

Full Length Research Paper

# Alternative remedies and approaches used by resources-challenged farmers in the management of cattle black-leg disease in Umzingwane district, Matabeleland South, Zimbabwe

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Received December 13, 2013; Accepted April 28, 2014

Cattle productivity has been minimized by the occurrence of diseases such as blackleg. This study was conducted to determine and document how resource-challenged farmers of Umzingwane district of Zimbabwe use alternative remedies to manage cattle blackleg cases. Random sampling was used to select 90 beef cattle farmers who were interviewed using a structured questionnaire. Results of the study revealed that cattle owners (86%) reported blackleg disease to be the most important disease followed by ehrlichiosis (23%) and lumpy skin disease (5%). Almost 71% of the respondents reported having experienced cases of blackleg in their herd in the past three years. Few farmers (22%) used conventional vaccines, whereas the majority (78%) used alternative remedies to manage the disease, which included; hot water (80%), hot iron (78%), Potassium permanganate (10%), *Ihlwili* (60%), *Ricinis communis* (5%), *Pterocarpus angolensis* (7%), *Sclerocarya birrea* (8%), *Diospyros mespiliformis* (3%), *Gardenia spatulifolia* (2%). Some of these remedies (*P. angolensis*, *S. birrea*, *D. mespiliformis*, *G. spatulifolia*) were believed to prevent the occurrence of the diseases, while hot water and hot iron were used for treatment of infected animals. The study revealed that most resource-challenged farmers in Umzingwane district of Zimbabwe used alternative remedies to manage blackleg infections in cattle.

**Key words:** Alternative remedies, blackleg, cattle, *Clostridium chauvoei*

## INTRODUCTION

In Zimbabwe, cattle play an important role in the livestock industry through provision of meat, milk, manure and raw materials for the processing industries (Neumann et al.,

2002). Despite its importance, cattle production is failing the local beef market demand (Chawatama et al., 2005). The demand for beef is on the rise throughout the world,

especially in developing countries due to increased human population and growth in income. To meet this demand, there is need to improve the productivity of cattle, which is relatively low at the moment (Neumann et al., 2002). Regardless of other positive attributes, the productivity of cattle in many tropical countries is low and has been related to diseases, nutrition, genotype and management (Neumann et al., 2002). Diseases such as blackleg and tick-borne are the most endemic in Zimbabwe (Chatikobo et al., 2013). Blackleg (Black quarter, Quarter evil) is a disease affecting cattle and other ruminants and it is caused by the bacteria *Clostridium chauvoei*. Infective spores of *C. chauvoei* were ingested during grazing lodge in the gastrointestinal tract, livers and spleens of healthy cattle and remain latent until their germination is triggered by punctured wounds or injury to muscles (Useh et al., 2010). During the multiplication of *C. chauvoei* in the anaerobic environment they produce lethal toxin which contains hyaluronidases, deoxyribonucleases and oxygen labile hemolysins (Moussa, 1958). The toxins affect the muscles, cause congestion, haemorrhagic and degenerative lesions in the liver and kidneys. In addition, the toxins cause the destruction of leucocytes and platelets (Useh et al., 2003).

According to Scoones (1992), cattle production by resource-challenged farmers is associated with sub-optimal management of diseases and parasites. This is attributed to a low income base to purchase drugs and vaccines. In addition, resource-challenged farmers have limited knowledge on the use and handling of drugs and vaccines. Ideally cattle diseases are controlled using commercial remedies; however, these are expensive, out of reach for resource-challenged farmers because of distance and the unwanted residual effects of drugs in meat (Ndhlovu and Masika, 2013).

In addition, inefficient veterinary service delivery systems due to inadequate staffing, force farmers to resort to the use of alternative remedies and approaches in the management of cattle diseases such as blackleg. There is therefore a need to determine, document and validate the alternative remedies that resource-challenged farmers use to manage blackleg within their cattle herds. Alternative remedies are reportedly cheap, locally available and culturally acceptable in communities (Lans et al., 2008).

However, there is little, if any documentation of the different alternative remedies that resource-challenged farmers use to manage blackleg in the Matabeleland South Province of Zimbabwe. Hence the objective of this study was to determine and document the various alternative remedies that resource-challenged farmers use to control and manage blackleg in their cattle herds.

## MATERIALS AND METHODS

### Study site

A baseline questionnaire survey was conducted in two villages Nswazi (20° 49'46.67" S and 28° 57'46.22" E; Elevation 926 m above sea level) and Dula (20° 37'26.99" S and 28° 48'52.28" E; Elevation 1196 m) in Umzingwane district which is in Matabeleland South Province of Zimbabwe. This area is characterised by rainfall which is received during spring to summer (November to March) (300 to 500 mm/annum). The average summer minimum temperatures range from 19 to 23°C and the maximum range is 28 to 31°C. In winter, the average minimum temperature is 7°C while the maximum temperature is 21°C.

