Diseases of free-ranging chickens in the Qwa-Qwa District of the northeastern Free State province of South Africa

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ABSTRACT

A total of 177 free-ranging chickens from 19 Qwa-Qwa villages were bled from wing veins over a period of 6 months (June–November 2000). Serological tests indicated that 5 % of chickens tested had been exposed to Newcastle disease, 43 % to infectious bronchitis and 63 % to *Mycoplasma gallisepticum* infection. McMaster and Visser sieve techniques were used to determine helminth and coccidia from pooled fresh faecal samples. Helminths isolated in 37 % of the villages investigated were *Heterakis, Ascaridia* and *Capillaria* species. *Eimeria* species were also isolated in 32 % of the villages investigated. The red fowl mite (*Dermanyssus gallinae)* was isolated from some of the birds and their nests. Data from a questionnaire survey indicated that all farmers interviewed had never received any technical support and that their chickens had never been vaccinated against any avian diseases. Only 10.5 % of the owners interviewed had scientific knowledge on poultry diseases. There is an urgent need for the government to support free-ranging poultry farmers by providing subsidised vaccinations and technical support in order to develop and stimulate economic development in impoverished rural areas of South Africa.

Key words: avian helminths, free-ranging chickens, infectious bronchitis, *Mycoplasma gallisepticum,* Newcastle disease.

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INTRODUCTION

The Qwa-Qwa district of the northeastern Free State province of South Africa has many villages where Basotho people still live traditional lifestyles. They own and breed various domestic animals such as cattle, sheep, goats, pigs and poultry. There are free-ranging village chickens (*Gallus gallus domesticus*) in Qwa-Qwa that are provided with night shelters made from inexpensive local materials such as wire mesh and old corrugated iron. Nests are made from dried grass and stones. These chickens serve as an important source of animal protein in the form of meat and eggs to the rural poor in most parts of Africa[3].

A major problem for village chicken production is a single infectious disease, Newcastle disease[7]. It is caused by a group of closely related viruses that form the avian paramyxovirus type 1 (PMV-1) serotype. Infectious bronchitis is a disease of chickens caused by a coronavirus. It is a highly infectious and contagious respiratory disease of chickens[2]. The infection is of greatest economic importance due to its adverse effect on egg production and egg quality in layers and is a cause of respiratory tract infection in broilers. *Mycoplasma gallisepticum* infection is commonly designated as a chronic respiratory disease of chickens and infectious sinusitis of turkeys.

The most common group of internal parasites found in poultry are intestinal nematodes and there are 3 genera that are of significance, *Capillaria, Heterakis* and *Ascaridia*[5]. Of the protozoa that affect chickens, the most important are coccidia of the genus *Eimeria,* which causes coccidiosis. There are numerous external parasites, including lice, mites, ticks, fleas and flies[1]. These parasites cause skin irritation and consequent unthriftiness on their host and as most are bloodsuckers, they may also cause anaemia in heavy infestations.

There is no documented information on poultry diseases of economic importance occurring in the Qwa-Qwa district. The aim of this study was therefore to identify these diseases with special reference to Newcastle disease, infectious bronchitis and *M. gallisepticum* infection. The study also identified endoparasites such as helminths and coccidia, and ectoparasites infesting free-ranging poultry in Qwa-Qwa. A questionnaire survey was conducted with the primary purpose of determining the knowledge and perceptions of village farmers with regard to poultry diseases, vaccinations, technical support and management of backyard chickens.

MATERIALS AND METHODS

Study area

Qwa-Qwa lies in the northeastern Free State (28°50′E, 28°35′S) and is 4470 km^2 in extent[4]. It lies 1600 m above sea level, with a mean annual rainfall of 800 mm.

Serological assays

A total of 177 blood samples was collected from approximately 10 chickens per village from a total of 19 villages. Blood samples were collected from the wing veins of chickens with a sterile 21G needle into vacutainers. Samples were stored overnight at 25 °C in a dry incubator and serum harvested into cryogenic vials using 500 $\mu\ell$ micropipettes. A rapid plate agglutination test for *M. gallisepticum* was conducted with the fresh serum using Nobilis MG antigen (Intervet South Africa) in the Parasitology laboratory of the University of the North's Qwa-Qwa campus. The remaining serum was stored at –35 °C and later used for haemagglutination inhibition test for Newcastle disease (Poultry Reference Laboratory Standard Operational Procedures 2000) and ELISA for infectious bronchitis (Delta Bioproducts Procedures 2000) which were conducted in the Poultry Reference Laboratory, Faculty of Veterinary Science, University of Pretoria.

