A qualitative assessment of the risk of introducing Contagious Caprine Pleuropneumonia into Zambia from south-western Tanzania

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SUMMARY

A qualitative assessment of the risk of introducing Contagious Caprine Pleuropneumonia (CCPP) from the south-western Tanzania into Zambia was conducted between November and December 2012 in Mbozi and Kalambo districts in Tanzania and, Mbala and Nakonde districts in Zambia. The study wards and veterinary camps in the participating districts were purposively selected along the Tanzania-Zambia border. A semi-structured questionnaire was used to gather information pertaining to animal management and disease control from 108 farmers, 11 animal traders and 8 veterinary staff. Emergency preparedness plans for CCPP in Zambia were also evaluated. Cross border movement of animals was notable mainly in Kalambo and Mbala districts which bordered each other. It was reported by 35% of farmers that their animals were not inspected prior to movement despite existence of veterinary regulations. It was also evident that there were no CCPP emergency preparedness plans in Zambia. Review of published information indicated that CCPP was present in 15 regions in Tanzania. Based on study findings, the risk of introducing CCPP into Zambia was rated moderate, whereas the probability of having widespread outbreaks inside Zambia was low. Therefore, the widespread nature of CCPP in Tanzania and the moderate probability of the disease being introduced into Zambia call for the development of a regional CCPP control programme in order to contain the disease in Tanzania and avoid spread into other SADC countries.

Key words: CCPP - qualitative risk assessment - Tanzania - Zambia border

INTRODUCTION

Contagious Caprine Pleuropneumonia (CCPP) is a highly contagious respiratory disease of goats that causes huge losses in the goat industry. It is considered to be a disease of goats primarily, whereas infections in sheep are believed to be refractory (El Hassan et al, 1984). The incubation period of CCPP is commonly 6 to 10 days, but may be as long as 45 days. CCPP is caused by Mycoplasma capricolum subsp. capripneumoniae (Mccp). The organism is very fragile; it can only survive outside the host for 3 days in the tropics and up to 2 weeks in temperate lands and can remain viable for 10 years in frozen infected pleural fluid (OIE, 2009). The disease is characterised by fever (41-43°C), coughing, severe respiratory distress, abortion, and high morbidity and mortality rates in susceptible naïve populations.

The disease occurs in many African and Middle Eastern countries (Thiaucourt and Bölske, 1996). It was probably present in Tanzania since 1980s when there were reports of a fatal respiratory disease in goats in Arusha region (Msami *et al.*,

1998) Contagious Caprine Pleuropneumonia was finally confirmed in 1998 in a flock of goats in Dar es Salaam and since then, the disease been reported in Arusha, Dodoma, Dar es Salaam, Iringa, Kilimanjaro, Morogoro and Tanga regions (Kusiluka et al. 2000: Kusiluka et al. 2007: Noah et al, 2011). The rapid spread of CCPP since its confirmation in Tanzania is thought to be attributed to lack of effective disease control programmes, poor animal health service delivery, especially in the rural areas. uncontrolled animal movements and indiscriminate use of antimicrobials by farmers (Kusiluka et al, 2007).

In southern African countries, CCPP was reported in Angola in 2010 and Democratic Republic of Congo in 2008 and 2009 (WAHID, 2013). To date there is no record of the disease in Zambia (WAHID, 2013). However, the continued occurrence of CCPP outbreaks in Tanzania and especially so in the southern regions poses potential risk of introducing the disease into Mozambique, Malawi and Zambia (Kusiluka, 2002). This, therefore, called for the present study to conduct a qualitative assessment of the risk of introducing CCPP into Zambia and to evaluate the existing emergency preparedness measures.

