

Research Application Summary

Economic analysis of transboundary animal disease control in Ntungamo and Rakai districts in Uganda

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Abstract

Livestock plays an important role in the economies of many developing countries. It provides food, income, employment and foreign exchange. Transboundary animal diseases (TADs) are a major threat to livestock keepers. They have evident economic impacts both through the private and public costs of the outbreak, and through the costs of measures taken to control infestation and disease outbreaks. This study assessed the socio-economic effects of two TADs namely Foot and Mouth Disease and East Coast Fever and farmers' willingness to pay for the control of these diseases. The study characterised agro-pastoralists in Ntungamo and Rakai districts in Uganda; evaluated the farm level benefits and costs associated with the control of TADs; and determined the factors influencing farmers' willingness to pay for TADs control. A sample of 176 farmers from Rakai and Ntungamo districts was used to generate responses. Data were collected using pretested questionnaires and analysed using SPSS and STATA. Analytical tools used included descriptive statistics, Cost Benefit Analysis (CBA) and Logit models. The study found that spraying and vaccination were the most commonly used methods of TADs control. Annual cost of spraying per animal was estimated at UGX 8,867 (equivalent to about US\$3.3) while that of vaccination was UGX 500 (\$0.2) per animal per year. Total annual losses avoided per animal were 64% higher if TADs were controlled than if they were not controlled. The benefit cost ratio was 4.4 indicating that the benefits of TADs control were greater than the costs. Whereas high income earning farmers had a higher probability of paying for TADs control, low income earning farmers reported a lower probability to do so. The study revealed that 60% of the farmers were willing to pay for TADs control. In order to ensure effective TADs control, farmers should be encouraged to pay for TADs control because it is from the healthy animals that reasonable annual income is realised. Vaccination should be subsidized to encourage farmers' willingness to pay for TADs control. Farmers should also be sensitised about the importance of their payment towards TADs

control as this boasts their output and hence their profits. Veterinary services delivery should also be improved by making veterinary services more accessible to farmers through training.

Key words: Transboundary animal diseases, agro-pastoralists, cost benefit analysis, willingness to pay, Uganda

Résumé

L'élevage joue un rôle important dans l'économie de nombreux pays en développement. Il fournit de la nourriture, des revenus, de l'emploi et de devises. Les maladies animales transfrontières (TADs) sont une menace majeure pour les éleveurs. Elles ont des impacts économiques évidents à la fois par les coûts privés et publics de l'épidémie, et par les coûts des mesures prises pour lutter contre l'infestation et les déclenchements de la maladie. Cette étude a évalué les effets socio-économiques de deux TADs à savoir la fièvre aphteuse et la theilériose et la volonté des agriculteurs à payer pour lutter contre ces maladies. L'étude a caractérisé les agro-pasteurs dans les districts de Ntungamo et de Rakai en Ouganda, a évalué les avantages au niveau des exploitations et les coûts associés à la lutte contre les maladies animales transfrontières, et a déterminé les facteurs influençant la volonté des agriculteurs à payer pour le contrôle des TADs. Un échantillon de 176 agriculteurs des districts de Rakai et Ntungamo a été utilisé pour générer des réponses. Les données ont été recueillies au moyen de questionnaires pré-testés et analysées à l'aide de SPSS et STATA. Les outils analytiques utilisés comprenaient des statistiques descriptives, l'analyse coûts-avantages (ACA) et des modèles logit. L'étude a montré que la pulvérisation et la vaccination étaient les méthodes les plus couramment utilisées pour lutter contre les TADs. Le coût annuel de la pulvérisation par animal a été estimé à 8.867 XUG (équivalents à environ 3,3 \$ US) tandis que celui de la vaccination était de 500 XUG (0,2 \$) par animal et par an. Les pertes annuelles totales évitées par animal étaient de 64% plus élevées si les TADs ont été contrôlées que si elles ne l'étaient pas. Le ratio avantages-coûts a été de 4,4 indiquant que les avantages de lutte contre les TADs étaient supérieurs aux coûts. Alors que les agriculteurs à revenu élevé ont une probabilité plus élevée de payer pour la lutte contre les maladies animales transfrontières, les agriculteurs à faible revenu ont signalé une plus faible probabilité de le faire. L'étude a révélé que 60% des agriculteurs étaient prêts à payer pour le contrôle de maladies animales transfrontières. Afin d'assurer un contrôle efficace des TADs, les agriculteurs devraient être encouragés à payer pour la lutte contre les TADs car c'est à partir des

