Sustainability of Control of CBPP in Tanzania: a case study of Southern Highlands of Tanzania

S.W. Nong'ona[1] and L.J.M. Kusiluka[2]

[1]Ministry of Livestock and Fisheries, Veterinary Investigation Centre, Southern Highland zone P.O. Box 290 Iringa; [2]Mzumbe University, P.O. Box 1, Morogoro
Email: snongona@yahoo.com

SUMMARY

This paper presents preliminary results on the contribution of cattle keepers' efforts in Southern Highland Zone (SHZ) of Tanzania towards the control of Contagious Bovine Pleuropneumonia (CBPP), which re-emerged in 2011 after cessation of the Rollback Vaccination Programme (RBVP). The RBVP was implemented in the zone from 2003 to 2008. Following the re-emergence of the disease, vaccination campaigns were conducted and cattle keepers compliance ranged between 66% and 166.3%. The costs for the vaccination campaigns were covered by cattle keepers in their respective LGAs. Interviews of veterinarians, livestock officers and cattle keepers in these LGAs revealed that in the absence of a national-wide programme like RBVP, if cattle keepers are mobilized and well-coordinated, they can contribute resources that will complement Government efforts for sustainability of CBPP control in the country. Between 2011 and 2017 CBPP were recorded in the 13 LGAs of SHZ with highest number was recorded in 2015 especially in Mbarali district. Masamala slaughterhouse survey in Songea based on records indicated CBPP prevalence of 2.2%. With these results, CBPP is still a problem in SHZ and creation of awareness to livestock keepers on the disease coupled with vaccination can give good outcome on the control of the disease. Nevertheless, using the observations in the SHZ, consideration should be made to declare CBPP control a shared good between the Government and cattle owners.

Key words: CBPP, southern highlands zone, sustainable CBPP control, RBVP

INTRODUCTION

Contagious Bovine Pleuropneumonia (CBPP) is an acute, subacute or chronic mycoplasmal disease of *Bovidae* caused by *Mycoplasma mycoides* subsp. *mycoides*, (OIE 2008)**.** For the first time CBPP was introduced into Tanzania in 1916 and successfully eradicated in 1964.The disease re-appeared in Ngorongoro district in 1990 having being introduced from Kenya as a result of collapsed disease surveillance and control infrastructure (Kondela *et al.*, 1995; Rweyemamu and Benkirane, 1996) thereafter the disease spread throughout the country. Recent re-emergency of CBPP in Southern Highland Zone (SHZ) occurred two years after the end of rollback vaccination programme (RBVP) which was implemented for five years from 2003 to 2008 (Iringa report, 2013). New CBPP cases after RBVP were reported in 2011 from Sumbawanga district (Sumbawanga reports, 2011).

There are several CBPP control methods such as movement control, establishment of buffer zone (cordon sanitaire**),** slaughter

of the affected herds, and vaccination. The later has been shown to be very effective when coverage of the cattle vaccinated in the population of a country or region is almost 100% and maintained over successive 5 years (FAO, 1995). However, it is well-known that the CBPP vaccine provides only short-term immunity and is rarely effective in the face of severe outbreaks. Furthermore, mathematical modeling has shown that even mass vaccination campaigns over a five-year period is unlikely to achieve eradication unless other strategies are also used (Mariner and Catley, 2004).

Several factors have contributed the spread of CBPP in SHZ, such as uncontrolled movement of cattle from northern of Tanzania searching for pasture, invasion of grazing land by farmers for crop production and lack enforcement of legislations governing cattle movement (Msami *et al.*, 2001). On other hand, despite of declaration by the government that CBPP is public good, vaccination against CBPP was not successfully implemented due to lack of enough resources after the end of FAO support (Musisi *et al.*, 2004). Limited knowledge to some of cattle keepers on how to control CBPP has contributed to spread this disease to other areas in the country causing a great economic loss to cattle keepers (OIE, 1997; FAO, 2004; Makondo *et al.*, 2009).

Disease control in Tanzania is guided by the National Livestock Policy (2006) where the main objective on Transboundary Animal Diseases (TADS) is to control and eradicate them. The policy stipulates the resolve of the government to control and eradicate TADs in order to sustain the livestock industry and access to markets using her own resources and support from different regional and international funding agencies (Tanzania National Livestock Policy, 2006).