MATERIALS AND METHODS

Study area

The study was conducted from November to December 2012 in Mbala and Nakonde districts in Zambia as well as Kalambo and Mbozi districts in Tanzania (Figure 1). The study area has a tropical climate, with the temperature ranging between 13°C and 29°C; average rainfall being 960 mm and average altitude of 1,500 m. The populations of small ruminants in Mbozi and Kalambo districts in Tanzania during the study were 89,377 and 105,410, respectively (MLFD, 2011). The number of goats and sheep in Mbala and Nakonde districts in Zambia were 21,010 and 13,723, respectively (MAL, 2011). A qualitative risk assessment of the introduction of CCPP into Zambia was carried out in wards (two in Kalambo and three in Mbozi districts) in Tanzania and veterinary camps (three in Mbala and two in Nakonde districts) in Zambia. The veterinary camps were the equivalent of the wards in Tanzania and represented one of the grass root government administrative structures above the village level. This study involved only the wards and veterinary camps along the Tanzania-Zambia border. The study areas were purposefully selected based on logistics and availability of veterinary staff.

Data collection

The qualitative risk assessment was based on data collected using a semi-structured questionnaire and in-depth interview of key respondents. A total of 108 small ruminant owners (41 in Mbala, 28 in Nakonde, 9 in Kalambo and 30 in Mbozi districts), who were purposively selected, were involved in the study. The study also involved eight purposefully selected veterinary personnel District comprising the Veterinary Officers. Veterinary Assistants. Zoosanitary Officers and Livestock Field Officers (two in Mbala, one in Nakonde, two in Kalambo and three in Mbozi) and 11 animal traders (six in Mbala and 5 in Kalambo districts). In Nakonde and Mbozi districts, no goat traders were interviewed as they were not available at the time of the study.

A semi-structured questionnaire survey was carried out to collect information from animal owners on animal rearing systems, forms of animal movement and, awareness about CCPP and veterinary regulations pertaining to animal movements.



Figure 1. A map showing location of the study districts of Kalambo, Mbozi, Mbala and Nakonde

For traders, the information gathered related to trading patterns of animals in 2011 and their awareness on CCPP and veterinary regulations pertaining to animal movements. The focus of the questionnaire for the veterinary personnel was on CCPP status and its control; the veterinary structure: staffing levels: livestock movements, especially across the border and, disease surveillance and reporting systems. The veterinary department reports were also used as sources of data on livestock population statistics. The World Animal Health Information Database (www.oie.int/wahis_2/public/wahid.php/W ahidhome/Home) and peer reviewed journals were used to get the status of CCPP in Tanzania.

Data analysis and interpretation

The gathered data was used to conduct a qualitative risk assessment based on OIE framework which relies on the principles of

release and exposure assessments as well as evaluation of the magnitude of the consequences (OIE, 2011). The overall risk was thereafter assessed as a function of the probability of a CCPP outbreak and the magnitude of the consequences of such an outbreak as described by Zepeda (1998). According to Zepeda (1998), a negligible risk implies that the probability of occurrence of the event is sufficiently low to be ignored, or the event is possible only in exceptional circumstances and it is low when the occurrence is a possibility in a minority of cases. A moderate risk indicates that the event is a possibility in the majority of cases and it is high when occurrence probable. the is The information gathered from veterinary personnel and veterinary departmental reports related to availability of CCPP control protocols at provincial, district and camp levels: staffing levels: disease surveillance and reporting system; and zoosanitary border control, was also used to assess the disease emergency preparedness in Mbala and Nakonde districts in Zambia.

RESULTS

Small ruminant grazing system and movements along Tanzania-Zambia border

The characteristics of flocks that participated in the study are summarized in Table 1. The majority of goat farmers (74%) in the study districts practiced communal grazing while tethering was practised 26% of the farmers only, mainly during the rainy season. Tethered animals were let loose to scavenge or communally grazed during the dry period often after crop harvests. During the dry season, some farmers (20%) took their animals for grazing along the Zambia-Tanzania border because of availability of pastures/fodders and water. It was further evident that the majority of farmers (61%) purchased animals for rearing from within their villages, and the rest sourced their animals from other villages (30.5%) or across the national borders (5.5%) (Figure 2). Purchase of animals for rearing across the border was apparent in Kalambo district in Tanzania and, to a small extent, in Mbala district in Zambia

