

Diseases of indigenous chickens in Bokaa village, Kgatleng district, Botswana

E Z Mushi^{a*}, M G Binta^b, R G Chabo^a and K Itebeng^a

ABSTRACT

This study examined flock size and management, level of internal and external parasite burden and seroprevalence of antibodies to poultry pathogens in indigenous chickens in Bokaa village, Kgatleng district, Botswana. The mean flock size was 22.6 ± 6.85 with a range of 11–34. The mean body weights of cocks and hens were 2.28 ± 0.56 kg and 1.70 ± 0.38 kg, respectively. Housing and commercial poultry feed were not provided. *Ascaridia galli*, *Heterakis gallinarum* and *Syngamus trachea* were found in some birds. Although the chickens were not vaccinated against any poultry diseases, serum antibodies to Newcastle disease, infectious bursal disease and infectious bronchitis were detected.

Key words: antibodies, Botswana, indigenous chickens, helminths.

Mushi E Z, Binta M G, Chabo R G, Itebeng K **Diseases of indigenous chickens in Bokaa village, Kgatleng district, Botswana.** *Journal of the South African Veterinary Association* (2006) 77(3): 131–133 (En.). Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana.

INTRODUCTION

According to some authors, African poultry stems from ancient traditional practices⁶. Indigenous chickens, otherwise known as traditional or backyard chickens, are local breeds of chickens (*Gallus gallus domesticus*) reared in rural areas of most parts of the world¹⁹. In these areas they are kept mostly for meat, a source of protein⁶. Usually there is very little nutritional supplementation and no proper housing is provided for the chickens. They range freely, scavenging for food and water²⁰. While in some African countries flock sizes of 20 chickens are not uncommon, in Botswana average flock size has not been established².

Although indigenous chickens are generally of low body weight, they can be a valuable source of tasty meat and eggs. There is scanty information on the health status and productivity of indigenous chickens. In Botswana, few are vaccinated against common poultry diseases³.

The main objectives of this study were to determine flock size and management, levels of internal and external parasites burdens and seroprevalence of antibodies to poultry pathogens in indigenous chickens in Bokaa village, Kgatleng district, Botswana.

MATERIALS AND METHODS

The study was undertaken from August 2003 to February 2004 in Bokaa village in the Kgatleng district, Botswana. Bokaa is located 20 km north of Gaborone. Fourteen randomly selected households were used in the study. A questionnaire was presented to the farmers after they were briefed about its objectives. The questionnaire sought information about the management of the chickens, supplementary feeding, reasons for rearing chickens, water supply, treatment, vaccinations, flock size, causes of mortalities, supplementary sources of income, and gender of the poultry keeper.

During farm visits, hens and cocks were counted, weighed and inspected for signs of anaemia and the presence of ectoparasites. Chicks were those birds which were 3–4 months old and accompanied by a hen. The chickens were gently restrained to expose the brachial vein, the preferred site for venipuncture in birds. The site was cleaned with 'Savlon' followed by 70 % ethanol. Blood was collected into sterile vacutainer tubes without anticoagulant and the serum thus separated was stored at -20°C in 1 ml aliquots.

Ten adult indigenous chickens were bought from 10 different households in Bokaa during the wet summer months, January to February 2004. The birds were starved for a day before *post mortem* examination was performed. The respiratory and digestive tracts were systematically examined after being separated into

trachea, oesophagus, crop, proventriculus, gizzard, and small and large intestines.

The contents of each part of the visceral organs were emptied into separate Petri dishes and the mucosa washed thoroughly with water and later scraped clean with the blunt edge of a scalpel blade. The gut and tracheal washings were examined under a microscope for helminths. The visible parasites were collected and preserved in 5 % formalin, and later identified and counted²¹.

Serum samples were tested for antibodies to the following poultry pathogens: *Mycoplasma gallisepticum*, *M. synoviae*, Newcastle disease (ND), infectious bronchitis (IB) and infectious bursal disease (IBD). Commercially available ELISA kits (Flock check; IDEXX, Westbrook, Maine) were used. The assays were carried out in duplicate serum samples according to the manufacturer's instructions.

The sample:positive ratios (S/P) were calculated as follows:

$$S/P = \frac{\text{Sample mean} - \text{negative control mean}}{\text{Positive control mean} - \text{negative control mean}}$$

The cut-off points for the different pathogens were as follows >0.2 for ND, IB, IBD; >0.5 for *M. gallisepticum* and *M. synoviae*. Any sera with an S/P ratio above the cut-off point was considered positive. Those below were negative.