The CBPP vaccine used in Tanzania in early 1990s was the one containing T_1SR strain of *M. mycoides*; this vaccine was actually not effective in controlling outbreaks of CBPP. The ineffectiveness of this vaccine was recorded in Botswana despite of a well-managed CBPP vaccination campaign and well-handled vaccines (Masiga *et al.*, 1996). Later on T_1SR was replaced by the vaccine containing T1/44 that was used during RBVP in Tanzania and the whole East Africa (Rweyemamu *et al.*, 1999). This type of vaccine showed to be effective in protecting the animals against CBPP.

The concept of the RBVP was to vaccinate cattle from unaffected areas (areas at risk) to affected areas. The area which was at risk by that time was southern part of the country (south of the central railway line) while northern area was already affected. The RBVP was introduced after the failure of previous direct cost sharing vaccination programmes and experiencing non-compliance from cattle keepers in 1990s (Kusiluka and Sudi, 2003). RBVP aimed at systematically concentrating resources and efforts in specific zones with the objective of eliminating the disease in the SHZ.

For the purpose of implementing the RBVP, the country was subdivided into zones whereby cattle in each zone were supposed to be vaccinated three times in the first year followed by annual vaccination for another four years (FAO, 2004). Thereafter, the zone became a surveillance area with vaccinations only being carried out depending on the outcome of active disease search. The whole programme was financed by FAO in collaboration with the Government of United Republic of Tanzania (URT) which

was planned to extend RBVP to other zones.

According to active surveillance performed and abattoir reports conducted by the Ministry of Livestock and Fisheries Development in 2007 in all LGAs of SHZ at the end of the RBVP, it was observed that the programme had a positive impact, because in these areas there was no positive case or incidence report of CBPP. However the disease reoccurred again in 2011 in SHZ two years after the end of RBVP due to uncontrolled movement of cattle from other zones which were not implementing the programme especially Northern and Lake zone. The disease spread from Sumbawanga (Rukwa region) to Mbarali, Chunya, Songwe, Ludewa, Njombe, Iringa, Mufindi, and Kilolo LGAs in SHZ and since then spread of the disease has been increasing unchecked despite of trying to treat with antibiotics (FAO, 2007).

Cattle keepers continue to incur losses. Therefore, there is a need for the Government to encourage cattle keepers to start vaccinating their cattle using their own resources under coordination of the veterinary officers in LGAs in order to control and limit further spread of the disease. The purpose of this paper is to assess the sustainability of CBPP vaccination, assess the status of CBPP in SHZ and encourage cattle keepers to contribute towards the costs sharing of the CBPP vaccination campaigns.

MATERIALS AND METHODS

Study areas

The study was conducted in all 29 LGAs of Southern Highlands Zone in five regions (Iringa, Mbeya, Njombe, Songwe and Ruvuma). Of these, only eight LGAs had CBPP reports from 2011 to 2017 as shown in Figure 1.