Forty eight percent of the farmers reported to had sold their animals within their own villages. Others sold their animals outside their own villages (24%) or even across the national borders (18%). Movement of animals within and between villages and

elsewhere also took the form of payment of bride price. Payment of pride price in form of animals within villages was reported by 49% of the respondents. Those who paid pride price in form of goats/sheep across villages were 39% and 12% reported to have moved animals across the border. The number of goats and sheep transported from Tanzania into Zambia for trade in 2012, as reported by veterinary personnel at the borders, was 248. However, the cross border movement of small ruminants for trading or payment of bride price was apparent mainly in Mbozi and Kalambo districts and almost rare in the other study districts

The majority of farmers in Mbala (68%), Nakonde (64%), Kalambo (78%) and Mbozi (80%) districts were knowledgeable about the veterinary regulations regarding the transportation of livestock but only 8% were aware of CCPP. However, despite having the knowledge of veterinary regulations pertaining to movement of animals, 35% of the farmers indicated that their animals were not inspected and issued with stock movement permits by veterinary authorities prior to their movements to other areas. This was also confirmed by some of the veterinary personnel. Such practice of moving uninspected small ruminants was going on irrespective of the reported CCPP outbreaks in Tanzania (WAHID, 2013). Between 2005 and 2011, a total number of 127 outbreaks of CCPP were reported in Tanzania (Figure 3a and 3b).



Risk of introducing Contagious Caprine Pleuropneumonia in Zambia

Figure 2. Source and destination of sold goats in the study districts

Table 1. Flock characteristics and knowledge of CCPP as reported by farmers (n=108) in the study districts

Flock characteristics and knowledge of CCPP	Mbala n=41 Yes n (%)	Nakonde n=28 Yes n (%)	Kalambo n=9 Yes n (%)	Mbozi n=30 Yes n (%)	Average n=108 Yes n (%)
Communal grazing	27 (65.8)	15 (53.6)	9 (100)	23 (76.6)	80 (74.1)
Grazing at border	1(24)	1 (3.6)	5 (55.6)	5 (16.6)	22(20.3)
	1(2.4)	1(3.0)	5 (55.6)	10(62.2)	22 (20.3) 60 (62 0)
Sell goals	28 (08.3)	19 (67.9)	5 (55.6)	19 (03.3)	51 (47.2)
Pay bride price (goats)	23 (56.1)	18 (64.3)	5 (55.6)	4 (13.3)	51 (47.2)
Knowledge of CCPP	1 (2.4)	3 (10.7)	1 (11.1)	2 (6.6)	9 (8.3)
Knowledge on veterinary regulations	28 (68.3)	18 (64.3)	2 (22.2)	24 (80.0)	64 (59.3)



Figure 3a. Temporal pattern of CCPP outbreaks reported in Tanzania between 2005 and 2011 (Source: WAHID, 2013).

The results of release, exposure and scope consequence assessments of are summarized in Table 2. Briefly, the results show that there was a risk of CCPP being Zambia. introduced with into the probability rated as moderate. The probability of exposure of animals to CCPP was found to be moderate. However, the probability of having a widespread disease outbreaks and immense consequences in Zambia was generally low.

It was also evident that in Nakonde district, the office was manned by one District Veterinary Officer (DVO), one Livestock Officer (LO) and one Veterinary Assistant (VA). The district had nine veterinary camps, 5 of which were manned by VAs, and the remaining four (two of which bordered Tanzania) had no qualified staff. It was also apparent that there were no zoosanitary staff at two border posts of Nakonde and Kasesya in Zambia.

E.D. Karimuribo et al.



Figure 3b. Spatial distribution of CCPP outbreaks that occurred in different regions of Tanzania between 2005 and 2011 (Source: WAHID, 2013).

Assessment of the disease surveillance and reporting system revealed that LOs and VAs conducted routine passive disease surveillance for which they prepared and submitted monthly reports based on a prescribed format to the district office. The DVO compiled and submitted monthly quarterly and annual reports to the Provincial Veterinary Officer (PVO) with copies to the Chief Veterinary Officer, the Chief Veterinary Research Officer at the Central Veterinary Research Institute (CVRI). and the Chief Epidemiosurveillance Officer at the National Livestock Epidemiology and Information Centre (NALEIC). In cases of disease outbreaks, the VA/LOs reported to the DVOs who then filled and submitted information about the disease using prescribed forms that were then sent directly to NALEIC, with a copy to the PVO. However, it was also apparent there were no contingency plans for CCPP control at the camp, district and provincial levels.

