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PERCEPTIONS ON MALIGNANT CATARRHAL FEVER (MCF) BY FARMERS CLOSE TO RHODES MATOPOS NATIONAL PARK, ZIMBABWE

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ABSTRACT

Malignant Catarrhal Fever (MCF) is a regularly sporadic disease of cattle in farms where there is contact between cattle and wildebeests. A study was conducted in smallholder and commercial farms close to Matopos National Park with the aim to determine farmer perceptions on the importance, possible transmission and control of MCF. Information was obtained from eight (8) commercial farms and ninety seven (97) smallholder farms using a semi structured questionnaire. The smallholder sector comprised of three (3) villages (Nyumbane, Manzana and Tshonaphansi). Malignant catarrhal fever, Quarter evil, Lumpy skin disease, Heartwater, Botulism and Helminthiasis were perceived to be the most important diseases in both sectors. Quarter evil and Lumpy skin disease were rated as major causes of cattle losses in Manzana and Nyumbane villages. Overall, MCF was rated as the most important disease at Tshonaphansi village and the commercial farms but second to Quarter evil in the smallholder sector. Perceptions by farmers in the commercial sector on importance, transmission, clinical signs and control of MCF were relatively accurate compared to that of the smallholder farmers. Farmers from both sectors do not treat clinical cases but instead slaughter the animals for domestic consumption. There was consistency on the perception of the seasonality of MCF occurrence and association of its occurrence with the calving season of wildebeests in both the smallholder and commercial sectors. It is therefore concluded that the farmers' perception on the importance, transmission and control depend on the type of farming sector and season.

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INTRODUCTION

Cattle play a vital role for the most of the communities in Zimbabwe through provision of meat, milk, manure and draught power (Moyo *et al.*, 2014; Masuku *et al.*, 2015). However, diseases undermine and limit cattle productivity. One of the diseases which affect cattle productivity in communities proximal to the national parks is malignant catarrhal fever (MCF). This is a lethal viral diseases of cattle caused by, Alcelaphine herpesvirus I (AIHV-1), which is excreted by blue and black wildebeest calves (*Connochaetes taurinus* and *C. gnou*) in the three months following the brief annual calving period (Lankester *et al.*, 2015).

Proximity to the wildebeest is only a risk to cattle for a specific and limited period annually in the community around RMNP (Mlilo *et al.*, 2015). The occurrence of MCF has been seen to follow a seasonal pattern with cases reported between February and May coinciding with the calving season of wildebeests (Mlilo *et al.*, 2015). The disease is believed to be transmitted by wildebeest calves below the age of four months. According to Honiball *et al.* (2008), wildebeests above four months of age would have developed the neutralizing antibodies making them unable to transmit the infective virus. There is no transmission of the disease between cattle since the virus shed by cattle is not infective (Swai *et al.*, 2013). Malignant catarrhal fever is characterized by high fever, profuse mucopurulent discharges, bilateral corneal opacity and ophthalmia that begins at the corneoscleral

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junction and progress inward (Hill *et al.*, 2014). The nozzle and nostrils are usually encrusted, causing laboured breathing and salivation. The inside of the mouth is often reddened and with erosions and ulcers. Sometimes diarrhoea with or without blood might occur. Furthermore, it is manifested by generalized lymphadenopathy and leukopenia. Lankester *et al.* (2015); O' Toole and Li (2015), reported that central nervous system signs including hyperesthesia, incoordination, disorientation, tremours, nystagmus or head pressing. Malignant catarrhal fever outbreaks cause large financial losses for cattle farmers (Lankester *et al.*, 2015) hence cause land use conflicts between farmers and national parks at wildlife-livestock interfaces. Livestock farmers would want wildebeests eliminated yet the practice is contrary to the wildlife conservation authorities' policy, making the elimination of carrier species difficult, (Bedelian, 2004). Farmers generally rely on the segregation of carrier from susceptible species (Reid and Van Vuuren, 2004).