Graph Pad Prism statistical software was used to generate means and standard deviations.

RESULTS

In total, 317 chickens were found in 14 households, giving a mean flock size of 22.6 ± 6.85 with a range of 11–34 chickens per household. The mean number of hens and cocks was 8.5 ± 2.4 and 3.0 ± 1.41 , respectively. There were 137 chicks, 131 hens and 49 cocks. The ratio of chicks to hens was 1:1.05. The mean body weights of cocks and hens were 2.28 ± 0.56 kg and 1.70 ± 0.38 kg, respectively.

The results of the questionnaire indicated that all the farmers rearing poultry in Bokaa village were females. Fifty per

^aBotswana College of Agriculture, Private Bag 0027, Gaborone, Botswana.

^bNational Veterinary Laboratory, Private Bag 0035, Gaborone, Botswana.

*Author for correspondence. E-mail: ezmushi@bca.bw

Received: June 2005. Accepted: August 2006.

cent of the chickens were kept for domestic consumption and 50 % were for both sale and consumption (Table 1). The egg-laying pattern of the chickens could not be established. The chickens brooded the eggs either in the kitchen or in some crude shelter.

Only 14.3 % of the chickens were provided with housing, while the rest (85.7 %) had no shelters. Most chickens (71.4 %) were scavengers. Occasionally they were given food scraps. Commercial feed preparations were given to only 28.6 % of the chickens (Table 1).

Deaths among chickens, caused by disease and predation, accounted for 78.6 % and 21.4 % respectively. Prior to death, the chickens showed signs of diarrhoea, respiratory distress and nervousness. External parasites such as lice, mites and ticks were not seen on physical examination of the birds.

Water was given to the chicks *ad libitum*. It was also learnt that 7 % of the farmers sought therapeutic intervention at the Animal Health Department, 14 % purchased drugs to treat the chickens and 79 % used traditional decoctions such as *Aloe marlothii*. None of the farmers ever vaccinated their chickens against common poultry diseases such as ND.

Faecal analysis and *post mortem* examination of apparently healthy indigenous chickens indicated the presence of 3 helminth parasites, namely *Syngamus trachea*, *Ascaridia galli* and *Heterakis gallinarum*. *A. galli* was found in the small intestine, and *H. gallinarum* in the caecum. *Syngamus trachea* was only recovered from the trachea. Only 1 species of the Cestode genus *Raillietina* was found in the large intestine and caecum. No helminth parasites were recovered from the oesophagus or crop.

The seroprevalence rates of ND, *M. gallisepticum*, *M. synoviae*, IB and IBD were 12.40, 13.04, 40.99, 34.78 and 65.22 %, respectively.

DISCUSSION

The mean flock size of indigenous chickens in the present study was higher than that reported for rural South Africa⁵. It was lower than that recorded in Chitungwiza, Harare, Zimbabwe¹⁰. It was, however, comparable with that reported for Oodi village, Kgatleng district¹⁵. The results of the questionnaire reflect the persistent pastoral attitude towards chickens. The study in Bokaa also indicated a gender bias, in that all backyard chickens were reared by women. At least 50 % of the chickens were sold while the rest were kept for domestic consumption. Of interest is that chicken markets are a rarity in Botswana. Eggs from the

Table 1: Response of farmers to questions relating to poultry management in Bokaa village, Botswana.

Parameter	Possible response	Number	Percentage response
Gender of poultry keeper	Male	0	0
	Female	14	100
Reasons for keeping poultry	Consumption	7	50
	For sale	0	0
	Both	7	50
Housing	Provided	2	14.3
	Not provided	12	85.7
Feeding	Scavenging and food scraps	10	71.4
	Commercial	0	0
	Both	4	28.6
Water supply	Supplied	14	100
	Not supplied	0	0
Cause of death	Predators	3	21.4
	Diseases	11	78.6
	Both	0	0
Action taken when chickens were sick	Animal Health Department	1	7
	Buy drugs	2	14
	Traditional drugs	11	79
Vaccinations	Yes	0	0
	No	14	100

chickens are traditionally reserved for children and it is taboo for women to eat eggs. Chicken eggs are traditionally reserved for young males for fear of precocious puberty if given to young girls. The questionnaire also showed that chickens were not vaccinated against ND, *M. gallisepticum*, *M. synoviae*, IBD or IB.

