

A survey of ectoparasites, cestodes and management of free-range indigenous chickens in rural Zimbabwe

S Mukaratirwa^a and T Hove^b

ABSTRACT

A survey of ectoparasites, cestodes and husbandry aspects of indigenous free-range chickens was carried out in selected districts from the highveld and lowveld of rural Zimbabwe. The survey recorded infection with 4 species from the order Phthiraptera (lice), 1 species from the order Siphonaptera (fleas), 6 species from the order Acarina (ticks and mites) and 9 species of cestodes. Among the ectoparasites, the most prevalent was *Menacanthus stramineus* (87.7 %) followed by *Echidnophaga gallinacea* (71.9 %). Chickens in the Mazowe district had the highest number of ectoparasites species (10 of 11) followed by Goromonzi district (9 of 11) both these districts are situated in the highveld of Zimbabwe. The most prevalent cestode species was *Raillietina tetragona* (84.4 %), followed by *Raillietina echinobothrida* (32.2 %). Chickens in the Goromonzi district had the highest number of cestode species (7 of 9), followed by Mazowe district (one subgenus and 5 of 9). In all the districts sampled the main purpose of keeping free-range chickens was for meat for the household, with few households using the birds as a source of income. The majority of households kept their birds extensively with barely any appropriate housing, and supplementary feeding was only occasionally practised.

Keywords: cestodes, ectoparasites, free-range chickens, husbandry, Zimbabwe.

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It is essential to identify the parasites commonly occurring in backyard or free-range poultry in rural Zimbabwe in order to plan strategies for improvement of production. The aim of this study was to provide information on husbandry aspects of free-range chickens in selected rural districts of Zimbabwe and document the species of ectoparasites and cestodes affecting them.

MATERIALS AND METHODS

Study area

The study was conducted in 8 districts of Zimbabwe, namely Chikomba, Goromonzi, Mazowe and Zvimba from the highveld and Zvishavane and Mberengwa from the lowveld (Fig. 1), and Chiweshe (highveld) and Chivhu (lowveld) not shown in Fig. 1. The highveld covers most of the northern half of Zimbabwe and is 1000–1500 m above sea level. The temperature ranges from 25–30 °C during the rainy season and 15–20 °C during the dry season, and mean annual rainfall ranges between 800 and 1200 mm. The lowveld covers most of the southeastern half of the country and is 900 m above sea level. The area is hot throughout the year with

INTRODUCTION

The importance of rural poultry in national economies of developing countries and its role in improving the nutritional status and incomes of many small-scale farmers and landless communities has long been recognised^{3,8,12}. Lack of measurable indicators of its contribution to macroeconomic indices such as gross domestic product results in rural poultry not being rated highly in the mainstream of national economies⁷.

In Africa, rural chickens are more widely distributed than other livestock species. Surveys in many African countries have reported that the main function of rural chickens from the farmer's perspective is to provide meat and eggs for home consumption^{13,24}.

The development of poultry health programmes requires reliable information on the epidemiology of diseases, which is lacking in village chicken pro-

duction systems¹⁷. Some limited work has been published on the ectoparasite and gastrointestinal helminth fauna of scavenging chickens in Zimbabwe^{2,14,18} and studies in East Africa^{15,20,22} have shown high parasite burdens.

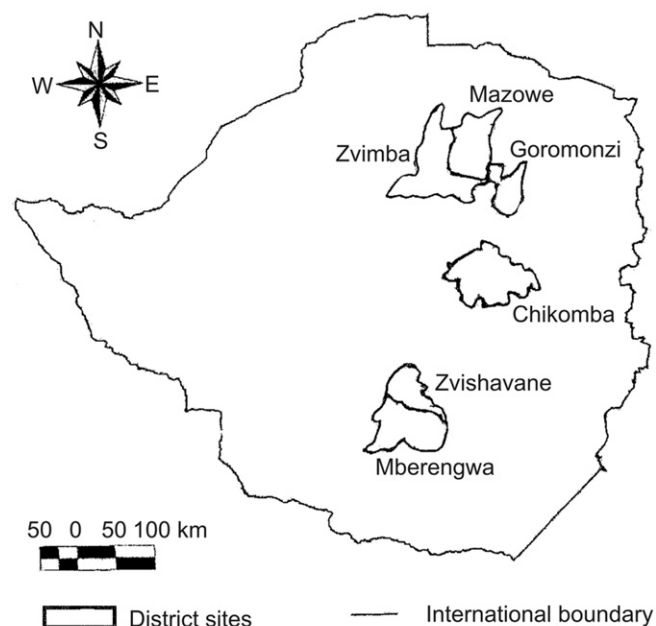


Fig. 1: Six districts in which rural chickens were sampled in Zimbabwe.