Collection and isolation of parasites

Pooled fresh faecal samples were collected from the poultry houses and placed in plastic bags. They were then

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taken to the Parasitology laboratory of the University of the North's Qwa-Qwa campus for analysis and identification of helminths and coccidia using the McMaster and Visser sieve techniques[6]. Ectoparasites were collected with forceps from the crevices on the walls into bottles . Additional parasites were also collected from poultry nest materials and other parasites were collected directly from the birds. In the laboratory the parasites were preserved in 70 % alcohol in Petri dishes and identified using a dissecting microscope.

Questionnaire survey

Questionnaires were completed by the owners while the chickens were being bled. The survey aimed to determine if they had any knowledge of poultry diseases, treatment and vaccines and to determine management practices.

RESULTS

Serological assays indicated that 63 % of sera were positive for *Mycoplasma gallisepticum* infection, 5 % for Newcastle disease and 43 % for infectious bronchitis. Endoparasites were isolated in 37 % of the villages investigated. Helminth species encountered were *Ascaridia* sp., *Capillaria* sp. and *Heterakis* sp. (Table 1). The *Eimeria* species was also found to be infesting free-ranging chickens in 32 % of the investigated villages.

Dermanyssus gallinae poultry mites were the most common ectoparasites found. These were isolated in 3 flocks at Malekunutu, Makhala farm and Namahadi. Unidentified lice eggs were also collected at Bolata. However, even in villages where no ectoparasites were isolated from the flocks, the owners mentioned that they had seen lice and mites on their chickens. None of the investigated flocks bore any sign of tick infestation.

Table 1: **Endoparasites isolated from chicken faecal samples in 9 Qwa-Qwa villages.**

Village	*Eimeria* spp.	*Heterakis* spp.	*Ascaridia* spp.	*Capillaria* spp.
Phomolong	P[a]	P	N	N
Thabong	P	N	N	N
Makoane	P	P	P	N
Naledi	P	N	N	N
Tseki	P	P	N	N
Namahadi	N	N	P	N
Thibella	P	P	N	N
Malekunutu	N	P	P	N
Mangaung	N	N	P	P

[a]P = present; N = not found.

DISCUSSION

The fact that 63 % of the sera were positive for *M . gallisepticum* means that although the chickens may not have exhibited any clinical symptoms, they had nevertheless been exposed to the disease. None of the flocks had been vaccinated against *M. gallisepticum*. This disease is common in chickens and can result in production losses. The infection may contribute to higher mortalities in combination with other severe diseases such as Newcastle disease and bacterial infections.

It has been estimated that in most developing countries, annual outbreaks of Newcastle disease kills 70–80 % of unvaccinated village chickens[8]. The results of haemagglutination inhibition tests for Newcastle disease in this study indicate that only 5 % of all chicken serum samples had antibodies to the Newcastle disease virus. Positive results indicate that chickens have been exposed to infection with the virus. From the questionnaire survey it emerged that all sampled flocks had never been vaccinated for Newcastle disease. All chicken owners also mentioned that there were mass mortalities of chickens in their villages in 1998. When asked, owners described Newcastle disease-related symptoms such as greenish diarrhoea, rales, gasping, swelling of the head and neck and paralysis of the wings and neck, all of which resulted in 80–100 % mortality. This might explain the current low antibody titres for Newcastle disease in Qwa-Qwa chickens. The remaining 95 % that did not show antibody response, thus no exposure to the disease, are at risk of being infected. This means that should there be outbreaks of Newcastle disease in the near future, most chickens could die since they are fully susceptible to infection.

Using the ELISA test, 43 % of the serum collected from the free-ranging chickens had high index values for infectious bronchitis antibodies, which is an indication of exposure to the disease. The severity of the disease can only be established once the virus strains that infect Qwa-Qwa chickens are isolated. Secondary infections by other pathogens such as mycoplasmas or certain strains of *Escherichia coli* are common and increase the severity and the duration of the resulting disease[5].

Some of the owners mentioned that they had sometimes observed worms in the chicken faeces. All the chickens investigated in this study are free-ranging, and are thus vulnerable to infections with coccidia and helminths as they scavenge for edible materials.

From the questionnaires that were administered to the owners it emerged that only 15.8 % of them were employed while the rest were either unemployed or pensioners. Only 2 of 19 owners (10.5 %) had scientific knowledge of poultry diseases. All interviewees stated that they had never received any technical support and that their chickens had never received any vaccination. In 37 % of the homes interviewed there were other domestic birds such as ducks, geese and pigeons. Most of the chicken houses were of poor quality, most of them having been made of old corrugated iron and wire mesh, with no roof. All the owners mentioned that they use ethnoveterinary medicine such as potassium permanganate, aloe plants and Epsom salts to prevent diseases. Carbolic acid (Jeyes Fluid, Adcock Ingram, Industria) is used as a disinfectant for cleaning the chicken houses, while insecticidal powders containing carbaryl (Blue Death Powder, Robertson's (Pty) Ltd; Alrode and Carbadust, Effecto, Silverton) are used against ectoparasites such as mites, fleas and lice.

