

A MONITORING STUDY ON THE PREVALENCE OF THE SKIN DISEASES DERMATOPHILOSIS AND PARAFILARIOSIS AND THE CONTROL OF DERMATOPHILOSIS IN CATTLE MANAGED IN A SEMI-ARID CROP-LIVESTOCK SMALLHOLDER FARMING SYSTEM IN ZIMBABWE

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SUMMARY

The study was conducted to determine the prevalence and extent of Dermatophilus congolensis infection and the occurrence of Parafilariosis (false bruising) in cattle managed in a semi-arid smallholder crop-livestock farming system in Zimbabwe. A total of 6000 cattle were monitored at four dip tanks once a month from September 1999 to March 2000. The prevalence and severity of Dermatophilosis differed significantly with season, being low (6%) during the dry season (September to November) and high (35%) during the rainy season (January to March). The occurrence of Parafilariosis was similar to that of Dermatophilosis being low during the dry season and high during the wet season. The increase in the degree of infection with the skin diseases was preceded by high ectoparasite infestation, particularly by *Amblyomma variegatum* with the onset of the rains. A sub-sample of 240 cattle was selected from the large population and the cattle were either dipped, hand sprayed with Triatix (an acaricide) or a combination of the two. Occurrence of Dermatophilosis was significantly higher in cattle using plunge dips compared to those treated using the acaricide applied through hand spraying. The incidence of clinical Dermatophilosis was also significantly higher in bulls than in the other classes of cattle. Lesions were mainly localised to the inguinal regions in both bulls and cows as well as between the front limbs. No mortality was recorded but farmers slaughtered some of diseased cattle. The results further indicated that morbidity was high during the rainy season. Overall, these results suggest that the skin diseases have negative implications on reproductive capacity, productivity of the herd and draught animal power availability.

Keywords: Skin diseases, dermatophilosis, Parafilariosis, smallholder, cattle

INTRODUCTION

Bovine Dermatophilosis is an acute or chronic exudative skin disease that infects mammals, including cattle, and is caused by the actinomycete bacterium *Dermatophilus congolensis* (Hadrill and Walker, 1994; Faibra, 1996). It is generally associated with infestation with *Amblyomma variegatum* ticks (Morrow *et al.*, 1989, 1993). The disease is recognized as one of the main constraints adversely affecting cattle productivity in tropical environments. The disease causes skin damage, decreases body weight gain, and impairs animal growth. Infected animals exhibit reduced reproductive capacity and mortality can occur due to debility and toxæmia. In cows, udder infections result in mastitis and abscesses that lead to decreased milk production. The latter is associated with high calf mortality attributable to poor nursing by the affected cows. In addition, infection of cattle with Dermatophilosis directly adversely affects crop production by smallholder farmers. This is due to the fact that smallholder farmers in Zimbabwe and most Sub-Saharan Africa countries depend on animal traction for land tillage. Cattle are the most preferred animals used for draught power provisions (Chimonyo *et al.*, 1999). Infection by Dermatophilosis would be expected to reduce the numbers of cattle available for draught as well as draught output from afflicted cattle.

Parafilariosis, another skin disease of cattle, is recognised by the presence of bleeding spots/lumps on the skin where fresh blood exudes. It is caused by the helminth *Parafilaria hovicola* (Nevil, 1981). The parasite is known to occur in north, central and southern Africa (Kruger and Scholtz, 1995). Infection by *Parafilaria hovicola* has been reported to cause considerable financial losses in South Africa and Zimbabwe's beef industries (Chambers, 1983; 1991). The known economic impact of Parafilariosis arises from trimming of meat with lesions (Chambers, 1983) and hide condemnation at meat inspection which results in substantial losses of income (Chambers, 1991). However, this disease would be expected to be of minimal significance to smallholder farmers' cattle, as it does not affect body condition of the cattle.