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Table 1: Number and prevalence (% in brackets) of infested birds, and location of ectoparasite species of free-range chickens from 6 districts in rural Zimbabwe.

Species	Location	Mazowe (n = 50)	Goromonzi (n = 110)	Zvimba (n = 25)	Chikomba (n = 30)	Zvishavane (n = 25)	Mberengwa (n = 30)	Overall prevalence
<i>Menacanthus stramineus</i>	Body	50 (100)	96 (87.2)	17 (68)	26 (86.7)	22 (88)	26 (86.7)	237 (87.7)
<i>Goniodes gigas</i>	Body	2 (4)	9 (8.2)	4 (16)	9 (30)	7 (28)	3 (10)	34 (12.6)
<i>Goniocotes gallinae</i>	Body	0	30 (27.3)	1 (4)	0	0	0	31 (11.5)
<i>Menopon gallinae</i>	Body	33 (66)	47 (42.7)	20 (80)	12 (40)	9 (36)	7 (23.3)	128 (47.4)
<i>Knemidocoptes mutans</i>	Legs	34 (68)	17 (15.5)	19 (76)	20 (66.7)	20 (80)	25 (83.3)	135 (13.0)
<i>Laminosioptes cysticola</i> *	Legs	1 (2)	0	0	0	0	0	1 (0.4)
<i>Liponyssus bursa</i> *	Legs	1 (2)	7 (6.4)	0	0	0	0	8 (3.0)
<i>Dermanyssus gallinarum</i>	Head and body	8 (16)	0	0	2 (6.7)	0	0	10 (3.7)
<i>Echidnophaga gallinacea</i>	Head	45 (90)	78 (70.9)	18 (72)	21 (70)	15 (60)	17 (56.7)	194 (71.9)
<i>Argas persicus</i>	Head and wings	5 (10)	9 (8.2)	0	0	0	0	14 (5.2)
<i>Lipeurus caponis</i>	Wings	3 (6)	5 (4.5)	2 (8)	1 (3.3)	0	3 (10)	14 (5.2)
Total no. of species	–	10	9	7	7	5	6	11

n = Total number of chickens sampled per district.

*New record for Zimbabwe.

temperatures ranging from 23–24 °C. The mean annual rainfall is between 400 and 650 mm.

Study animals

A minimum number of 25 free-range chickens were randomly sampled from different households in each of the 6 districts shown in Table 1. The birds were inclusive of both young and adult of an indigenous breed common in Zimbabwe and had no history of treatment against ecto- and endoparasites using commercial remedies. The minimum age of chickens sampled was 6 weeks.

Recovery and identification of ectoparasites

Hosts were examined under good illumination to locate the ectoparasites on the head, feet and among feathers of the different parts of the body. The legs and featherless areas of the body with any seborrhea or crusts were scraped for microscopic examination. The skin scrapings were processed according to a method already described¹⁹. After isolation from the host the lice and mites were dehydrated in 80, 90 and 100 % methanol before clearing in xylene and mounting on a slide prior to microscopic examination and identification. Ticks were preserved in 70 % alcohol before identification.

All identifications to generic and species level was as recommended^{21,25} based on the morphological characteristics and anatomical location of the parasite on the host.

Recovery and identification of cestodes

The digestive tract of each chicken was separated into small intestines and large intestines including caeca. Each segment was opened into a separate container. The mucosae of the separated parts were scraped off using a glass slide and

thoroughly washed in tap water over a sieve with 200 µm apertures. Cestodes were recovered from the washings using a stereoscopic microscope and preserved in 70 % alcohol for identification. Cestodes were processed and identified following described methods and identification keys^{9,11,21}.