Risk of introducing Contagious Caprine Pleuropneumonia in Zambia

Table 2. Risk levels for occurrence of CCPP in Zambia based on the descriptive scale and classification matrix (considering two factors at a time) designed by Zepeda (1998).

Event	Risk level	Combined risk
A. Release		
Prevalence	High	
Volume of trade in live goats/dowry	Moderate	Moderate
Grazing in border areas	Low	
B. Exposure		
Potential of transmission	Moderate	Moderate
Potential of spread within country	Moderate	
C. Probability of occurrence of hazard		
Probability of entry (A)	Moderate	Moderate
Probability of exposure (B)	Moderate	
D. Magnitude of consequences of hazard		
Public heath	Negligible	
Extent of dissemination of hazard	Low	Low
Economic effects	Low	
Overall Risk Estimate		
Probability of occurrence of hazard (C)	Moderate	Moderate
Magnitude of consequences of hazard (D)	Low	

DISCUSSION

Contagious caprine pleuropneumonia that has been reported in many north and east African countries (Thiaucourt and Bölske, 1996) was probably present in the northern part of Tanzania since the 1980s. The disease was finally confirmed in Dar es Salaam in 1998 (Msami et al. 1998). It has since spread to most regions, including the southern regions of Mbeya, Iringa, Ruvuma and Mtwara (WAHID, 2013) that border Zambia, Malawi and Mozambique. The widespread nature of CCPP in Tanzania is probably attributed to lack of efficient disease control programmes, poor animal health service delivery systems. uncontrolled animal movements and indiscriminate use of anti-microbials by farmers (Kusiluka 2002). The traditional animal rearing system that allows intermingling of animals during communal grazing and uncontrolled animal movements in form of trade or payment of pride price as also practiced in the study districts in both Tanzania and Zambia pose risks of spread of the disease into new areas.

It was also evident that there were crossborder movements of animals between Tanzania and Zambia, especially between Mbala district in Zambia and Kalambo in Tanzania and this was mostly due to trade and payments of bride price. In addition, there were no zoosanitary officers at the two border posts of Kasesya (in Mbala district) and Nakonde (in Nakonde district). It was also evident that to an appreciable extent 35% of farmers had their animals transported without being inspected by veterinary personnel and this despite the farmers and traders being aware of the requirements. This uncontrolled animal movement across the borders and the lack of zoosanitary personnel in some border posts in Zambia pose a potential risk of introducing the disease into Zambia. This

is further compounded by the observation that only 9% of the farmers were knowledgeable about CCPP and hence the majority would not be able to tell whether the animals they were transporting were infected by the disease. The risk of introduction of CCPP into Zambia was likely to be further facilitated by the lack of protocols for the control of CCPP at the veterinary camp, district or provincial offices and the inadequate or lack of staff in some of the veterinary camps, including the border posts. Indeed, the long term presence and widespread nature of CCPP in Tanzania create possibilities for the spread of the disease southward and possibly into Zambia as a result of uncontrolled cross-border movement of uninspected animals and intermingling of animals through communal grazing along the border.

The potential of spread of CCPP into Zambia is further exemplified by the results of the qualitative assessment that showed that the probability of this happening is moderate. However, the risk assessment also showed that the probability of CCPP assuming the status of widespread outbreaks was low. This is probably because goat/sheep keeping is not a primary source of livelihood in most rural communities in the study districts in Zambia and that movement of animals for trade or bride price payment is often within the same villages or veterinary camps. Thus, if the disease ever occurs in Zambia, is likely to be confined in affected the villages, with minimal chances of spreading into other localities.

In conclusion, the continued presence and widespread nature of CCPP in Tanzania including its south and western regions poses a serious risk of the disease crossing the borders into the countries in the south. This thus calls for regional concerted efforts to control this trans-boundary disease, which is often associated with immense economic losses to the resource poor small ruminant farmers. Tanzania and its regional partners thus need to develop joint efforts to contain and eventually to eradicate the disease.

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