As mentioned earlier, Dermatophilosis in cattle is associated with *Amblyomma variegatum* tick infestation. Invariably, the collapse of dipping infrastructure and services in Zimbabwe during the past three decades has resulted in cattle being infected by *Amblyomma variegatum* ticks. As a result, sporadic outbreaks of Dermatophilosis in communal area cattle have been reported in various parts of Zimbabwe, including Sanyati Communal Area (DVS, 2000). However, the extent and pattern of occurrence has not been investigated. Due to lack of documented information, the current study was conducted to determine the incidence and prevalence of Dermatophilosis as well as Parafilariosis in cattle in Sanyati District, a semi arid crop-livestock farming area in Zimbabwe.

MATERIALS AND METHODS

Site description

The study was conducted in Sanyati District of Mashonaland West Province of Zimbabwe. Sanyati District is situated approximately 250 km west of Harare and approximately 100 km north of Kadoma. The site is 900-1200 metres above sea level and is located in Natural Region IV of Zimbabwe. Sanyati is a small-scale cotton producing area. Mean diurnal temperatures experienced in Sanyati are 32°C in the hot rainy season, and 24°C during the cool dry months. Sanyati receives low to moderate annual rainfall (450-600 mm) during the rainy season extending from November to March. The area is subject to periodic droughts (Kjaer, 1994 and Chimonyo *et al.*, 1999).

The vegetation in Sanyati is mainly woodland savannah with predominant tree species being *Acacia* sp. and *Colophospermum mopane*. Some of the trees and bushes provide browse and sustenance to approximately 40 000 cattle, 4 500 sheep, and 26 000 goats (DVS 2000) during time of pasture scarcity. Natural pastures abundance and quality vary with season. Generally, during the rainy season, pastures are abundant and of good quality. In contrast, during the dry season, grasses are scarce and where available, are unpalatable. Animals are forced to forage riverine vegetation along the perennial Munyati River, in addition to foraging from crop residues left in the fields.

Animal health management

In Zimbabwe, cattle are required by law to be dipped once every two weeks in summer, and once every month in winter. At the study site, 11 dip tanks, were used for dipping when water was available. Generally, the farmers observed no standard animal health management practices. The treatment of sick animals and vaccination to prevent known communicable diseases was done on an ad hoc basis and at the farmers discretion.

Data collection

Cattle that were brought for dipping at four dip tanks that had been randomly selected from the total of 11 were examined for the skin diseases, Dermatophilosis and Parafilariosis, and any other diseases at four-week intervals from September (1999) to March (2000). The presence and severity of Dermatophilosis lesions were recorded and classified according to the procedure by Hadrill and Walker (1994). Briefly, the classification was as follows: "+/-" were initial, small lesions, "+" were clear circumscribed scabs at least 1 cm in diameter, and "++" were confluent lesions in progressive infection (Hadrill and Walker, 1994). On the other hand, incidences of Parafilariosis were indicated by the presence of bleeding spots/lumps with no evidence of trauma to the animal. Concurrent with assessment of Dermatophilosis and Parafilariosis infection, the number and types of ticks on the cattle were counted to establish degree of challenge. Samples of ticks were removed by hand, preserved and taken for identification using a microscope in the laboratory in Harare.

Data analysis

Data on prevalence of Dermatophilosis and Parafilariosis was analysed using EpiInfo, 1999 a statistical package for epidemiological data analysis. Count data were analysed using the chi-square test.

RESULTS

The patterns of cattle infections with Dermatophilosis and Parafilariosis are shown in Figure 1, while prevalence is presented in Table 1. The prevalence of both diseases varied with season being low during the dry season (September-November), and high during the wet season (January-March) (Figure 1). The occurrence of Dermatophilosis was significantly higher ($P < 0.05$) in cattle using plunge dips compared to those treated using the acaricide applied through hand spraying. The prevalence and extent

(severity) of clinical Dermatophilosis was higher ($P < 0.05$) in bulls compared to the other classes of cattle (Table 2). Lesions were mainly localised to the inguinal regions in both bulls and cows as well as between the front limbs. No mortality was recorded but farmers slaughtered some of diseased cattle. In addition, various species of ticks were identified and confirmed with *Amblyomma variegatum* accounting for approximately 53% of ticks found in the area. The other species comprised *Boophilus microplus* (31%), *Boophilus decoloratus* (6%), *Hyalomma ruipes* and *Rhipicephalus evertsi*, each constituting 5% of ticks found in the area. The highest tick counts were recorded between September 1999 and January 2000.

