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# A DIAGNOSTIC SURVEY OF AVIAN PARASITIC INFECTIONS FROM VILLAGE POULTRY IN QWA-QWA, SOUTH AFRICA

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## ABSTRACT

The main aim of this study was to document information on the existence of endoparasitic infections, ectoparasitic infestations and infectious bronchitis viral infection in village poultry of the Qwa-Qwa district of the northeastern Free State province. Endoparasites isolated were: *Ascaridia*, *Capillaria*, and *Trichostrongylus* species. *Eimeria* species (coccidian) was also isolated. No haemoparasites were isolated. Ectoparasites isolated were the red fowl mite *Dermanyssus gallinae*, sticktight flea *Echidnophaga gallinacea*, and louse *Menopon gallinae*. Of the 177 blood samples collected for serodiagnosis, 52 % of tested sera for infectious bronchitis virus by enzyme linked immunosorbent assay (ELISA) were positive. The range of packed cell volume (PCV) values for chickens were from 15-39 %, for ducks 13-36 % and for geese 13-29 %. To ensure a thriving and sustainable free ranging system in Qwa-Qwa, the small scale farmers will require assistance in the control and prevention of disease causing agents through vaccination and administration of drugs to infected poultry.

**Key words:** Free ranging poultry, infectious bronchitis, PCV, helminths, ectoparasites.

## INTRODUCTION

Village poultry are birds of indigenous breeds living in almost symbiotic relationship with human communities. They are usually freely ranging and scavenge for most of their food requirements, receiving sometimes a small supplement of household scraps or of food produced or procured specifically as ration for chickens. Some owners will supply drinking water close to the house, even when surface water is available (Spradbrow, 1993/4).

Village chickens are affected by a wide range of bacterial, viral and parasitic diseases, many of which, particularly parasites, are constantly present (Verger, 1986). Examples include ectoparasites such as lice, mites, fleas and ticks, endoparasites such as helminths and coccidia and haemoparasites such as *Haemoproteus*, *Plasmodium*, and *Leucocytozoon*. The effects of parasitism on birds are often severe, including retarded growth, low egg production and susceptibility to other infections. Other more subtle effects of ectoparasites may also be important. It is only after a thorough study of these parasites and host-parasite relationships that control measures can be effective (Dranzoa et al, 1999).

Infectious bronchitis was first reported in the United States of America in 1931 as a highly contagious clinically acute disease of the respiratory and urogenital tract of chickens. Since then infectious bronchitis has been recognized wherever chickens are kept and assumes particular importance with intensive management of stock (Gordon, 1977). It is caused by strains of coronaviruses, which are enveloped, single stranded RNA viruses (ACIAR-Website, 2000). Tracheal rales, coughing, and sneezing characterize the disease. In addition, a nasal discharge may occur in young chicks, and in laying flocks there is usually a drop in egg production frequently associated with abnormal eggshell formation. The short incubation period of 24-72 hours is a unique characteristic of the disease. Mortality may occur in young chicks due to respiratory or kidney manifestations of infection (Jordan and Pattison, 1996).

The Qwa-Qwa district of South Africa has many villages where the Basotho people still live in traditional lifestyles. They own and breed various domestic animals such as cattle, sheep, goats, pigs and poultry. They own poultry for domestic consumption of eggs and meat. The average flock number is 18 with two or three males and the rest being females and chicks. Other domestic birds owned in Qwa-Qwa are geese, turkeys, ducks and pigeons. The chicken houses are made of inexpensive material such as wire mesh and old corrugated iron. Poultry farmers in Qwa-Qwa use aloe plants, potassium permanganate and Epson salt in order to prevent diseases. Insecticidal powder containing carbaryl (Blue death powder, Robertson`s (Pty) Ltd; Alrode) is used to control ectoparasites and a disinfectant containing carbolic acid (Jeyes fluid, Adcock Ingram; Industria) is used when cleaning the houses (Thekisoe, et al., 2003). Very little is known in rural areas of Qwa-Qwa about the disease that infect the free ranging poultry. The study was therefore conducted in order to identify and elucidate the epidemiology of diseases affecting free ranging poultry of Qwa-Qwa.

## MATERIALS AND METHODS

***Study area.*** Qwa-Qwa lies in the north eastern Free State (28° 50' E, 28° 35 S). It is at 1600m above sea level, and the mean annual rainfall of the north eastern Free State is given as 800mm, and the mean maximum monthly temperatures range between 21° C and 30° C. The mean minimum temperatures range between 6° C and 19° C (Vrey and Smith, 1980).

**Diagnosis of endoparasites.** Pooled fresh faecal samples were collected from the poultry houses and placed into plastic bags. The faecal material was taken to the laboratory for analysis and identification for helminths and coccidia using McMaster and Visser sieve techniques (Malan and Visser, 1993; Reinecke, 1983).