Most households cited a disease with clinical signs of diarrhoea, dyspnoea and nervous signs as the most common cause of mortality among chickens. It can only be speculated that mortality may have been caused by ND based on clinical symptomatology. This, however, did not exclude the possibility of infection due to IBD, IB and mycoplasmosis, characterised by respiratory distress⁹. These findings corroborate those from Zimbabwe¹⁰.

In this study, serum from adult indigenous chickens had demonstrable antibodies to ND, IBD and IB. The seroprevalence of IBD in Bokaa was 65.22 %, much lower than that reported for Zimbabwe¹⁰, but higher than that reported for Oodi.¹⁵ Antibodies to IBD have previously been demonstrated in the serum of unvaccinated chickens on farms around Gaborone¹¹. In Botswana, IBD has been shown to be endemic and to predispose chickens to other pathogens such as *Mycoplasma* spp. and ND virus³. Other reports on the presence of agglutinating antibodies to *M. gallisepticum* and *M. gallinarum* in the sera of indigenous chickens have been cited¹². It is therefore possible that the high mortalities in chickens reportedly caused by ND could have been

exacerbated by mycoplasmosis subsequent to intercurrent IBD. The presence of antibodies to ND among unvaccinated indigenous chickens has previously been established¹⁵. Since these chickens were over 6 months of age, when maternal antibodies have waned, they could only have been acquired from a natural infection.

Workers in other African countries have also found antibodies to IBD virus^{16,18}. There is strong supporting evidence for the susceptibility of indigenous chickens to the virus¹¹. While the seroprevalence of *M. synoviae* and IB were 40.99 % and 34.8 %, respectively, these figures were lower than those obtained for Oodi village, Botswana¹³, and Benin⁴. They were comparable to those reported for Chitungwiza, Zimbabwe¹⁰. Antibodies to IB virus have been demonstrated in the sera of local chickens in Sudan, although no clinical disease has been reported from Sudan¹.

The other health constraint encountered was internal parasitism. The nematode parasite *A. galli*, known to cause heavy infestation in wet and warm environments, was one of the most commonly found parasites in this study, although Botswana is a relatively dry country²¹. Heavy infection with *A. galli*, resulting in partial occlusion of the intestinal lumen, has been reported in local chickens in Uganda²². In contrast to these 2 reports, low infection rates were reported for indigenous chickens in Zimbabwe^{8,10}.

Free-ranging predisposes fowls to

cestodes through ingestion of their arthropod intermediate hosts. The only cestode species identified in the faecal samples of chickens from Bokaa village was *Raillietina* sp. at a prevalence rate lower than that reported for Oodi village. The rates were lower than those reported for Nigerian chickens¹⁷ and also in southern Ethiopia²⁴.

Syngamus trachea, known to thrive in humid environments, was found in low numbers in the trachea of some chickens for the first time in Botswana compared with *H. gallinarum*¹⁰. Previous reports from other villages did not mention recovery of the parasite from the trachea¹⁴. It is possible that the low numbers could have been due to the fact that sampling was carried out during a dry period. High temperatures could have destroyed the eggs and infective larval stages.

That poultry farmers resort to traditional decoctions of dubious efficacy to treat sick chickens has also been alluded to in the literature⁷. Indigenous poultry farmers resort to traditional decoctions because they are readily available. There is a need to establish the efficacy of these widely used decoctions.

Apart from the poor aesthetic appearance of the ascarid worms in the gut, they can cause fatal impaction. Since chickens in this study were heavily parasitised, anthelmintics active against ascarid worms should be administered as has been suggested by some authors²³. It is also therefore imperative that chickens be given anti-cestodal treatment to prevent unthriftiness among chickens due to malabsorption and possible digestive disturbances.

It is possible to increase production of backyard chickens and commercialise the system. In spite of its acknowledged importance, backyard chicken production is still being hampered by ND outbreaks in some parts of the world. In order to sustain poultry farming and maximise production, vaccination programmes against ND should be introduced. Campaigns to raise the awareness of the indigenous farmers of the importance of ND should

be carried out and, if possible, financial support to pay for vaccines should be provided. Annual vaccination against ND and IBD would go a long way towards reducing the incidence of these major diseases of indigenous chickens.