animaux sains que le revenu annuel raisonnable est réalisé. La vaccination devrait être subventionnée pour encourager la volonté des agriculteurs à payer pour le contrôle des maladies animales transfrontières. Les agriculteurs devraient également être sensibilisés sur l'importance de leur paiement pour le contrôle des maladies animales transfrontières car ceci améliore leur production et donc leurs profits. La prestation de services vétérinaires devrait également être améliorée en rendant les services vétérinaires plus accessibles aux agriculteurs par le biais de la formation.

Mots clés: Maladies animales transfrontières, agro-pasteurs, analyse coûts-avantages, volonté de payer, Ouganda

Background

Recent surveys in the different agro-ecological zones of Uganda revealed that herders are facing various challenges relating to low rainfall, long dry season spells and the spatial variability of precipitation (FAO, 2010). The situation becomes more complex with transboundary animal disease outbreaks which have been increasing nationally and globally (ICEID, 2008). As a result, transboundary animal diseases are now a permanent threat for agro-pastoralists in Uganda, public health and global trade.

Although a lot of effort has been put to the control of TADs in Uganda, the problem is still far from being solved. Large sums of money have been spent in the attempt to reduce TADs infestation in the country (Tambi *et al.*, 1999). Unfortunately, like in other African countries, TADs infestation has not changed considerably (Otte *et al.*, 2004). Despite the many studies that have been conducted on the economics of TADs control, little has been done to accurately quantify the costs and benefits of TADs control in Uganda (Tambi *et al.*, 1999;; Rutagwenda, 2000; Otte *et al.*, 2004; Mugasi, 2009). Furthermore, most of the analyses have focused on the impact of one disease regardless of the prevailing multiple disease context (FAO, 2009). Whereas current disease control is a public good, there is lack of knowledge about farmers' willingness to pay for TADs control. Thus, this study characterised agro-pastoralists, determined their willingness to pay for TADs control, and established the benefits and costs of TADs control. It also assessed the socio-economic effects of TADs on livestock producing households with a view to propose appropriate interventions to disease incidences and effects in Uganda.

Literature Summary

Livestock plays a key role in the agricultural economy of many countries in Sub-Saharan Africa, contributing over a quarter of the total value of agricultural production (Tambi *et al.*, 1999). In addition to providing food, income, employment and foreign exchange earnings, livestock serves as a source of wealth and supplier of inputs and services such as draught power, manure and transportation. Despite these important roles, the growth in livestock productivity in Sub-Saharan Africa has been below that of other developing regions due to, among other factors, increased outbreaks of transboundary animal diseases (TADs); other constraints include droughts and market issues (Tambi *et al.*, 1999; Otte *et al.*, 2004). In Uganda, the livestock sub-sector contributes about 17% of the agricultural GDP and 7% of the National GDP (UBOS, 2008). Livestock production has continued to grow, at a rate of over 3% per annum, in response to increasing demand for milk and meat in the domestic market (FAO, 2005). However, higher rates of growth are envisaged as Government pursues its policies of modernizing and commercializing agriculture. Presently, livestock production does not satisfy domestic market because of TADs outbreaks, which reportedly have been increasing nationally and globally (ICEID, 2008).

Transboundary animal diseases are: “those diseases affecting the environment (farms) hundreds of miles away from the source” (FAO, 2009). Therefore, they are of significant economic, trade, and / or food security importance for a considerable number of countries (Otte *et al.*, 2004). They can easily spread to other countries and reach epidemic proportions; and their control requires cooperation between countries” (FAO, 2009). A number of diseases limit productivity through morbidity and mortality, resulting in loss of meat, milk, hides and skins, eggs, wool, manure and animal traction. Infectious diseases such as Foot and mouth disease, Contagious bovine pleuropneumonia (CBPP) and Rinderpest account for the largest share of the losses (Tambi *et al.*, 1999; Otte *et al.*, 2004). Despite the significance of TADs, most governments in sub-Saharan Africa are unable to maintain effective surveillance and control programmes against these diseases due to inadequate budgetary funding to the agricultural sector (Tambi *et al.*, 1999). However, collaboration between national governments and international donor institutions such as the European Union (EU) in the last ten years has led to significant progress in the control of TADs in Africa. Because TADs spread quickly covering large areas, the need for public intervention frequently extends to the

international level and calls for regional co-operation without which control efforts cannot be effective (FAO, 2009). However, it is practically difficult to determine the proper mix between private and public as well as national and international action because of inadequate information on costs of both TADs and control efforts (Otte *et al.*, 2004).