**Collection of ectoparasites.** The birds under observation was sprinkled with carbadust powder (carbamate) and then placed into a plastic bag big enough to contain the whole body, except the head which was left out. The bag was then shaken for about 15 seconds or more. The bird was removed and the contents of the bag were collected into a bottle. Other ectoparasites were collected with forceps from the crevices on the walls into bottle containers. More parasites were also collected from poultry nest materials such as grass and stones. In the laboratory the contents were placed in a petri-dish containing 70 % ethanol and parasites were identified with the aid of a dissecting microscope (Thekisoe et al., 2003).

**Diagnosis of haemoparasites.** Thin and thick blood smears were prepared on microscope slides according to the procedure of De Waal (1999). The slides were fixed using analytical grade absolute methanol and then stained in 10 % Giemsa for 30-35 minutes. Thereafter the slides were removed and

rinsed under running tap water until all stain was removed, and then were allowed to dry in a slide rack. The slides were then examined using a standard light microscope at X1000 magnification (De Waal, 1999).

**Determination of Packed Cell Volume (PCV).** Blood samples were collected from wing veins of chickens, geese and ducks into EDTA coated vaccutainers. Micro-haematocrit tubes (Brand, PCS100) were filled with blood samples collected from the wing vein of the poultry and centrifuged in a micro-haematocrit centrifuge (KHT 400) for ten minutes. Using a micro-capillary reader (KHT 400), the PCV of poultry was measured and recorded.

**Serodiagnosis of infectious bronchitis.** Samples for serodiagnosis were collected from chickens that were chosen randomly in each village from 17 Qwa-Qwa villages between June and November 2001. Blood samples were collected from the wing veins of poultry with a sterile 21G needle into vacutainers. At the Parasitology Laboratory of University of the Free State Qwa-Qwa campus, blood samples were stored overnight at 25° C in a dry incubator for serum to separate from plasma. Serum was harvested into cryovials and thereafter the serum was stored at -35° C and later used for serological assay. In the serology laboratory of the Poultry Reference Laboratory of the Faculty of Veterinary Science at the University of Pretoria ELISA for detection of infectious bronchitis virus antibodies was conducted (kit supplied by Delta Bioproducts). The index values that were less than 100 were considered as negative results, greater than 200 as positive results and those between 100 and 200 were considered as suspect (Poultry Reference Laboratory Standard Operational Procedures, 2000).

## RESULTS

The following helminths were isolated: *Capillaria*, *Ascaridia*, and *Trichostrongylus* species. *Eimeria* species was also identified. These endoparasites were isolated in 17 % of the villages studied.

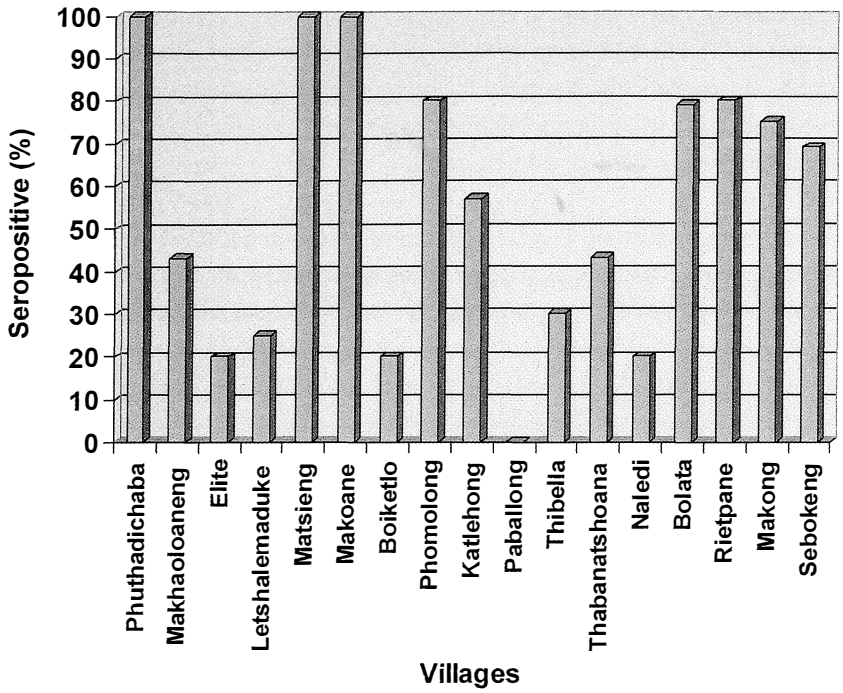
The two most common ectoparasites which were collected in free ranging poultry in Qwa-Qwa were red fowl mite (*Demanyssus gallinae*), which was isolated in 29 % of villages studied and sticktight flea (*Echidnophaga gallinacea*) in 29 % of villages studied. The louse *Menopon gallinae* was isolated in 5 % of the villages studied. There were no ticks isolated in all villages during the investigation. In this study no haemoparasites were isolated in free ranging poultry in Qwa-Qwa.

PCV of chickens ranged from 15 to 39 %, of ducks ranged from 13 to 36 % and of geese ranged from 13 to 23 % (Table 1).