However, this practice has faced some challenges as national parks boundary fences are no longer intact making the interaction of wildlife and livestock in search of grazing areas and water sources inevitable (Goldman, 2007; Essen and Du Toit, 2008). Unavailability of vaccine to protect animals has also compounded the problem (Russell, 2012). This disease is one of the high impact diseases in cattle rearing areas proximal to the national parks where wildebeests are found (Li *et al.*, 2008). Exact transmission of the diseases is poorly understood with different perceptions existing among stakeholders (Honiball *et al.*, 2008 and Swai *et al.*, 2013). This has made it very difficult for both scientists and ordinary farmers to come up with comprehensive and conclusive technical strategies to mitigate the prevalence of the disease in hot spots areas. This study therefore seek to assess perceptions on the importance, transmission, clinical signs and employed control measures used by farmers around RMNP.

MATERIALS AND METHODS

Study site

The study was carried out in farm settlements around Rhodes Matopos National Park (RMNP) in Matobo district, Matabeleland South of Zimbabwe. Rhodes Matopos National Park is situated about 30 km south of Bulawayo along the Bulawayo – Kezi road at the longitude 28° 30' East, latitude of 20° 23' South at altitude of 1340m (Assan, 2012). The area is found in Natural Region IV of Zimbabwe where extensive livestock rearing and wildlife are the best land use option for optimum agricultural returns (Sukume *et al.*, 2000). Annual rainfall ranges from 450 to 650mm, erratic and characterised by mid-season droughts. Loamy sands and clays are the dominant soil types with spaces of rock out crops. The bulk of the area is unfit for cultivation of crop because of the presence of very big rocks (Moore *et al.*, 2009). The dominant tree species include the *Acacia* and *Terminalia species* while the dominant grasses are the *Hyparrhenia*, *Heteropogon* and *Bothriochloa* species. There is a variety favourable habitats for different wildlife species e.g. trees, mountains, grassland plains, rivers and dams (Mlilo *et al.*, 2015). Some of the wildlife species found at RMNP include the black and white rhino, impalas, kudus, giraffes, water bucks, leopards,

monkeys, baboons, and wildebeests, with the primates (baboons and monkeys) and wildebeests as the most dominant wildlife species. The national park is surrounded by the communal, resettlement and the commercial farming areas. Due to scarcity of water and grazing in the communal areas, livestock usually stray into the national park and mix with wildlife.

Sampling and data collection

Sampling was done to be representative to all the three farming systems. A purposive sampling was done in selecting wards and farms. Selection of study villages was done with the help of the local Veterinary officials stationed at Matopos Research Station Animal Health and Management Centre. Nyumbane village of Mkhokha ward was used to represent the communal area while Boomer Rang resettlement area's two villages Tshonaphansi and Manzana represented the A1 resettlement area. The commercial farms sharing physical boundaries with Rhodes Matopos National Park were all used in the study.

Only villagers who own cattle were interviewed. A mixed design was used to collect the data in the study. A simple random method was used in the traditional communal area to reduce bias and all farmers were interviewed. A census was done in the A1 resettlement and commercial areas due to the small number of cattle owners in these areas. A total of 97 cattle owners in the smallholder sector were used, of which 59 of them were from the traditional communal area (50% of households in the village) and 38 (100%) from the A1 resettlement area. The total number of commercial farms used in the study was 8. The semi structured questionnaires were used to obtain data from these farmers. Data collected include demographics, socio-economic characteristics of the households, livestock inventory, and local farmers' perceptions on the importance, transmission and control of MCF.

Data analysis

Statistical Package for Social Sciences (SPSS) version 21 was used in analyzing the data. Descriptive analysis tools (frequencies, cross tabulations, compare means) in SPSS were used to tabulate the different relevant statistics for the report.

RESULTS

Demographic structure

The survey conducted in the smallholder farming area showed that the majority (81.3 %) of the households were male headed and were of ages of above 50 years (75.3 %). The majority of them were married (76.5 %) with most having been resident in the area for more than 20 years (43.6%). Most of these had not gone beyond the primary level of education (47.4 %). Family sizes ranged from 2 to 13 and the majority of these had a household size of 5 (22.7%). In the commercial area all (100 %) of the respondents were farm managers of which the majority of them (62.5 %) were holders of Diplomas while the rest (37.5 %) held National Certificates in Agriculture.