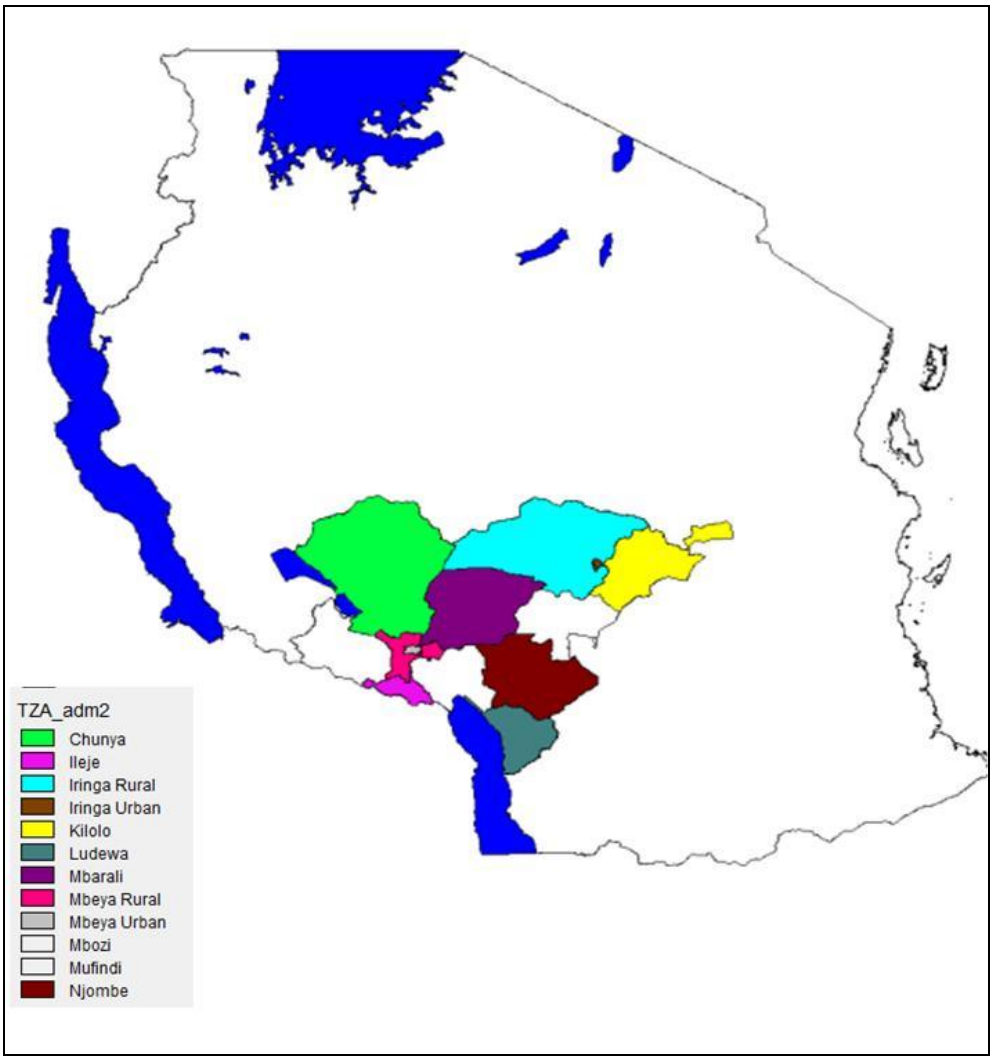

Figure 1: Map showing Southern Highland Zone Local Government Authorities. Source of information about CBPP

Data collection

Data were obtained from veterinarians, livestock officers and cattle keepers in LGAs which had reported frequent occurrences of CBPP cases. the LGAs where the data were collected include Iringa DC, Mufindi DC, Chunya DC, Songwe DC, Mbarali DC, Momba DC, Ludewa DC and Kilolo DC. The data were gathered through review of diseases reports and surveillance forms in SHZ that had been recorded between 2011 and 2017. Nevertheless, direct interviews was done to some livestock officers, veterinarians and cattle keepers to get more information on CBPP in their respective working stations.

Vaccination process

After noting that there are many death of cattle caused by CBPP in the zone the Ministry of livestock and Fisheries gave directives that all the cattle in the zone had to be vaccinated. The regional authorities through Zonal Livestock meetings agreed to mobilize and coordinate cattle keepers to start vaccination against CBPP by using their own sources. Livestock field officers and veterinarians were ready to effectively participate in the vaccination campaign in the SHZ.

Data analysis

The collected data were organized and summarized using Microsoft Excel® 2007 and analysed by Epi Info® version 7.2 (CDC, 2009) to establish the proportions (%). The variables analyzed were: number of cattle with clinical CBPP, number of cattle diagnosed to be CBPP positive during postmortem examination of carcasses at slaughter facilities and cattle vaccinated against CBPP.

RESULTS

The number of CBPP cases reported in various LGA in SHZ from 2011 to 2017 are summarized in Table 1. It was observed that a total of 2990 cases of CBPP were recorded in the 13 LGAs of SHZ during the seven years period (2011 - 2017). The trend of cases was increasing with years but the highest number was recorded in 2015. Mbarali DC recorded the highest number of cases (899) while Mafinga DC had the lowest (5).

Table1. Number of clinical CBPP cases reported in various LGA in SHZ from 2011 to 2017

SN	Region	Council	Year							Total
			2011	2012	2013	2014	2015	2016	2017	
1	Mbeya	Mbarali DC	0	0	47	26	487	192	147	899
2	Mbeya	Chunya DC	0	0	0	0	10	198	35	243
3	Mbeya	Mbeya DC	0	0	0	0	4	14	73	91
4	Mbeya	Rujewa DC	0	0	0	0	0	11	12	23
5	Songwe	Songwe DC	0	0	153	0	0	0	0	153
6	Njombe	Ludewa DC	0	0	0	0	798	109	69	976
7	Njombe	Njombe TC	0	0	0	0	8	0	0	8
8	Iringa	Iringa DC	0	0	0	0	46	124	16	186
9	Iringa	Iringa M	0	0	0	0	0	35	0	35
10	Iringa	Mafinga TC	0	0	0	0	0	5	0	5
11	Iringa	Mufindi DC	0	12	0	0	68	11	261	352
12	Iringa	Kilolo DC	0	0	0	0	0	13	0	13
13	Rukwa	Sumbawanga M	6	0	0	0	0	0	0	6
	Total		6	12	200	26	1421	712	613	2990