Transboundary animal diseases (TADs) are arguably the most important diseases that have devastated most of the herds in Sub-Saharan Africa (FAO, 2009). Damage can be economic loss (loss of output, income and investment) and psychological (shock and panic) (Otte *et al.*, 2004). Combating TADs is therefore necessary to farmers given that the presence of diseases on one farm poses a threat not only to adjacent farms, but even to distant locations as well. In addition, the loss of food due to disease poses a threat to national food security and rural livelihoods such that government intervention is unavoidable. As a result, government control interventions for TADs are usually stronger than for other diseases that only occur locally. The spread of emergent diseases and invasive species has dramatically increased in the recent years. This is attributed to numerous developments such as rapidly increasing transboundary movements of goods and people, and trade liberalisation. There is today increased concerns over food safety and the environment and call for regional and international cooperation in controlling and managing TADs (Otte *et al.*, 2004).

The TADs include Foot and mouth disease (FMD), Rinderpest, Contagious bovine pleuropneumonia (CBPP), East coast fever (ECF), Lumpy skin disease (LSD), Newcastle disease (NCD) and African swine fever (ASF) (WAH, 2004). These diseases are highly contagious and have the potential to spread very rapidly across borders causing serious economic losses (Thomson, 2008). They cause high morbidity and mortality in susceptible animal populations, damage farmers' property, may threaten food security, injure rural economies and potentially disrupt trade relations (FAO, 2009). As a result, the extent of their consequences may significantly affect the food security of pastoralists and national economies.

Singh *et al.* (2007) noted that poor farmers are the most affected by the diseases because of the scarcity of the vaccines and lack of awareness about vaccination programmes. The group found out that economic losses due to TADs were more among

marginal farmers and in animals less than three years old than in commercial farms because of the regular and proper vaccination programmes at those farms. The authors further noted that the control of TADs such as FMD depends on prophylactic immunisation of susceptible animal population. Therefore, control of these diseases could lead to at least 5% annual increase in milk production (Singh *et al.*, 2007). For effective control of FMD, about 60-80% of the animals need to be vaccinated (FAO, 2009). This can be made possible only through implementation of veterinary extension education for livestock owners about the economics of diseases and by readily making vaccination services available to farmers. Absence of veterinary clinics, inaccessible distances and lack of extension advice are the reasons for non-adoption of vaccination by farmers (Koma, 2003). According to Singh *et al.* (2007) educated farmers are more likely to seek profession advice and to vaccinate their animals regularly.

Study Description

The study was conducted in two border districts of Western Uganda (Ntungamo and Rakai). Within each district, at least two sub-counties were selected based on existence of sustainable livestock management (SLiM) project and access to market. Ntungamo and Rakai districts were purposively selected for the study because they border Tanzania and Rwanda and also nearby districts with high livestock populations. As such, they are prone to TADs. The two districts greatly contribute to livestock production in Uganda (MAAIF and UBOS, 2008). In addition, the two districts are in areas where the activities of the project “Assessment of spatio-temporal bovine migratory routes and trans-boundary animal diseases (TADs) infestation in Western and North-Eastern Uganda” were centered. Information pertaining to livestock was obtained from a number of sources including the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) staff, sub-county veterinary officers, and the media. Other information sources included farmers’ organizations, bulletins and newspapers. Both primary and secondary data were used. Primary data were collected through stakeholder consultations; focus group discussions and key informant interviews at the village level; and discussions and surveys at the household level. A questionnaire was designed to obtain information on the extent to which respondents to the survey thought that each disease affected the performance of livestock. This was supplemented by on-farm observations. A multi-stage sampling technique which involved selection at different stages (that is, regions,

districts, villages and farmers) was used. For each district, at least two sub-counties were randomly sampled. The sub-counties were Kakuuto and Kibanda in Rakai district; and Rubaare, Ngoma and Rukoni in Ntungamo district. Lists of major livestock producing villages per sub-county were obtained from the district veterinary officers. Lists of all agro-pastoralists in the villages were obtained from Local Council One (LCI) chairpersons. Thereafter, a sampling frame was drawn from the list of agro-pastoralists in each Local Council following a random walk. Choosing a random starting point in each village, every third household was picked until 86 and 90 agro-pastoralists from Rakai and Ntungamo districts respectively were interviewed. Thus, a total of 176 agro-pastoralists were sampled to represent all the farmers in the two districts.

