale de l'Ouganda. L'étude est à son stade d'initiation.

Mots clés: Mouvements d'animaux, impact économique, le pastoralisme, les maladies animales transfrontières

Background

Livestock constitute about 15% of Uganda's agricultural output, 9% of GDP and more than 60% of households derive their livelihoods from livestock related activities (UBOS, 2008). However, recent surveys in the different agro-ecological zones of Uganda revealed that herders are facing serious challenges relating to shortage and/or lack of pasturelands for livestock (Majaliwa and Nkonya, 2009). Trans-boundary Animal Disease (TADs) outbreaks which reportedly have been increasing nationally and globally have aggravated the situation (ICEID, 2008). Trans-boundary animal diseases (TADs) can be highly contagious and have the potential to spread very rapidly irrespective of the national borders, causing serious economic losses (Thomson, 2008).

According to the Uganda Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), the major animal diseases causing a threat to the livestock sub sector in Uganda include Foot and Mouth Disease (FMD), Contagious Bovine Pleural Pneumonia (CBPP), Peste de petit Ruminantium (PPR), Lumpy Skin Disease (LSD), New Castle Disease and East Coast Fever, among others. These diseases cause high morbidity and mortality in susceptible animal populations and significantly affect the food security of pastoralists and the national economy. Animal Movement is a mechanistic element of ecological processes at various spatial and temporal scales (Crist Guertin *et al.*, 1992). It is also viewed as a tool for maintaining environmental variability in African pastoral systems (Baker and Hoffman, 2006). Grazing management is paramount for ecological sustainability and requires the understanding of existing ecological knowledge (Hudak, 1999). The understanding of factors that determine the movements of herds is important for predicting and managing the movement patterns for purposes of sustainable grazing in rangelands and control of TADs. The factors include water availability, land tenure, cropping patterns, availability of pasture, authority to enforce movement restrictions, herd size, production goals, among other factors (Baker and Hoffman, 2006). This study therefore aims at determining the movement of bovines in Western and Eastern Uganda, assessing the socio-economic impact and institutional responses to trans-boundary animal diseases in Western and Eastern parts of Uganda and identification of the best TADs management options for the two regions of Uganda.

Literature Summary

The Uganda Government's National Development Plan (NDP) has highlighted the constraints to growth in livestock sector as

related to diseases, lack of good breeds, lack of quality pastures and livestock feeds (MFPED, 2010). Transboundary animal diseases (TADs) impose major social and economic costs and risks to infected countries, their neighbours, and trading partners. For all livestock producers, the threat of TADs increases the risk of lost production and impacts on livelihood, increasing vulnerability to poverty particularly for small scale producers (FAO, 2004). For example, several countries have in the past experienced various impacts related to outbreaks of Foot and mouth disease (FMD) an important Transboundary animal disease. Garner *et al.* (2002) in Australia reported that an outbreak of FMD could lead to their GDP falling by AUS\$ 3.5 billion over a six month period. African countries because of their weaknesses in the control of animal diseases, end up losing economically when developed countries come up with restrictions on the trade of their livestock commodities (Vallat and Mallet, 2006). Mozambique, Kenya, Tanzania and Uganda lost an estimated US\$ 332 million during 1998-2002 as a result of Europe restricting the importation of fish following the outbreak of cholera in those countries (Kimball *et al.*, 2005). Soniaya (2007) noted that within the East African community countries, livestock disease control strategies were not harmonised, e.g., for CBPP there was cost sharing in Uganda but not in Kenya and Tanzania, for FMD- it was free in Uganda, at cost in Tanzania but cost-sharing in Kenya.

Generally, uncontrolled transboundary livestock movements affects efforts on disease control and this is aggravated by drought, floods and overstocking which accelerate disease outbreaks. A study of FMD outbreak in West African countries indicated that a livestock production system that was characterised by uncontrolled animal movements facilitated the spread of the disease (Couacy-Hymann *et al.*, 2006). According to Tambi (2006), Contagious bovine pleuropneumonia (CBPP) is considered a disease of economic significance because of its ability to: compromise food security through loss of protein and draft power, reduce output, increase production costs due to costs of disease control and inhibit sustained investment in livestock production leading to disruption in livestock/product trade.