Information on management of rural chickens

Structured interviews were carried out by the authors in a number of households in the Chiweshe and Goromonzi (Highveld) and Chivhu, Zvishavane and Mberengwa (lowveld) districts (Table 3) and were conducted with the persons directly responsible for the management of the chickens. Information regarding the principal sources of the chickens, purpose of keeping chickens, management system, type of housing, type of feed and the frequency of feeding was recorded.

Data processing

Prevalence of infection (%) was calculated for each ectoparasite and cestode species per district as follows:

$$\frac{\text{Number of infected chickens}}{\text{Total number of chickens examined}} \times 100$$

Frequencies of husbandry parameters were computed using Excel.

RESULTS

A total of 270 birds from 6 districts was examined and 11 species of ectoparasites (Table 1) and 9 species of cestodes (Table 2) were recovered.

The greatest numbers of ectoparasite species were recorded in the highveld districts of Mazowe (10), Goromonzi (9) and Chikomba and Zvimba with 7 species each. *Menacanthus stramineus* had the highest overall prevalence (87.7 %)

followed by *Echidnophaga gallinacea* (71.9 %) and *Menopon gallinae* (47.4 %). *M. stramineus*, *Goniodes gigas*, *Menopon gallinae*, *Knemidocoptes mutans* and *Echidnophaga gallinacea* were present in all districts. *Laminosioptes cysticola* and *Liponyssus bursa* are new records for Zimbabwe.

The highest numbers of cestode species were recorded in the highveld districts of Goromonzi (7) followed by Mazowe (6) and Zvimba (5). Chikomba district had the least, with only 3 cestode species recorded. In the lowveld, 4 species were recorded in Zvishavane district and 2 in Mberengwa. *Raillietina (Pironnella)* sp. and *Cotugnia digonopora* are new records for Zimbabwe. The most frequently encountered cestode species across the districts were *R. tetragona* and *R. echinobothrida*, which were recorded in all districts, and the least frequent was *R. (Pironnella)*, which was recorded only in 1 chicken.

The main purpose of keeping chickens in all districts was for meat and the majority of households raised their own chickens, with a few households buying from commercial breeders (Table 3). The chickens were mainly kept extensively in all districts and the common housing was of a rustic type. The households who practised feeding of chickens either fed them in the morning or towards evening and the type of feed was mainly home-mixed grains.

DISCUSSION

Results from this survey show that ectoparasites and cestodes are common in rural free-range chickens in Zimbabwe, and climatic conditions influence the abundance and diversity of these groups of parasites, with the highveld region (high rainfall) having a higher prevalence and diversity than the lowveld region (low rainfall).

Eight species of ectoparasites have been reported to occur in the Goromonzi district

Table 2: Number and prevalence (% in brackets) of infested birds, and location of cestode species in the small intestines of free-range chickens from 6 districts in rural Zimbabwe.

Species	Mazowe (n = 50)	Goromonzi (n = 110)	Zvimba (n = 25)	Chikomba (n = 30)	Zvishavane (n = 2)	Mberengwa (n = 30)	Overall prevalence
<i>Raillietina tetragona</i>	36 (72)	108 (98.1)	15 (60)	24 (80)	21 (84)	24 (80)	149 (84.4)
<i>Raillietina echinobothrida</i>	9 (18)	57 (51.8)	6 (24)	3 (10)	5 (20)	7 (23.3)	87 (32.2)
<i>Raillietina cesticillus</i>	0	70 (63.6)	3 (12)	0	0	0	73 (27.3)
<i>Raillietina (Pirionella) spp.*</i>	1 (2)	0	0	0	0	0	1 (0.4)
<i>Davainea proglottina</i>	8 (16)	0	3 (25)	0	0	0	11 (4.1)
<i>Cotugnia digonopora*</i>	3 (6)	2 (1.8)	0	0	0	0	5 (1.9)
<i>Hymenolepis spp.</i>	0	83 (75.4)	0	0	3 (12)	0	86 (31.9)
<i>Amoebotaenia cuneata</i>	0	69 (62.7)	0	7 (23.3)	2 (8)	0	78 (28.9)
<i>Choanotaenia infundibulum</i>	5 (10)	18 (16.4)	1 (4)	0	0	0	24 (8.9)
Total no. of species	6	7	5	3	4	2	9

n = Total number of chickens sampled per district.
*New records for Zimbabwe.