Number of CBPP cases diagnosed at Masamala slaughterhouse in Songea in 2011

Livestock markets in Songea in 2011 received cattle from Mbarali mainly during the operation of shifting cattle from Ihefu Basin. A total of 3,038 cattle were slaughtered at Masamala slaughterhouse during the seven months of 2011. Out of the slaughtered cattle, 66 (2.2%) were found to have lesions of CBPP. Most of the cattle that had CBPP lesions had originated from Mbarali DC. Table 2 has the details of slaughter cattle with CBPP pathological lesions at Masamala in 2011.

Table 2. Number of slaughter cattle with CBPP pathological lesions at Masamala in 2011

Month	No. of cattle slaughtered	No. of CBPP positive cases	Percent of positive cases	LGAs of origin
January	432	9	2.1	Mbarali, Songea
February	361	7	1.9	Mbarali
March	448	13	2.9	Mbarali
April	419	1	0.2	Songea
June	445	13	2.9	Mbarali, Njombe, Songea,
July	470	18	3.8	Mbarali, Njombe, Songea,
August	40	5	12.5	Mbarali, Songea
Total	3,038	66	2.2	

Number of cattle vaccinated against CBPP

In 2017, the cattle keepers were sensitized on the importance of vaccination and a total of 280,000 animals were vaccinated. This number is 66% of the target of 425,000 cattle as detailed in Table 3. Songwe DC and Iringa DC had the highest vaccination coverage which was beyond the targets.

Table 3: Number of cattle vaccinated against CBPP during 2017

Region	LGA	Target per LGA	Vaccinated cattle	Percentage (%)
Iringa	Mufindi	60,000	48,850	81.4
Iringa	Iringa DC	45,500	75,665	166.3
Songwe	Momba	50,000	20,505	41.0
Mbeya	Chunya	170,000	99,929	58.8
Mbeya	Mbarali	76,500	24,476	32.0
Songwe	Songwe	3,000	4,877	162.6
Iringa	Kilolo	10,000	2,500	25.0
Ruvuma	Mbinga	10,000	3,407	34.1
Total		**425,000**	**280,209**	**66**

DISCUSSION

Contagious bovine pleuropneumonia still is the disease of great importance as it causes high mortalities in cattle that affects the growth and performance of livestock development in Tanzania. The purpose of the current study was to assess the status of CBPP in SHZ and review the sustainability of control of the disease in Tanzania. It was generally found that during the period of seven years (2011 and 2017) CBPP were recorded in the 13 LGAs of SHZ with highest number was recorded in 2015 especially in Mbarali district. Masamala slaughterhouse survey in Songea based on records indicated CBPP prevalence of 2.2%. After sensitization the cattle keepers on importance of vaccination against CBPP, the compliance ranged between 66% and 166.3%. With these results, CBPP is still a problem in SHZ and creation of awareness to livestock keepers on the

disease coupled with vaccination can give good outcome on the control of the disease.

Historically, the RBVP was implemented by the government in SHZ from 2003 up to 2008 with support from FAO. During this period, CBPP was declared as public good whereby the government was expected to continue supporting cattle keepers in purchasing vaccines and coordinating vaccination campaigns. Currently private companies import vaccines and sell to veterinary centres from which they become available to livestock keepers through private veterinarians, paraprofessional and paraprofessional assistants for vaccination. Tanzania has permitted two private companies to import CBPP vaccine on behalf of the government which sell direct to farmers.

During the vaccination, it was revealed that vaccine from private companies which were importing on behalf of the government was very expensive when compared with other private companies which were not among those importing the vaccine through the government permission. The price offered by these companies was almost three times the price of companies which were not in this programme although vaccine had the same origin, batch number and the same contents. This showed that the companies were aiming at making big profit from cattle keepers. Availability of CBPP vaccine in the SHZ for now is coordinated by VIC-Iringa and purchased by LGAs. In one of its zonal Livestock and Fisheries Meetings (2016) it was agreed that vaccination had to be done at a cost that ranges between TZS 700= and 1000= per cattle depending on the local agreement in the particular LGA or support from other partners. For example, in Mufindi DC, the East African Dairy Development (EADD) Non-Governmental Organization (NGO), which deals with development of dairy cattle in the zone contributed some amount of money to buy vaccines and therefore, the price of vaccination went down to TZS 700/= , however, in other LGAs was vaccinated at TZS1000/= per cattle. Iringa DC combined vaccination of cattle against CBPP with national identification campaign and they managed brand 117,946 and vaccinate 75,665 cattle. These two activities were undertaken simultaneously and were successfully done. At the moment where Tanzania government does not support cattle keepers to meet the cost of buying the CBPP vaccine and vaccination campaigns as it was in RBVP, more pressure is required for LGAs to allocate funds for CBPP and other diseases which controlled by vaccination during their annual budget.