### Sampling procedure

Stratified random sampling technique was used to select 90 households that were to be interviewed. The households were chosen by the researcher with the help of the local extension officers. Umzingwane district was stratified into wards and villages from which whence households were randomly selected. Two wards (ward 7 and ward 12) were selected at random and from each of these wards, four villages, Sibambene, Thandabantu, Dula and Mazhowe were subsequently selected randomly. The four chosen villages had significant number of households rearing cattle. Inclusion of farmers (both male and female) in the survey was on condition that they owned cattle.

### Data collection

A total of 90 structured questionnaires were administered to 90 randomly selected cattle owners from the four villages during the month of August 2012. Informal and formal interviews were conducted with 28 and 26 farmers in Nswazi and Dula area respectively, and four key informants from each village were also interviewed. The key informants were; the village head, councilors and two herbalists. The data collected from cattle farmers included; household demography, livestock inventory, role of cattle, occurrence of blackleg, perceived challenges caused by blackleg and blackleg disease management practices. Further data on blackleg disease management practices included the types, preparations and applications of remedies used to treat and prevent the occurrence of blackleg disease in cattle.

### Statistical analysis

The collected data were analysed using the Statistical Package for the Social Sciences (SPSS, 2010). Descriptive statistics and cross tabulation were computed.

## RESULTS

### Household demographics

Many households heads (69.3%; n=90) were over 56

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years of age while 17.3 and 9.6% were in the age range of 46 to 55 and 35 to 45 years, respectively. The majority of households were male headed (63.4%; n=90). Although the majority (74.8%) of the household heads were not employed, they were literate. Their education background ranged from primary, Zimbabwe junior certificate to ordinary level. The daily management of cattle was performed mainly by boys (62%) followed by fathers (20%). A few households had mothers (2%) and girls (16%) managing cattle. Households owned an average of 8 cattle ( $\pm 3$  S.E.M). In addition to cattle, farmers owned chickens (87%), goats (30%). The majority of farmers (86%) reported blackleg to be the most important disease followed by ehrlichiosis (23%) and lumpy skin disease (5%). Almost 71% of the respondents reported having experienced cases of blackleg disease in their herd in the past three years. Blackleg disease was perceived to be an important contributor to cattle mortality (52.2%) in the last three years. The mortality due to blackleg disease ranges from 0.4 to 12.5%. About 96.1% of the respondents in the study area reported that blackleg disease was prevalent during summer while 3.9% reported blackleg cases in winter. The majority of the respondents (72.5%) acknowledged that blackleg disease frequently affected cattle that are 1 to 3½ years age range. About 23.5% of the respondents reported that blackleg disease affected cattle that were older than five years. The community had various ways of disposing dead carcasses. Almost 66% of the respondents cut the affected portion and fed it to dogs while the rest of the carcass was used for human consumption. The rest of the respondents disposed carcasses by burning (23.7%) and burying (8.2%).

Farmers got information on how to manage blackleg disease from different sources. The majority got the knowledge from elders (62%), neighbours (11.8%), extension officers (4.5%) and friends (3.9%). A range of alternative remedies and approaches were used to manage blackleg disease. These included conventional vaccines (22%) and alternative remedies (78%). Tables 1 and 2 shows the alternative remedies and management approaches used by the respondents to manage black leg disease. The majority of farmers (80%) claimed that hot water was the mostly used remedy in managing black leg disease. Some remedies; *Pterocarpus angolensis*, *Sclerocarya birrea*, *Diospyros mespiliformis*, *Gardenia spatulifolia* and "ihlwili" were believed to prevent the occurrence of the disease. Respondents using traditional remedies administered these by drenching animals with an infusion of the plant powder and water prepared to volumes of 300, 500 and 750 ml (Table 3).

### Methods used to prevent blackleg disease put it at the right place

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knowledge from elders (62%), neighbours (11.8%), extension officers (4.5%) and friends (3.9%). The respondents varied in the methods and frequency of use of the commercial and alternative remedies. Of the farmers using the conventional blackleg vaccine, 92.3% annually vaccinated their cattle while 7.7% of the respondents had no regular vaccination programme, they only vaccinated when there was an outbreak. All the traditional remedies which the respondents used had no clear program that was followed.

All the farmers who used blackleg vaccine reported that the dosage was 2 ml per animal as prescribed in the bottle. Also they reported that they first communicated with the veterinary officer before buying the vaccine so that the officer would keep the vaccine in their office refrigerator until use.