Table 1. The prevalence of the skin diseases Dermatophilosis and Parafilariosis among the different classes of cattle in Sanyati communal area

Animal class	Prevalence (%)	
	Dermatophilosis	Parafilariosis
Bulls	78.6 ^a	22.2 ^{ab}
Cows	41.9 ^b	34.9 ^a
Calves	35.7 ^b	18.6 ^b
Oxen	29.6 ^b	36.1 ^a

Figures in the same column with different superscripts have significant differences ($P > 0.05$)

Table 2. Severity of Dermatophilosis infection in various classes of cattle

Class of animal	n	Severity of infection		
		1+/-	2+	3++
Bulls	11	0	0	11
Cows	26	14	5	7
Calves	20	10	5	5
Oxen	32	16	11	5

Where:

1+/-: Small lesions less than 1 cm in diameter

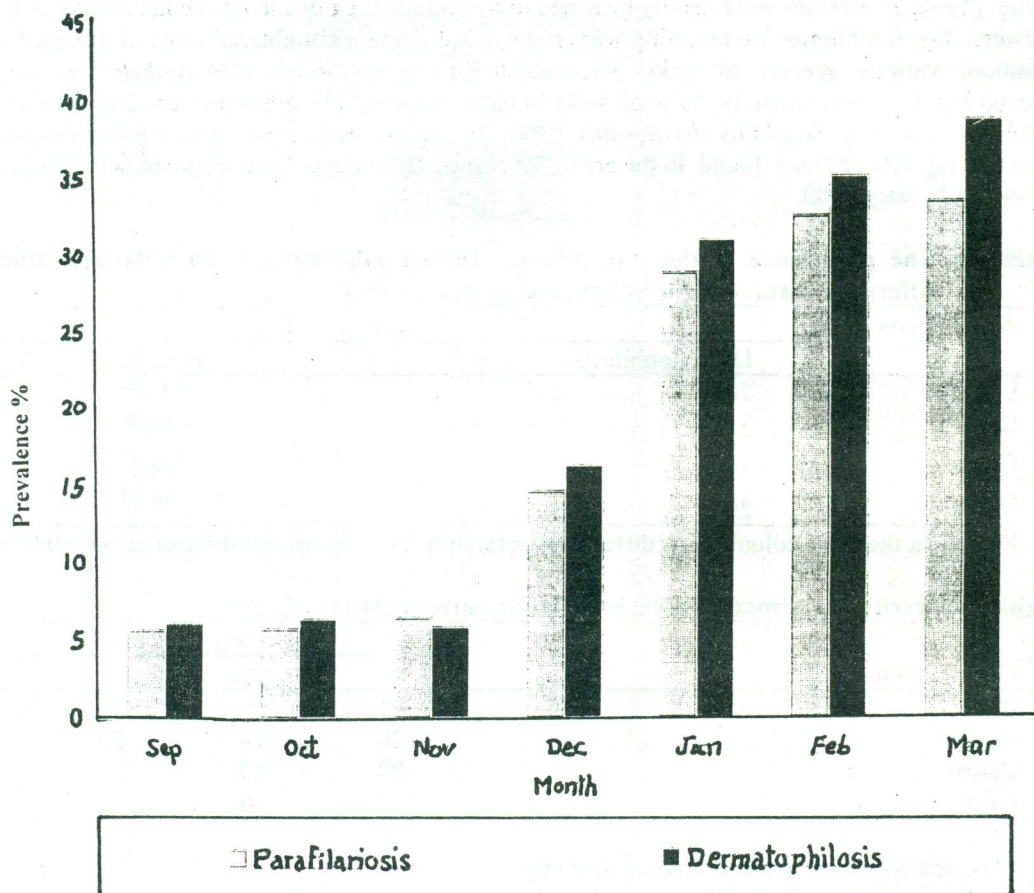
2+: Clear circumscribed scabs at least 1 cm in diameter