As it was noted above, RBVP was expected to be extended to other zones in order to completely eradicate the disease in the country; unfortunately it was not achieved due to lack of resources to sustain the plan. Cattle keepers in SHZ LGAs affected with CBPP would not let their cattle dying of the disease without taking control measures, that's why they decided to start vaccinating their cattle by using their own resources. This campaign would be fruitful if the whole country decides to implement as it was planned by government in RBVP.

Nevertheless, vaccination programs have been difficult to implement in many pastoral communities in Africa partly because of wide infected area, limited resources, failure of herdsmen to present the whole herd for vaccination or repeat the vaccination as required, and their refusal to continue vaccination following vaccination reactions (Melewas 1999; Kitalyi 2005). The highly challenged vaccination programs have resulted in spots of

unvaccinated animals and more virulent field strains that have been potential sources of frequent outbreaks. Unfortunately, these outbreaks are loosely handled leading to more wide spread of infections from apparently healthy animals.

Uncontrolled cattle movement in search of water and pasture contributes significantly to the eruption and spread of the disease from an apparent healthy herd (Ocaido *et al.*, 2009). During the current study, it has been established that CBPP was introduced in Songea from Mbarali district in Mbeya where the disease was endemic. The slaughterhouse prevalence of CBPP that was recorded in 2011 was 2.2% and most of the animals that were infected had the history of originating from Mbarali district. CBPP has been an endemic problem in Ihefu Basin and has the history of causing frequent mortalities in cattle.

It was observed that a total of 2,990 cases of CBPP were recorded in the 13 LGAs of SHZ during the seven years period (2011 - 2017). The results indicated that the trend of CBPP cases was increasing with years with the highest number of CBPP cases being recorded in Mbarali district. However, the disease is all over the areas in SHZ and studies also report the same in other places of the Tanzania (Msami et al., 2001; Malago and Mlay, 2013). This shows that the disease is still endemic in the SHZ and calls for immediate intervention on the control measures.

The detection of CBPP in this slaughterhouse signifies presence of the disease in several places in the SHZ. Hence the spread of CBPP at the moment could be wider than expected. There is therefore, a need to make a close follow up on the epidemiology of the disease in the SHZ to assess its prevalence. Generally, slaughter facilities provides useful information regarding the diseases surveillance as it was observed at Masamala slaughterhouse. The CBPP prevalence of 2.2% may also have been underestimated because of diagnosis of diseases and conditions based on gross pathology has low sensitivity, so that some conditions are likely to be missed at routine meat inspection. The prevalence may also have been underestimated because of generally poor record keeping. Therefore, effective extension, implementation and periodic review of routine livestock disease surveillance systems, including an effective trace-back system, are recommended. This will help to reduce the burden of diseases in animals.

From the findings of this study, it is concluded that although CBPP is public good; its control should be shared between the government and cattle owners involving local leaders in all stages during planning to make it sustainable. Political leaders' involvement should accompany with educating cattle owners about disease effects on production and animal products trade activities. In the view of the findings of this study, it is recommended that the government needs to commit more funds to support the Tanzania Veterinary Laboratory Agency (TVLA) for production of CBPP vaccine, disease monitoring, surveillance and vaccination campaigns similar to RVBP in order to eradicate the CBPP in LGAs. Emphasis should be on provision of education to cattle keepers on the importance CBPP control in the country and extend the implementation coverage to control the CBPP country wide. The seasonal movement of cattle from central and northern parts of Tanzania to SHZ should be controlled in all LGAs according to the regulations. Strengthening the Livestock Development Funds (LDF) in LGAs can enhance the disease control especially transboundary diseases like

CBPP and close collaboration with National Parks (TANAPA) in SHZ as wild ruminants have close association with CBPP spread in cattle. There is a need for a stronger link between local government and central government authorities in veterinary services delivery to foster the monitoring and surveillance of the disease which would provide information on the effectiveness of the control campaign.

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