Culicoides (Diptera: Ceratopogonidae) associated with laying chickens at Sebele, Gaborone, Botswana

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A total of 2083 *Culicoides* spp. were collected in an ultraviolet light trap hung from the rafters of a laying chicken house at a location in Sebele, giving a mean daily catch of 208.3 biting midges. *C. imicola* was the most abundant and constituted 57.5% of the total catch. *C. leucosticus* and *C. engubandei* constituted 20.5% and 14.7%, respectively, of the catch. A comprehensive questionnaire conducted at three sites in the village indicated that many chickens in the homesteads in this location had died as a result of fowl pox. A high incidence of *Haemoproteus columbae* gametocytes was also found in the cytoplasm of erythrocytes of domestic pigeons (*Columbiae livia domestica*).

Keywords: culicoides, chickens, disease

Introduction

Culicoides spp. are small biting flies which have dark and light patterned wings from the pigmentation of the wing membranes (Kettle, 1990). These insects are economically important for they act as vectors of arboviruses and protozoa. *Leucocytozoon caulleryi*, a haemosporina, is transmitted by *Culicoides* spp. causing disease in chickens in South East Asia and Africa (Fallis *et al.*, 1973; Soulsby, 1986). They may also mechanically transmit fowl pox virus (Jordan, 1990). When they occur in large numbers, *Culicoides* spp. also cause great annoyance and irritation to animals and birds resulting in lowered production.

Culicoides in Botswana have been associated with horses, dairy cows and pigs (Mushi *et al.*, 1998a,b,c). Following a severe outbreak of fowl pox among chickens at Sebele (Mushi, 1998, unpublished results) and the demonstration of *Haemoproteus columbae* in pigeons (Mushi *et al.*, 1999), chickens were screened for

ectoparasites. *Culicoides* species associated with laying chickens at Sebele, Gaborone were collected, counted and differentiated into species. This is the first report on the collection of *Culicoides* spp. from laying chickens in Botswana.

Materials and methods

COLLECTION SITE

The collection site was at Sebele, near Gaborone at 24°33'E, 25°57'S and an altitude of 994 m. There were 359 adult laying hens consisting of 200 White Leghorn and 159 Red Isa birds in the poultry houses which had half of the side walls open to allow ventilation. The chickens were put in cages in threes and had access to continuous water. They were fed on commercial layer's mash. Manure which accumulated under the cages was removed once a week. A questionnaire on chicken health was conduced at three random sites located within a radius of 500 m, involving 10 homesteads.

LIGHT TRAP COLLECTION

A single light trap was suspended from the rafters of the poultry house. A down-draught suction light trap (220 V) equipped with an 8 W ultraviolet light tube was used. *Culicoides* spp. were collected into water with 0.5% Savlon antiseptic solution as described by Meiswinkel *et al.* (1994). Different species were identified by comparing the wing patterns as described by Meiswinkel *et al.* (1994). Female *Culicoides* were easily differentiated from males as the latter had a tapering abdomen and bushy antennae. The prevailing weather conditions on trapping nights were recorded.

Results

Culicoides species were collected on 10 consecutive nights from 30 March to 8 April 1998, during the warm summer weather when insect activity was at its peak. During the insect collection period the weather was stable with mean daily maximum and minimum temperatures of 32.4°C and 18.2°C, respectively (*Table 1*).

Table 1 Nightly catches of *Culicoides* spp. in poultry layer houses

Day	No. of *Culicoides*	Maximum temperature (°C)	Minimum temperature (°C)	Rainfall (mm)
1	67	29.7	21.0	42.0
2	335	30.9	18.5	0.0
3	278	30.9	18.5	0.0
4	150	32.9	21.5	0.0
5	284	33.3	18.5	0.0
6	220	31.5	17.5	0.0
7	359	33.5	16.4	0.0
8	164	34.5	15.5	0.0
9	226	35	17.0	0.0
10	230	32	18.0	0.0
Total	2083	324.2	182.4	42.0
Mean	208.3	32.4	18.2	4.2

Table 2 Nightly catches of *Culicoides* spp. from light traps

Species	Number	%
C. imicola	1198	57.51
C. leucostictus	428	20.50
C. engubandei	307	14.74
C. similis	79	3.79
C. pycnostictus	56	2.69
C. schultzei group	15	0.72
Total	2083	100

Rainfall was only recorded on one day. The answers to the questionnaire indicated that many chickens had died from fowl pox.

A total of 2083 *Culicoides* were collected with a mean daily catch size of 208.3 biting midges (*Table 1*). Six species were identified of which *C. imicola* was the most abundant and constituted 57.5% of the total catch. *C. leucostictus* and *C. engubandei* accounted for 20.5% and 14.7%, respectively, of the catch (*Table 2*), and *C. schultzei* was the least commonly collected midge constituting only 0.7% of the catch. Generally, there were more females than males with a mean average of 89.6% females and 10.4% males (*Table 3*).

Discussion

Culicoides were collected in light traps placed in chicken layer houses. The counts were low on rainy and windy nights. This confirms previous findings that wind speeds of more than 3.5 miles per hour handicapped their flight (Kettle, 1990) and more *Culicoides* were collected on windless nights. The counts may be regarded as low and this could be due to the absence of watered lawns or other sources of stationary water. *Culicoides* may use the chicken manure as a larval habitat as is the case with other animal dungs (Meiswinkel *et al.*, 1994). Regular disposal of the manure from under the cages could remove this larval habitat, resulting in fewer adult flies.

Table 3 Sex of *Culicoides* spp. caught in light traps

	Female		Male	
Species	Numbers	Percentage	Numbers	Percentage
C. imicola	1089	91.65	109	9.09
C. leucostictus	374	87.38	54	12.61
C. engubandei	290	94.64	17	55.37
C. similis	55	69.62	24	30.37
C. pycnostictus	46	82.14	10	17.85
C. schultzei group	13	86.66	2	13.33
Total	1867	89.63	216	10.36

C. imicola was the most abundant species collected. Although it is mainly associated with cattle, sheep and horses (*Meiswinkel et al.*, 1994), it is the most common species of *Culicoides* in tropical Africa. *C. leucostictus* was the second most abundant and this may be because they prefer to feed on birds (Venter *et al.*, 1996).

Conclusion

Culicoides are important to poultry as vectors of the haemoprotozoa *Leucocytozoon* spp. and probably *Haemoproteus* spp. *Leucocytozoon* infection is characterised by lethargy, loss of appetite, diarrhoea and anaemia. Gametes may be seen in blood smears. Although *L. schoutzdeni* has been reported in chickens in Tanzania (Fallis *et al.*, 1973), this haemoprotozoa has not been found in the blood of chickens from Botswana (Binta, personal communication). Because *Culicoides* may transmit the fowl pox virus mechanically, it is strongly recommended that all laying chickens should be vaccinated against fowl pox to curb losses from the disease.

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