Prevalence of *Culicoides imicola* and other species (Diptera: Ceratopogonidae) at eight sites in Zimbabwe

Biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) are small (1–2 mm in size) and chiefly nocturnal with blood feeding restricted to females. Details of their varied life cycles have been published[5,8]. In Africa, the most important species is *C. imicola,* as it is the principal vector of the viruses of African horse sickness (AHS) and bluetongue (BT)[3] both of which cause disease in susceptible domesticated livestock. AHS mortality rates can exceed 95 % in unvaccinated horses. Recently a second vector of these orbiviral diseases was shown to exist in Africa *i.e. C. bolitinos*[9,13]. The aim of this letter is to briefly present some prevalence data on these 2 species in Zimbabwe, and on other common species, as revealed by collections made over 2 years at 8 widely-separated study sites. The data augment the little information that currently exists on the abundance and distribution of *Culicoides* in Zimbabwe.

At each site *Culicoides* were trapped using a 220 V ultraviolet down-draught light trap equipped with an 8 W blacklight tube. The sites were Chinhoyi, Mashonaland West (17°29'S, 30°09'E); Chipinge, Manicaland (20°14'S, 32°40'E); Gwanda, Matabeleland South (20°49'S, 28°59'E); Harare, Mashonaland Central (17°45'S, 31°05'E); Kwekwe, Midlands (19°08'S, 29°55'E); Rekomitjie, Mashonaland West (16°08'S, 29°24'E); Rusape, Manicaland (18°32'S, 32°01'E) and Inkomo, Mashonaland West (17°40'S, 30°43'E). Collections were made weekly from dusk to dawn for varying periods between August 1996 and October 1998. *Culicoides* were identified with the aid of a dissecting microscope using the wing picture atlas of southern African *Culicoides* developed by one of us (R.M. unpubl. data, 1995). For very large catches a previously described subsampling method was used[7].

More than 1.4 million *Culicoides* were captured on 266 trap nights. *C. imicola* was by far the most abundant species, representing 85 % of all midges collected, and confirms earlier findings on its abundance in Zimbabwe[2,10]. It was caught at all the study sites, with the largest total trapped at Kwekwe (952 283), but was also found in abundance at the Harare racecourse (236 838). A relatively high average annual rainfall, high average summer temperatures, and moisture-retentive clay soils, coupled to the presence of mammalian hosts, are factors that favour the development and maintenance of large populations of *C. imicola* at these 2 sites[1]. At the remaining sites, far fewer *C. imicola,* and other *Culicoides,* were trapped. This can probably be attributed to a variety of factors including lower rainfall (Gwanda, Rekomitjie), lower average temperatures with extended periods of frost (Inkomo, Rusape, Chipinge and Chinhoyi), and sandy soils (Rekomitjie) whose quick-draining properties induce surface aridity, and so would inhibit larval development in *C. imicola*[10]. While climatic and edaphic factors certainly play a role in determining the prevalence and abundance of *C. imicola,* it must be noted that another very important factor that limits its numbers, and negates the direct comparison of data, is that different farming conditions prevailed at each site. For example, at Gwanda ranch, animals are widespread, and so are rarely found in the immediate vicinity of the trap for it to attract and capture large numbers of *Culicoides.* At the opposite end of the scale would be the high numbers collected around penned or stabled animals (Kwekwe and Harare), which can best be described as sedentary 'blood banks' that aid the development and maintenance of large numbers of *C. imicola.*

Another member of the Imicola complex, *C. bolitinos,* and previously reported from Rekomitjie[6], was in this survey found at only half of the sites (Chinhoyi, Gwanda, Inkomo and Rekomitjie). It breeds in the dung of cattle and buffalo and was most abundant at Rekomitjie, where 30 cattle were kraaled near the trap. Very low numbers (<100) of *C. bolitinos* were identified in the survey, but this is likely to be an underestimate, as the species is easily overlooked owing to its close taxonomic relationship to *C. imicola.* In South Africa, *C. bolitinos* is almost as widespread as *C. imicola,* and can become abundant where cattle are husbanded. Importantly, it has been shown recently to be an efficient vector of BT and AHS[9,13], and so the development of point foci of *C. bolitinos* adds to the risk of transmission of these diseases in Zimbabwe. Other species of *Culicoides* regularly captured in the survey (overall percentage and site of greatest abundance in brackets) were: *C. zuluensis* (7.0 %; Harare), *C. subschultzei* (1.1 %; Kwekwe), *C. similis* (1.0 %; Kwekwe), *C. enderleini* (0.8 %; Kwekwe), *C. leucostictus* (0.6 %; Inkomo), *C. ravus* (0.3 %; Kwekwe), *C. pycnostictus* (0.2 %; Inkomo), and *C. nivosus* (0.1 %; Kwekwe). Including *C. imicola* (85 %; Kwekwe), this species list is virtually identical to that recently compiled for South Africa[12]. This strongly suggests that ecological conditions in the 2 countries are broadly similar, and thus the epidemiology of the abovementioned orbiviral diseases will also be similar. At least for AHS this apears to be true, as it is known to occur widely in Zimbabwe, with nearly all 9 serotypes represented[3]. The fact that the viruses that cause BT, Akabane, bovine ephemeral fever, and Nyabira (Palyam serogroup) have also been isolated from various *Culicoides* species in Zimbabwe[2] is further proof that the interaction between *Culicoides,* livestock and orbiviruses is very dynamic in that country.