Cattle ownership and losses

In the smallholder sector the number of cattle per household ranged from 4 to 43 with an average of 13, while in the commercial sector it ranged from 58 to 698 with a mean of 310 cattle per farm. The majority of the smallholder farmers were keeping cattle for draft power as their first priority (74.2 %), milk as their second priority (40.2 %) and manure as their third priority (34 %). In the commercial sector, most of the farms (75 %) kept cattle for sale while others (25 %) kept them for both sales and research purposes. Two major causes of animal losses in the order of importance for both the commercial and the smallholder sectors were diseases (42.1 %) and predators (22.7 %) respectively.

Starvation (17.1 %) and thefts (18.8 %) were rated as the third in smallholder and commercial sector respectively. The main cattle predators in the both farming sectors were leopards and hyenas. Most of the farmers were affected by leopards (50.4 %) in the smallholder and 40 % in the commercial sector. Hyenas affected 32.3 % and 40 % of the smallholder and commercial sector farmers respectively. The rest of the farmers did not experience any cattle losses due to predators (17.3 %). The classes of cattle affected in both sectors were mostly calves (51.8 %) and young adults i.e. heifers/ steers (30.5 %). The majority of the respondents graze their cattle in the communal grazing lands (60.8%) while others graze theirs either in both in the communal grazing lands and at the national parks (26.8 %) or in the national park exclusively (12.4 %). Their livestock get water from the rivers (37.1 %) dams (35.1 %) and vleis (10.3 %).

Farmers from both sectors reported cattle losses due to MCF (44.2 % in the smallholder and 85.7 % in the commercial sectors). In the smallholder sector, Tshonaphansi village had the most farmers (83.3%) who lost the cattle due to MCF during the periods 2012 to 2014. A total of 57 and 125 cattle were reported to have been lost by farmers in the smallholder sector and commercial sector respectively during the same period.

Farmers' knowledge about MCF

The majority of the respondents (61.9 %) were aware of the diseases and pests transmissible between wildlife and livestock. Those include rabies, malignant catarrhal fever, foot and mouth disease, anthrax, ticks and theileriosis. The most commonly known were MCF (47.5 %), ticks (23 %) and rabies (13.1 %). Almost all of the respondents (93.8 %) in the smallholder sector were able to identify the wildebeest from the picture though most of them (63.9 %) were not aware of a disease that it transmits to cattle. Among those who were not aware of this disease, some of them (16 %) were able to recall having witnessed the disease after its clinical signs were described. The majority (96.9 %) of the respondents could not state the common name of the disease but named the disease in vernacular (Ndebele) using description of their clinical signs and the disease reservoir. The names used were *Umkhuhlane wamehlo* (diseases of the eyes) (34.2 %), *Umkhuhlane wenkonkoni* (Wildebeest disease) (26.5 %) and *Ubuphofu benkonkoni* (Wildebeest blindness) (2.9 %). The disease was perceived to be most prevalent in February (25.7 %), April (20 %), and November (14.3 %).

Table 1. Perception on the order of importance of MCF and other diseases in the commercial and smallholder sectors

Nyumbane	Manzana	Tshonaphansi	Smallholder (Overall)	Commercial
1. QE (84.7 %)	1. QE (62.8 %)	1. MCF (71.4 %)	1. QE (67 %)	1. MCF (42.9 %)
2. LSD (62 %)	2. LSD (23.1 %)	2. QE (84.2 %)	2. MCF (17.5 %)	2. LSD (40 %)
3. Helminthes (56 %)	3. Botulism (25 %)	3. Heartwater (50 %)	3. LSD (12.4 %)	3. Helminthes (50 %)

Table 2. Perception of clinical signs of MCF in the smallholder and commercial sector

Perceived clinical signs	Smallholder	Commercial
Blindness	38.7 %	30.8 %
Nasal discharges	0.0	15.4 %
Difficult breathing	27.4 %	38.5 %
Nervous signs	0.0 %	7.7 %
Dry cracking muzzle	19.4 %	7.6 %
Ocular discharges	14.5 %	0.0 %

Table 3. Perceptions on modes of transmission of MCF by commercial and smallholder farmers around Rhodes Matopos National Park