of Zimbabwe in previous studies¹⁸ and 11 species have been recorded in this study encompassing 6 districts. The additional 3 species recorded in 3 districts in this study (*Laminosioptes cysticola*, *Dermanyssus gallinae* and *Liponyssus bursa*) were at very low prevalence. *Menacanthus stramineus*, *E. gallinae*, and *Me. gallinae* had the highest overall prevalence in that order in this study, which is similar to results reported elsewhere^{1,18}. Of the 3 species mentioned above, *M. stramineus* has been reported to reduce weight gain and egg production in free-range chickens⁴, cause irritation and loss of plumage⁵. *Argas sp.*, although found in lower frequency and limited to only 2 districts, has been implicated as a cause of high mortalities due to the blood-sucking habit of the parasite and may also act as a vector of *Aegyptianella sp.* and *Borrelia sp.*,⁶ and the larvae have

been reported to cause paralysis in chickens¹⁶. The nymphs and adults of the tick are temporary obligate parasites and only visit birds when feeding, indicating that the prevalence recorded in this study could have been higher if the parasite was searched for where the birds were housed at night.

The prevalence of cestode species in free-range chickens in Zimbabwe has been recorded in the Goromonzi district¹⁸ and in the Harare metropolitan area¹⁰. Only 1 cestode species, *R. cesticillus*, was recorded at a very low prevalence¹⁰. Six cestode species were recorded¹⁸ with the following prevalences; *R. tetragona* (94%), *R. echinobothrida* (66%), *Hymenolepis sp* (62%) with *A. cuneata*, *Skrjabinia cesticillus* and *Choanotaenia infundibulum* having a prevalence of $\leq 60\%$. The previously recorded prevalences of the different ces-

tode species are comparable with the findings of this study. However, the authors did not isolate *Cotugnia digonopora*, *Davainea proglottina* and *Raillietina (Pirionella) spp.*, which were present in 3 districts in this study. The difference in the coverage of study areas might have strongly influenced the differences in the diversity of species recorded, since the former study¹⁸ covered only 1 district compared with 6 districts in this study.

Respondents from all districts surveyed in this study mentioned a variety of reasons for keeping chickens, with the majority of households keeping them for meat. This is partly in agreement with studies reported from Tanzania,²⁵ where meat and eggs were predominant. Although all respondents provided housing for their chickens, the majority provided a rustic type of housing and this is

Table 3: Summary of information collected on the management of free-range chickens during the survey.

		Chiweshe (n = 28) (%)	Goromonzi (n = 32) (%)	Chivhu (n = 26) (%)	Zvishavane (n = 21) (%)	Mberengwa (n = 20) (%)
Purpose of keeping chickens	Meat	86	92	87	96	97
	Eggs	8	1	4	1	1
	Income	6	7	9	3	2
Principal sources	Self-raised	81	78	91	93	85
	Commercial	8	21	3	3	6
	Friends/family	7	5	6	2	4
	Others	4	6	0	2	5
Management system	Extensive	95	97	98	98	99
	Intensive	4	3	2	2	1
	Semi-Intensive	1	0	0	0	0
Type of housing	Rustic	88	81	76	66	71
	Well built	8	12	7	6	4
	Human dwelling	4	7	17	28	25
Type of feed	Home-made mix of grains	50	39	43	53	35
	Commercial	8	7	6	3	3
	None	42	54	51	44	62
Frequency of feeding	Every morning	41	37	57	55	31
	Every afternoon	0	9	3	5	9
	Every evening	4	0	0	0	0
	Whenever feed is available	45	54	40	40	60

n = Number of owners interviewed.

attributed to lack of funds and resources to built adequate housing²³.

Result also show that supplementary feeding of the chickens was not routinely practised and hence scavenging was the major feeding system. The high prevalence of cestodes recorded in this study can be attributed to the scavenging diet that includes a variety of species of arthropods and molluscs that act as intermediate hosts to these parasites¹⁷.

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