3++ Confluent lesions

DISCUSSION

The prevalence of Dermatophilosis and Parafilariosis varied with season being low during the dry season and high during the wet season (Figure 1). A number of researchers (Samui *et al.*, 1988; Chambers, 1991; Honey *et al.*, 1994) observed similar seasonal patterns in disease infection. In addition, the preponderance of *Amblyomma variegatum* on cattle infected with these skin diseases, in particular Dermatophilosis as compared to other tick species implies an association between Dermatophilosis as reported elsewhere (Morrow *et al.*, 1989; 1993). Although specific association between the tick and the disease could not be established from this study, it was observed that the predominant tick species found in the area was *Amblyomma variegatum* (53%). The occurrence of *Amblyomma variegatum* ticks is known to be a seasonal event with high numbers being recorded at the start of the early rains (Koney *et al.*, 1996). In the present study, the prevalence of Dermatophilosis increased rapidly soon after the first rains that were recorded in early November 1999. The increase in disease incidences also coincided with increased tick challenge. The latter might be partly attributed to erratic and inconsistent dipping of cattle in the area during the dry season caused by farmer resistance to pay a "dipping levy" for the purchase and procurement of acaricides coupled with government inability to finance affordable or free tick remedies (DVS, 2000). In addition the area is prone to periodic droughts (Kjaer, 1994), which cause water shortages that led to the closure of dip tanks for extended periods of time during the dry season.

Similar to Dermatophilosis, the observed exponential increase in the incidence of Parafilariosis might be attributed to increased activity of the fly, *Musca* species which transmits the disease (Chambers, 1983). The humid hot tropical climatic conditions promote proliferation of this vector. The situation is aggravated by the fact that Triatix®, the acaricide used to control ectoparasites, has no effect on the flies (Seifert, 1996).



Apart from the association with *Amblyomma variegatum*, the seasonality of Dermatophilosis infection may also be attributed to other factors such as the direct and indirect effect of rain. Rainy water activates *Dermatophilus congolensis* zoospores in scabs while at the same time wetting of the skin diminishes its protectiveness against invading pathogens. This may explain the high transmission rate of the disease during the wet season. During the dry season, the skin is dry and unless lacerated, provides maximum defence against infection. Moreover, management of cattle in communal areas during the wet season encourages a high degree of contact through frequent sharing of pastures and dip tanks that is conducive for the spread of the disease.

Effective tick control strategies have been found to reduce both tick infestations as well as Dermatophilosis outbreaks within herds (Morrow *et al.*, 1993). Findings from this study corroborate these observations. Use of Triatix® hand spray every fortnight was an effective method of tick control compared to the communal plunge dipping. It is highly likely that the communal dip tanks act as reservoirs of Dermatophilosis from scabs falling into the dip tanks from infected animals. In addition, the act of plunging into the dip tank exposes cattle to *Dermatophilus congolensis* zoospores accumulating in the dip wash, or the contact between wet, infected and non infected animals.

The localisation of lesions to the inguinal area, scrotum and axillae regions may be associated with the predilection sites for *Amblyomma variegatum* ticks. In cows, lesions were localized around the udder and external genitalia. The high prevalence of Dermatophilosis in bulls has to be interpreted with caution due to the fact that a few bulls were available for examination. Nonetheless, lesions around the scrotum and inguinal area militate against desire to mate, and this might partly explain the poor fertility of cows that has been reported to average 30% per year in the area (Chimonyo *et al.*, 1999). Similarly, udder infections increase calf mortality as cows resist suckling.

In conclusion, the results from this study suggest that, overall the skin diseases have negative implications on reproductive capacity, productivity of the herd and draught animal power availability.

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