Perceived mode of transmission	Smallholder sector	Commercial
Sharing grazing with wildebeests	39 %	0.0
Contact with wildebeest afterbirth	30 %	53.3 %
Contact wildebeest calves saliva	16.7 %	0.0
Aerosol at the wildebeest calving site	7.1 %	38.4 %
Eating bones of dead wildebeests	4.8 %	0.0 %
Ticks	2.4 %	0.0 %
Insect bites	0.0 %	8.3 %

Table 4. MCF control practices implemented by the farmers around Matopos National Park and their suggestions on improvement

Practiced	Smallholder	Commercial	Suggested	Smallholder Area	Commercial area
Nothing	78.9 %	16.7 %	Fencing of the park	59.4 %	57.1 %
Avoidance	7.9 %	66.6 %	Farmer education	9.3 %	0.0 %
Fencing	13.2 %	16.7 %	Provision of vaccines	20.6 %	0.0 %
			Avoidance	6.2 %	28.6 %
			Relocating the wildebeests	4.5 %	0.0 %
			Introduction of legislative control	0.0 %	14.3 %

Perception on the importance of MCF

Malignant catarrhal fever, quarter evil (QE), lumpy skin disease (LSD), heart water, botulism and helminthiasis were perceived to be among the three most important diseases in both sectors (Table 1).

Perceptions on clinical signs of MCF

Farmers from both sectors identified blindness, difficulty in breathing, dryness and cracking of the muzzle as the clinical signs of MCF (Table 2).

Perceptions on transmission of MCF

There were different responses on how the smallholder and commercial sector perceived the mode of disease transmission though both believed that the transmission of the disease to cattle has something to do with wildebeest calving (Table 3)

Action taken to treat clinical MCF cases

The majority of the respondents (51 %) claimed they had no idea on how the animals suffering from the disease should be treated. However, 35 % of them knew that there is no treatment for the disease while 12 % claimed to have tried using the antibiotics such as Hi-Tet 120 (Tetracycline) though it failed to cure the animals. Only 2 % of farmers claimed to have used traditional medicine to treat eyes i.e. *Albizia antunensiana* (Umnonjwana) and *Synedenum cupulare* (Umdlebe).

Practiced and suggested control measures

Almost the entire population (95.7 %) interviewed claimed they have not received any teachings from the Department of Veterinary Services about the disease. Those that got advice from the Veterinary Services (4.3 %) claimed they were advised to avoid grazing cattle in the wildebeest grazing areas. In instances where their cattle mixed with the wildebeest, cattle would have strayed into national park (47.4 %) or wildebeests would have invaded their grazing areas (21.1 %). However some farmers (10.3 %) indicated that their cattle did not mix with wildebeest at all because of the distance. There were variations in the practiced and suggested control MCF measures in the smallholder and commercial sectors (Table 4).

DISCUSSION

Malignant catarrhal fever was rated the most important disease at Tshonaphansi village and commercial farms. These results are similar to the findings by Cleaveland *et al.* (2001) at Ngorongoro district in Tanzania where the disease was ranked among the five most important diseases of cattle in the area as it contributed much in cattle losses. These areas are located relatively closer to wildebeest grazing plains compared other villages (Manzana and Nyumbane). According to Li *et al.* (2008), distance between the hosts and the susceptible animals has an effect on MCF incidences. In sheep derived MCF, virus is similar to that of the wildebeest derived MCF, distance between cattle and sheep was noted to have an effect on cattle

mortality rates (Rwambo *et al.*, 1999). Cattle and sheep were grazed at 1.6m, 4.2m and 5.1m apart, mortality rates of 17.7 %, 6.1% and 0.43 % respectively were recorded (Li *et al.*, 2008).

There was consistency in the belief that the transmission MCF is associated with the wildebeest calving in both farming sectors. This is being supported by the fact that they believed the virus was from the afterbirths and saliva of wildebeest calves. This agrees with the findings by Honiball *et al.* (2008), Cleaveland *et al.* (2001) and Rwambo *et al.* (1999) who reported that the afterbirth, foetal fluids and hair from the moulting wildebeest calves were believed to transmit the disease among the East African Masaai herders, of Kenya and Tanzania. Other believed sources of transmission were insects and ticks involvement, nasal secretions and eating of dead wildebeests bones. Thomson *et al.* (1999) and Honiball *et al.* (2008), however dismiss the possibility of ticks and afterbirth as sources of viral transmission following the results of a study where the virus was not isolated in ticks, afterbirths and foetal fluids of MCF infected wildebeest cows. The virus was however isolated in the wildebeest calves' nasal secretions making aerosol transmission by young calves the likely mode of transmission.