Uncontrolled livestock movements are the major cause of the spread of cattle diseases, overgrazing, declining ecosystem productivity, and widespread and dangerous inter and intra-tribal conflicts (Kisamba Mugerwa, 2001). Specifically, uncontrolled

livestock movement have created difficulties in disease control and disease spread through the unmarked trek routes, difficulties in planning and implementing development programmes, control of stocking rates to avoid land resource degradation; and the design of optimum resource allocation among multiple users and uses within the ecosystem.

Study Description

This study will be conducted in the districts of Nakapiripirit and Karamoja in north-eastern Uganda, areas bordering Kenya, Ethiopia and Sudan; and in two districts from western Uganda, namely, Ntugamo and Rakai. Within each district, four communities will be selected based on existence or not of Sustainable Livestock Management project (SLiM) and access to market. Traditional grazing groups and their inter-ethnic relations with neighboring communities will be assessed through desk review and using PRA techniques. Interviews will be conducted at two levels: resource persons and with communities.

Geo-spatial techniques will be used to track back the routes of the herders for the last 30 years. This information will be used to calibrate and validate the outputs of the –simulation Pastoral Livestock Movement Model. The drivers of the livestock movements will also be identified.

A survey will also be done in order to identify major TADs for bovines for Western and Eastern Uganda, determine their hotspot area in terms of occurrence, determine their impact to people's livelihood and assess the institutional responses for food security and poverty reduction. A spreadsheet model will be used to establish the economic impact of major TADs identified for bovines in eastern and western Uganda. Benefit–cost analysis will help to compare the value of the incremental benefits with the value of the incremental costs in order to establish whether or not bovine disease control is economically viable. The willingness of respondent households to meet part of the costs for disease control will be assessed by using a qualitative choice model and assessing factors influencing that choice decision.

Research Application

This study is expected to result into the identification and estimation of the impact of TADs in the Western and Eastern Uganda, establishment of bovines' migratory routes for the last 20 years and their drivers, local TADs management strategies and their effectiveness of institutional responses to TADs overtime and best TADs management strategies.

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Although some spatio-temporal clusters of H7N9 have been identified in these researches, the study periods are not long enough neither (the longest study in these papers was conducted between 19 February 2013 and 31 March 2014 [3]). In order to fully examine the spread of the H7N9 outbreaks in humans, the disease data consisted of 460 influenza A(H7N9) human cases reported in China from March 2013 through December 2014, which were aggregated at the municipal level, and the spatio-temporal attributes of each H7N9 human case were used, including the Spatio-temporal cluster in phase I. There were totally 31 localities and 130 influenza A(H7N9) human cases contained in the first epidemic phase. A Special Issue on spatio-temporal analysis of infectious diseases is being organized in the International Journal of Environmental Research and Public Health. For detailed information on the journal, I refer you to <https://www.mdpi.com/journal/ijerph>. Epidemiological research on the pathogenesis, diagnosis, and treatment of infectious diseases is a broad field of work with renewed validity in the face of social changes and new threats. The spatiotemporal distribution is central in the knowledge of the development, transmission, spread and dynamics of these diseases. New technologies and GIS m Spatial and Spatio-temporal Epidemiology. journal homepage: www.elsevier.com/locate/sste. Original Research. Spatio-temporal clusters of incident human brucellosis cases in Ecuador. Lenin Ron. a,b,c. The seroprevalence of bovine brucellosis was ofcially estimated to range from 1.92% to 10.62% among the provinces in the highlands (Sierra) and from 4.12% to 10.62% among provinces in the Coast (Torres, 2008). This will enable the identification of areas with a high incidence of the disease and also to assess the effects of important risk factors such as ethnicity and cat-tle, sheep and goat population densities on the space-time distribution of the disease. 2. Materials and methods. 2.1. Study region and data.