The survey was carried out between June and July of 2011. Using pre-tested questionnaires, heads of selected households were interviewed. In the absence of the household head, the spouse or any other responsible and knowledgeable adult member of the household was interviewed. The main respondent would provide most of the information, but other household members were consulted when necessary. Qualitative and quantitative data were collected from the selected agro-pastoralists. Information on the nature and perceptions of TADs in the study sites; the vulnerability of livestock and people to TADs, adaptive or other types of responses to each TAD; factors affecting these responses and impacts of the responses to people's livelihood, economic development, local natural resource and environmental conditions were captured using the semi-structured questionnaires. The data collected include socio-demographic data, economic data, production and marketing constraints, service delivery and information on farmers' willingness to pay for TADs control. Information on farmers' various characteristics including age, sex, marital status, incomes, number of animals owned and experience in cattle rearing was collected. In addition, information on status of TADs and geographic characteristics of the study area was collected. To collect supplementary information, key informant interviews were also conducted with the district veterinary officers, district agricultural officers, sub-county veterinary/extension officers and local leaders. This information was used to validate what was collected from the farmers. It comprised of information on costs of vaccines/ drugs, price changes with and without TADs outbreaks, farmers' coping strategies in the

event of TADs outbreaks and opinions on TADs control methods.

In order to gain a deeper understanding of TADs, focus group discussions were conducted. These were arranged into two categories (community leaders, and herders only). In total six groups were conducted; three in Rakai district and three in Ntungamo. For each district, one group consisted of only community leaders and the other two groups consisted of herders only from at least two sub-counties where the research was conducted. Each group consisted of 8-10 people for easy management. There was at least one female in each group given that fewer females were involved in livestock keeping. General questions about TADs and how they could be controlled were asked to each group. The responses were recorded and non-verbal communication noted as well. Secondary data were obtained from various publications on livestock production including reports, newspapers, library sources, researchers, NGO's, documentaries, international and government publications such as FAO, MAAIF, Uganda Bureau of Statistics (UBOS), Ministry of Finance Planning and Economic Development (MFPED), internet and District Production Directorate for Rakai and Ntungamo. Data were analysed using Statistical Package for Social Scientists (SPSS) and STATA. Descriptive statistics, Cost Benefit Analysis (CBA) and Logit models were used to address the three objectives.

Research Application

The study findings showed that spraying and vaccination were the most commonly used methods of TADs control. The cost of spraying per animal was estimated at UGX 8,867 (US\$3.5) while that of vaccination was UGX 500 (US\$0.2) per animal per year. Using the cost benefit analysis, it was estimated that the total annual avoided losses per animal per farmer were 64% higher if TADs were controlled than if they were not controlled. Analysis of the factors affecting farmers' willingness to pay for TADs control showed that whereas high income earning farmers had a higher probability of paying for TADs control, low income earning farmers reported a lower probability to do so. The challenge is compromising with these farmers to agree on how to manage TADS. Although 60% of the farmers were willing to pay for TADs control, majority of those willing to pay had a bidding price of UGX 500 for Vaccination. The median willingness to pay for TADs control of UGX 500 could be primarily because most of the farmers did not have enough income to pay for those services. This was confirmed in the

analysis of the factors affecting the willingness to pay for TADs control where results showed that the probability of paying for TADs control increased with increasing farmers' annual income. Therefore, given that 60% of the farmers were willing to pay for the control of TADs, TADs control in Ntungamo and Rakai districts is economically viable.

Recommendation

In order to ensure effective TADs control, farmers should be encouraged to pay for TADs control because it is from the healthy animals that reasonable annual income is realised. Vaccination should be subsidized to encourage farmers' willingness to pay for TADs control. Farmers should also be sensitised about the importance of their payment towards TADs control as this boosts their output and hence their profits. Veterinary services delivery should be improved by making veterinary services more accessible to farmers through training.

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