The serological tests indicated that infectious bronchitis, *M. gallisepticum* infection and Newcastle disease exist in free-ranging chickens in Qwa-Qwa. There has been no sustained scientific study of poultry diseases in village chickens because most funding for animal resource studies in South Africa are directed to ruminant animals or commercial chickens. There is thus a need to control diseases in free-ranging village poultry so that there can also be control and elimination of diseases in commercial village poultry. There is thus a need for increased knowledge of poultry diseases in villages or rural areas such as Qwa-Qwa. It is important to start educating owners of free-ranging poultry about poultry diseases and management strategies as this could improve their production. This can be achieved by development of extension programmes such as annual workshops on poultry diseases of economic importance and on control strategies.

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Book review — Boekresensie

Clinical neurology in small animals: localization, diagnosis and treatment

Edited by K G Braund

An International Veterinary Information Service book. Available on-line at http://www.ivis.org

K G Braund and the International Veterinary Information Service (IVIS) have created an extremely useful electronic book for both the small animal clinician and the veterinary student. *Clinical neurology in small animals: localization, diagnosis and treatment,* contains concise, well-referenced, and up-to-date information on how to perform the neurological examination, how to arrive at a diagnosis, and how to institute effective therapy. Because of the electronic format, it is the most accessible and current reference source available on clinical neurology for the small animal clinician and, best of all, is available at no charge.

The goal of IVIS is to publish relevant, up-to-date veterinary information quickly and make its publications available for free to veterinary health professionals throughout the world. To achieve their goal, they have assembled electronic books written by experts in the veterinary field. The IVIS site can be accessed from any computer terminal with Internet capabilities. Once you register as an IVIS subscriber, at no charge, text is available to you for downloading, printing, or viewing on-screen. In the future, IVIS also hopes to make the text available, with all its formatting intact, for downloading to PDAs.

Braund's electronic book is an excellent source for learning to diagnose and treat disease of the nervous system. This level of excellence is no less than one would expect from an author with extensive clinical and research experience in the field of veterinary neurology. The book is divided into sections on neuroanatomical localisation, etiological categories of disease, neurodiagnostic techniques, and special therapeutic techniques including canine rehabilitory medicine, radiation therapy, and management of behavioral conditions. This format allows the clinician to first learn how to perform and interpret the neurological examination, and then, based on the signalment and progression of signs, allows the clinician to quickly use the chapters on categories of disease and diagnostic techniques to arrive at a definitive diagnosis. Thus the book mimics the method of the experienced clinician. Most chapters are written by Braund, but several chapters are authored by speciality experts: A de Lahunta ('Neurologic Examination'), M Berendt ('Epilepsy'), J Steiss ('Electrodiagnostics' and 'Canine Rehabilitation'), A Tipold ('Cerebrospinal Fluid') and K Overall ('Evaluation and Management of Behavioral Conditions'). Several chapters are invaluable to the veterinary neurologist including a fascinating chapter written by J Jones on neuroimaging with beautiful images available at the click of a mouse, and a chapter written by L Forrest, on the principles and uses of radiation therapy. Most chapters may be read in either English or Spanish.

Each chapter is concise, extensively referenced, and highly understandable serving as an excellent reference for both small animal clinicians and veterinary students.

The electronic format has several useful benefits. First, in a given chapter specific words, highlighted in red or blue, may be clicked on in order to open another window where text specifically related to the word may be read. For example, in the list of differential diagnoses for signs consistent with disease of the thoracolumbar spine, a click on the words 'Spinal trauma' opens an additional window with text describing the pathophysiology and treatment of spinal trauma. Clicking on the words 'methylprednisolone succinate' opens a window with information on manufacturers of this drug as well as information on possible routes of drug administration. Clicking on any one of the numerous references opens a window containing the citation for the reference. Second, all text within the IVIS database may be searched for specific terms. Simply typing the term of interest causes a search in catalogues in the IVIS library for documents in English or Spanish containing this term. Clicking on the search results takes you immediately to the relevant chapter.

Finally, and critically, the electronic format allows for regular updates on diseases and their therapies. The date when last updated is provided at the start of each chapter. Chapters are updated every three months by the authors of each chapter.

Braund's electronic textbook is an excellent reference source for the clinician and a useful, and free, learning tool for the veterinary student. I have no doubt it will become a repeatedly visited and bookmarked site on most clinicians' Internet browsers.

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