The involvement of flies has not been totally ruled out because of the isolation of the virus in the nasal and ocular fluids. The flies that are believed to be involved are the wildest blowfly (*Oestrus spp.*) and *Gedoelestia spp.* According to DuToit, (1991), the *Oestrus* completes part of its cycle in the perinasal cavity of wildebeests while the *Gedoelestia* does so in the cornea of the eye. Therefore there is possibility of mechanical transmission taking place basing on these facts but there is need for further investigation (Honiball *et al.*, 2008). Farmers from Tshonaphansi village and the commercial sector were able to describe the clinical signs more accurately compared to those at from Manzana and Nyumbane villages. This could have been attributed to more exposure to the cases of the disease as they were located relatively closer to the game park. This is also supported by the fact that almost all the farmers in both sectors claimed they have not received any teaching from the veterinary services about the disease. This is however contrary to the findings in Ngorongoro among the Masaai communities, (Cleaveland *et al.* (2001) where farmers who were from the least risk areas could fairly describe the clinical signs like those in the most risky areas.

The most common clinical signs that were mentioned by farmers from both sectors in were blindness, difficulty in breathing, nasal discharges and crusted muzzles. The description of MCF clinical signs by farmers close to Rhodes Matopos National Park were consistent to that of the Masaai people of Ngorongoro Conservation Area as blindness, difficulty in breathing and lacrimation were the most evident clinical signs seen in cattle suffering from MCF (Cleaveland, 2001). Farmers from both sectors did not use any commercial drugs to treat the cattle showing clinical signs as they are quite aware that the disease does not respond to treatment but instead resorted to slaughtering the animals for consumption. This is consistent with what is practiced by the Masaai in Kenya and Tanzania who slaughter and sell at half the normal price (Cleaveland *et al.*, 2001).

However, some few farmers claimed to have used traditional medicine such as *A. antunensiana* (Umnonjwana) and *S. cupulare* (Umdlebe). The use of traditional medicine is believed to be ineffective by most of the farmers as supported by Cleaveland *et al.* (2001), where some pastoralists at Ngorongoro revealed that though use of traditional medicine was practiced, cattle continued to die.

Farmers from both the smallholder and commercial sectors used the avoidance method as sometimes grazed cattle away from the park while the commercial farms use paddocks that are rarely reached by the wildebeest. This is consistent with the practice used by the Masaai pastoralists (Bedelian, 2004; Cleaveland *et al.*, 2001). Farmers close to the game park generally blame the Zimbabwe Parks and Wildlife Management Authority (ZWPA) for not erecting strong fences to prevent wildebeests from straying into their farms. This perception is also shared with the pastoralists at Kitengela Wildlife Dispersal area, Kenya who also feel that the Kenyan government is to blame for their cattle losses as a result of MCF as it is failing to maintain game fences (Bedelian, 2004). According to Honiball *et al.* (2008), fencing of the park for the purposes of MCF control may not be feasible due to its costs since it may require two fences that are at least 1000 metres apart as transmission has been reported in distances of 800 metres (Honiball *et al.*, 2008).

Conclusion

The study revealed that MCF is perceived to be most important killer cattle disease in the commercial and rated second from quarter evil in the smallholder farming sector around Rhodes Matopos national park, Zimbabwe. Farmers from the commercial sector and villages relatively closer to the game park could describe clinical signs of MCF more accurately than those from distal village due to exposure to cases. The transmission of MCF is believed to be associated with the calving of wildebeests and their foetal membranes are believed to be the source of infection from both farming sectors. Farmers from both farming sectors are quite aware that there is no treatment for clinical MCF cases and therefore feel the government has the obligation to provide the vaccine and erect game fences that keep wildebeests and cattle away from each other in order to reduce MCF incidences in their cattle.

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Conflicts of interest

Authors declare that they have no conflict of interest.

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