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G N Musuka[a], R Meiswinkel[b], M Baylis[c], P J Kelly[a] and P S Mellor[d]

[a]Biomedical Research and Training Institute, Harare, Zimbabwe
[b]Onderstepoort Veterinary Institute, Onderstepoort, South Africa
[c]Institute for Animal Health, Pirbright, Surrey, UK
[d]Institute for Animal Health, Compton, Berkshire, UK

Chlamydial abortion in goats in the Umzimkulu district of Eastern Cape

Goats aborted in the Bossenfontein and Ngozi administrative areas of Umzimkulu district, Eastern Cape Province, during the period December 1998 to March 1999. All abortions occurred in the last month of gestation and in primiparous goats that had never been immunised against any reproductive diseases and that had not experienced abortion storms. The prevalence of abortion at Bossenfontein and Ngozi were 4 % and 5.66 % respectively.

Umzimkulu district, which adjoins and is surrounded by KwaZulu-Natal Province, has many small scale-farms where grazing is communal. Most of the livestock farmers own on average 5–15 goats that are of indigenous origin or crossbred. The goats are not provided with proper housing and are exposed to environmental hazards. Furthermore they depend entirely on pasture for nutrition and receive no supplementary feed. They are not vaccinated.

Factors that predispose to the prevalence of chlamydiosis include environmental and host factors. Communal grazing enables easy transmission through shedding of *Chlamydia* within genital discharges that contaminate the pastures at the time of parturition. The goats that aborted did not have vaccine-induced or naturally-acquired antibodies to enable them to resist infection.

The investigation was carried out on 2 small-scale farms in Bossenfontein during February 1999 and on 10 small-scale farms in Ngozi during March and May 1999. Blood samples from goats 4–5 weeks after abortion from Bossenfontein and Ngozi as well as from randomly-selected goats from Ngozi were collected in plain evacuated tubes for serological studies. Following blood clotting, the serum was separated and forwarded to the Ixopo state veterinarian, who submitted them to Allerton Provincial Veterinary Laboratory.

Complement fixation revealed antibody titres for *Chlamydia* in aborted goats from both the above administrative areas, confirming the outbreak, while randomly-selected goats had no complement-fixing antibody, indicating that there was no subclinical chlamydiosis, and were also negative for other reproductive diseases, namely brucellosis, Wesselsbron and Rift Valley fever (Table 1).

Serological results from Bossenfontein administrative area indicated that samples 3, 7, 8, 9 and 10 were anti-complementary and there was therefore no result for the complement fixation test for *Chlamydia.* Titres of >24 for *Chlamydia* are regarded as positive. The sera tested for Rift Valley fever by the haemagglutination inhibition test had negative titres.

Serological studies from aborted goats from Ngozi administrative area revealed low complement fixation antibody titres compared to the positive titres for *Chlamydia* in Bossenfontein. The sera tested negative for Rift Valley fever, *Brucella melitensis* and Wesselsbron.

It is interesting to note that no abortions have been reported from the above-mentioned administrative areas since December 1999. This is ascribed to the administration of ovine enzootic abortion vaccine to all susceptible goats during April and June 1999 in the Bossenfontein and Ngozi areas respectively.

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Table 1: **Serological results for aborted and randomly-selected goats.**

Sample number	Chlamydiosis Complement fixation titre	Rift Valley fever Haemagglutination inhibition titre	*Brucella melitensis*	Wesselsbron
Aborted – Bossenfontein				
1	32	Not done	Not done	Not done
2	32	Negative	Not done	Not done
3	Anti-complement	Negative	Not done	Not done
4	32	Negative	Not done	Not done
5	32	Negative	Not done	Not done
6	24	Negative	Not done	Not done
7	Anti-complement	Negative	Not done	Not done
8	Anti-complement	Negative	Not done	Not done
9	Anti-complement	Negative	Not done	Not done
10	Anti-complement	Negative	Not done	Not done
Aborted – Ngozi				
1	6	Negative	Negative	Negative
2	8	Negative	Negative	Negative
Randomly-selected – Ngozi				
3rd – 58th	Negative	Negative	Negative	Negative

C Sri Jeyakumar
Department of Agriculture, Private Bag 527, Umzimkulu, 3297 South Africa