## DISCUSSION

The study revealed that blackleg disease was the most important disease affecting cattle and it was more prevalent in summer which was in agreement with reports by Useh et al. (2010) who found positive correlation between heavy rainfall and outbreaks of blackleg disease in Nigeria. High rainfall may give rise to water-saturated soils and anaerobiosis in the soil, which favours the multiplication of *C. chauvei*. The soil becomes the source of infection and cattle will ingest *C. chauvei* together with grass (Useh, 2002). Useh et al. (2006) affirmed that high rainfall assisted in the dissemination of spores to a wider area. The control of blackleg in the study area was complicated by the way the farmers dispose the cattle carcasses suspected to have died of blackleg. Skinning and throwing away the affected muscles, exposes and spreads the *C. chauvoei* spores. This serves as a source of infection to other supposedly healthy herds (Useh et al., 2006). As such farmers need to be trained on proper carcass disposal methods such as burning of the carcasses.

In this study, there were few farmers who used conventional vaccines. This was attributed to inadequate veterinary skills and lack of money to buy the vaccine by the farmers. The finding in this study was in agreement with Useh et al. (2010) who reported that ineffective vaccination policy and lack of adequate facilities to maintain the cold chain for vaccine storage limits blackleg disease control. Conventional vaccines and services are expensive and they require veterinary technology in the storage and administration of the vaccine (Sori et al., 2004; Harun-or-Rashid et al., 2010). Most respondents were resource-challenged farmers and unemployed and they could not afford to purchase conventional vaccines, a finding which is supported by Useh et al. (2006). In addition, farmers had inadequate resources to purchase syringes and needles and as a result they depend on equipment from the Department of Veterinary Services.

**Table 1.** Alternative remedies and approaches (non plant material) used by Umzingwane farmers to manage blackleg disease in cattle.

Name of the alternative remedy	Farmers using alternative remedies (%)	Part used	Preparation method	Administration route
Hot water	80		It is sprinkled on the affected part of the animal	Topical
Hot iron	78	Hot surface	Heat the metal or iron to cherry then apply on the affected part for 5 s.	Topical
Potassium permanganate	10		1 g is mixed with 5 L of water. Cattle are drenched with 750 ml in cases of outbreak.	Drenching

**Table 2.** Alternative remedies and approaches (plant materials) used by Umzingwane farmers to manage blackleg disease in cattle.

Scientific name	Common name	Ndebele name	Farmers using alternative remedies (%)	Part of the plant used	Preparation method	Administration route
<i>Pterocarpus angolensis</i>	Mukwa	uMvagazi	7	log	It is horizontally laid at the foot of kraal for the animals to jump over it daily.	Crossing over the log
			8	Bark	The bark is chopped, soaked in cold water for 6 h or when water has changed reddish colour. Mainly drenched twice annual. 750 ml are drenched per animal.	Drenching
<i>Ricinus communis</i>	Castor oil plant	Mhlafutho	5	leaves	They are ground on the wound that susceptible to blackleg disease.	Topical
<i>Diospyros mespiliformis</i>	Jackal berry	uMdlawuzo	3	log	Put together with <i>Gardenia spatulifolia</i> at the foot of the kraal for animal to jump over them daily.	Crossing over the log
<i>Gardenia spatulifolia</i>	Bushveld gardenia	uMvalasangwana	6	log	It is horizontally laid at the foot of kraal for the animals to jump over it daily.	Crossing over the log
		iHlwili	60	bulb	Chop the bulb, soak in cold water or hot for 6 h or water has turned reddish in colour. Drench with 750 ml when suspected to be ill. Sometimes it can be drenched prophylactic.	Drenching

In this study, farmers had an average of 8 cattle per household, while the vaccine vials had 50 doses which was large compared to the small herds reared by the household. As such farmers had to first mobilise themselves so that the numbers of cattle reached close to 50. However, farmers expressed some challenges in mobilising themselves. As a result some farmers discarded the unused doses, and this was a waste of the resources which is unacceptable to financially challenged farmers. Furthermore, the farmers'

challenge was compounded by the fact that veterinary livestock technicians cover huge areas without mobility which made it difficult for the farmers to access their services. Some of the farmers travelled more than 20 km to get the services from the Department of Veterinary Services. This contributed to low vaccine usage. Another factor that contributed to low usage of the vaccine is lack of refrigerators and electricity supply to maintain the cold chain while farmers were mobilising themselves. Most of the rural

homes were not electrified making it difficult for farmers to have cold mediums such as cold rooms or refrigerators.