Table 1: Mean value for Packed Cell Volume determined in Qwa-Qwa poultry (%)

| Type of poultry | Mean value |
|---|---|
| Chickens | 25 |
| Ducks | 26 |
| Geese | 23 |

Figure 1: The prevalence of infectious bronchitis infection in chickens from different villages in Qwa-Qwa.




A total of 157 samples were tested for the infectious bronchitis infection using Enzyme Linked Immunosorbent Assay (ELISA) test. From the tested sera, 52 % were positive, 12 % were negative and 32 % were suspect. Figure 1 shows positive sample values per village sampled.

**DISCUSSION**

In the village chickens the presence of helminths would most probably be common, but do not reach burdens that are sufficient to produce severe disease (van der Merwe, 2000). Three species of helminth eggs were isolated in fresh-pooled faecal samples of free ranging poultry in Qwa-Qwa: *Capillaria*, *Ascaridia*, and *Trichostrongylus* species. *Eimeria* species which causes coccidiosis was also found. The results confirm the high risk of endoparasitic infection in free ranging poultry in Qwa-Qwa. Poultry farmers in Qwa-Qwa use aloe plants, potassium permanganate and Epson salt as prophylaxis for different poultry diseases (Thekisoe et al., 2003). This traditional treatment is not scientifically proven whether it is effective or not. Increased biosecurity and improvement of hygiene can eliminate the risk of helminth infections in free ranging poultry in Qwa-Qwa.

Ectoparasites such as lice, mites and ticks cause skin irritations, blood and production losses in poultry. These can also act as vectors of some disease causing agents (Jordan and Pattison, 1996). Those collected from Qwa-Qwa poultry include the red fowl mite *Dermanyssus gallinae*, sticktight flea *Echidnophaga gallinacea* and

the louse *Menopon gallinae*. Poultry owners in villages where ectoparasites were not isolated during the investigation reported that they normally observe heavy infestations of fleas during the warmer months of the year. Although parasites are rarely the sole cause of mortality, they have been found responsible for weight loss and poor nutritional status of village chickens (Permin et al., 1997). No ticks were isolated from the sampled birds. The most important tick, *Argas persicus*, usually feeds for periods at night, spending most of their time off the host, hidden in cracks and crevices (Jordan and Pattison, 1996). As a result, inspection of birds during the day may not reveal infestation. Majority of poultry owners in Qwa-Qwa seem to control ectoparasites successfully. They use insecticidal powder called blue death (carbamate) to treat the birds and burn infested nest materials.

In normal birds PCV of the domestic fowl ranges from 24 % to 43 % (Ritchie et al., 1994). The PCV values were less than 24 % in 35 % the poultry tested. Ectoparasites such as lice, mites and fleas, found infesting Qwa-Qwa poultry may be the reason of blood loss observed in these birds hence the lower PCV values.

Blood parasites in poultry are rarely associated with clinical disease such as anaemia. These parasites occur mostly in various wild birds and other families of birds (Kaufmann, 1996). No haemoparasites were identified in free ranging poultry in Qwa-Qwa. In personal communication with the state veterinarian of the area, he mentioned that no case of haemoparasite infection in poultry had been reported to date. Transmission of parasites is by vectors such as bloodsucking arthropods, hippoboscid flies and biting midges. Distribution and incidence depend on coexistence of the vector species with the avian hosts, with the parasites being widespread throughout the tropical and temperate areas (Russell, 1984). These vectors such as bloodsucking arthropods, hippoboscid flies and biting midges favours high temperatures and high rainfall areas (Kaufmann, 1996), since Qwa-Qwa weather is dominated by low temperatures the existence of haemoparasites is very limited.

The avian infectious bronchitis viral infection is of greatest economic importance in its adverse effect on production and egg quality in layers and on production in broilers. Infection with the virus together with other pathogens such as mycoplasma or certain strains of *Escherichia coli* is common, and increases the severity and duration of the resulting disease (Jordan and Pattsion, 1996). Of the 157 sera tested 52 % were seropositive for infectious bronchitis. The result indicates that chickens tested in Qwa-Qwa have been exposed to infectious bronchitis. This may be due to the fact that the village poultry in Qwa-Qwa had no previous history of vaccination against infectious bronchitis (Thekisoe et al., 2003) hence exacerbating the spread of the disease. Therefore antibodies of infectious bronchitis detected in sera were as a result of natural infection.

In conclusion, this study has indicated that village poultry in Qwa-Qwa is susceptible to different disease causing agents including ectoparasites, endoparasites and viral diseases. Little is known on management and diseases of backyard poultry flocks in developing countries. This is of concern, as these often represent a substantial capital outlay for people with marginal incomes and are important sources of earnings and food (Kelly et al., 1994). The poultry owners in areas where the diseases are identified need to be advised on how to control and treat different diseases and their causal agents, for an example, by different types of vaccines. There is also a need to conduct further research on effectiveness of ethnoveterinary medicines that are used by villagers as prophylaxis. This study would primarily help to fill the information gap and also provide the foundation needed for any future development programs seeking to optimize village chicken production.

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