Farmers perceived that the Department of Veterinary Services was indifferent to the utilisation of alternative remedies; this could be ascribed to the fact that the veterinary officers were not trained in the use of these alternative remedies during their academic training at colleges and universities. As such they were not keen to promote the use of alternative remedies

**Table 3.** Dosage of the alternative remedies used by Umzingwane farmers.

Traditional herb	Dosage (ml)
<i>Ihlwili</i>	750
<i>Gardenia spatulifolia</i>	750
<i>Diospyro smespiliformis</i>	500
<i>Sclerocarya birrea</i>	300
<i>Pterocarpus angolensis</i>	750
<i>Ricinus communis</i>	300

which they were not knowledgeable about (Mwale and Masika, 2009). Majority of farmers were reported to be using alternative remedies, a finding consistent with Fullas (2010) and Yirga et al. (2012) which could be ascribed to local availability, accessibility and their cheapness. Alternative remedies were perceived to be effective, easy to use by resource-challenged farmers. Most respondents were resource-challenged farmers and unemployed and they could not afford to purchase conventional vaccines, a finding which is supported by Moreki (2013). Use of hot water by farmers was perceived to be effective in the management of blackleg disease, however its mode of action was unknown. Topical application of hot water or hot iron on the affected portion was believed to increase the muscle temperature which could be lethal to the bacteria in its vegetative form. It has also been speculated that temperatures above 40°C may inhibit the neuraminidase activity for the *C. chauvoei* (Singh et al., 1993).

Farmers in this current study reported that they drenched their cattle with potassium permanganate. Potassium permanganate is an inorganic substance that has various uses. It is an oxidizing agent that has broad antimicrobial properties against bacteria, algae, fungi and viruses (Khan, 2005). However, Khan (2005) reported that potassium permanganate should be used at low concentration to avoid irritation of tissues. Farmers dissolve a pinch of potassium permanganate (1 g) to 5 L of water; however, cattle are drenched with 750 ml. In this current study, farmers used it before and during outbreaks. Moreki (2013) reported the use of potassium permanganate in the control and treatment of poultry disease especially Newcastle disease. As potassium permanganate has antimicrobial properties, it is speculated that it destroys the ingested *C. chauvoei* which is localised in the intestines and muscles before they cause damage to the muscles.

The plant materials were used as single decoctions or infusions for drenching or topical applications. This was in contrast to traditional healers who frequently use complex mixtures (Luseba and Van der Merwe, 2006). Plant materials were collected when needed from the bush with the exception of *ihlwili* which was kept and perceived to be an essential remedy for a livestock farmer. The mode of action of the plant material was not well explained

by the farmers. Farmers perceived that the remedies stimulate the blood circulation and would clean the blood. Furthermore, farmers believed that the reddish colour of the mixture would cleanse the blood from infection with blackleg disease.

The concentrations of the remedies were determined by the qualitative means such as colour changes of the liquid after being soaked in water. The use of *P. angolensis* in the current study was consistent with findings by Luseba and Van der Merwe (2006) who reported that farmers used the plant in the control and treatment of blackleg. According to Ndhlovu and Masika (2013) and Luseba and Tshisikhawe (2013), *P. angolensis* has been used for treatment of Bovine dermatophilosis and cattle anorexia respectively. In addition, Luseba et al. (2007) reported that *P. angolensis* had antibacterial activities. It was speculated that drenching cattle with plant decoctions or infusions inhibited *C. chauvoei* neuramidase (Useh et al., 2003). This might be the pharmacological action by which they ameliorate clinical blackleg infections (Useh et al., 2003). Farmers reported that they put log of *P. angolensis*, *D. mespiliformis* and *G. spatulifolia* across the entrance of the cattle pen so that cattle will step over them when they enter or exit the pen. They changed the logs after a year of its use or when the logs lost their barks. Farmers perceived that these log prevent the occurrence of the blackleg disease. However, they were divergent views on the efficacy of the log in the prevention of blackleg. For instance, some farmers doubted their efficacy; as such they used the logs in conjunction with other remedies.

## Conclusions

The use of alternative remedies used in the control and management of blackleg disease, needs to be scientifically explored. Considering the fact that Zimbabweans have a wide range of alternative remedies, research should be directed to explore their potential. The poor accessibility of modern veterinary healthcare services by resource-challenged farmers makes the use of alternative remedies a viable option. In addition to being cheaper and more accessible, alternative remedies can be a viable therapeutic option, if properly investigated and standardized.

## Conflict of Interests

None of the authors of this paper has a financial or personal relationship with people or organisations that could inappropriately influence or bias the content of the article.

## ACKNOWLEDGEMENTS

The authors are grateful to the communities for sharing

their knowledge and experiences in controlling and managing blackleg disease in their cattle. They also wish to thank Solusi University for financial support.

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