ACKNOWLEDGEMENT

This paper was financially supported by the Research and Publications Committee of the Botswana College of Agriculture.

REFERENCES

1. Abd El Rahim B E E, Eisa M, Kheir S A M 1996 Infectious bronchitis virus associated with disease outbreaks in Khartoum. *Bulletin of Animal Health and Production in Africa* 44: 83–86
2. Anon. 1997 *Regional research priorities for crop and livestock resources in the S.A.D.C. region*. Southern African Centre for Cooperation in Agriculture and Natural Resources, Research and Training, Gaborone, Botswana
3. Binta M G, Mushi E Z, Adom E K 1995 The impact of infectious bursal disease in Botswana. *Zimbabwe Veterinary Journal* 26: 110–115
4. Chrysostome C A A M, Bell J G, Demey E, Velhurst, A 1975 Seroprevalence to three diseases in village chickens in Benin. *Preventive Veterinary Medicine* 22: 257–261
5. Dreyer K, Fourie L J, Kok D J 1997 Predation of livestock ticks by chickens as a tick-control method in a resource-poor urban environment. *Onderstepoort Journal of Veterinary Research* 64: 273–276
6. Guèye E H F 1998 Village egg and meat production in Africa. *World's Poultry Science Journal* 54: 74–86
7. Guèye E H F 1999 Ethnoveterinary medicine against poultry disease in African villages. *World's Poultry Science Journal* 55: 187–198
8. Jansen J, Pandey V S 1989 Observations on helminth parasites of domestic fowls in Zimbabwe. *Zimbabwe Veterinary Journal* 20: 15–17
9. Jordan F T W (Ed.) 1990 *Avian mycoplasmosis in poultry diseases*. Baillière Tindall, London.
10. Kelly P J, Chitauro D, Rukwava J M, Majok A, Davelaar F, Mason P R 1994 Diseases and management of backyard chicken flocks in Chitungwiza. *Avian Diseases* 35: 626–629
11. Mushi E Z, Binta M G, Chabo R G, Ndebele R T 1999 Seroprevalence of infectious bursal disease in non-vaccinated indigenous and exotic chickens on selected farms around Gaborone, Botswana. *Onderstepoort Journal of Veterinary Research* 66: 135–137
12. Mushi E Z, Binta M G, Chabo R G, Ndebele R T 1999 Detection of *Mycoplasma gallisepticum* and *Mycoplasma synoviae* in the sera of indigenous chickens by rapid serum agglutination test at Mmopane, Gaborone, Botswana. *Onderstepoort Journal of Veterinary Research* 66: 333–334
13. Mushi E Z, Binta M G, Chabo R G, Ndebele R T, Ramathodi T 2000 Diseases and management of indigenous chickens in Oodi, Kgatleng, Botswana. *World's Poultry Science Journal* 56: 153–157
14. Mushi E Z, Binta M G, Chabo R G, Ndebele R T, Thibanyane T 2000 Helminth parasites of indigenous chickens in Oodi, Kgatleng district, Botswana. *Journal of the South African Veterinary Association* 71: 247–248
15. Mushi E Z, Binta M G, Chabo R G, Hyera J M K, Thibanyane K M, Mkaria J 2001 Antibodies to Newcastle disease virus in the sera of indigenous chickens in Oodi, Kgatleng, Botswana. *Onderstepoort Journal of Veterinary Research* 66: 69–70
16. Okeye J O A, Aba-Adulugba E P, Ezeokonkwo R C, Udem S C, Orajaka L J E 1999 Susceptibility of local Nigerian and exotic chickens to infectious bursal disease by contact exposure. *Tropical Animal Health and Production* 31: 75–81
17. Sa'Idu L, Abdu P A, Umoh J U, Abdullahi U J 1994 Diseases of Nigerian indigenous chickens. *Bulletin of Animal Health and Production in Africa* 42: 19–22
18. Salman A, Shuaib M A, Suleiman T H, Ginawi M 1983 Infectious bursal disease in the Sudan. *Tropical Animal Health and Production* 15: 219–220
19. Say R R 1987 *Manual of poultry production in the tropics*. CABI, Wallingford
20. Sonaiya E B, Branckaert R D S, Gueye E F 1999 *Research and development options for family poultry*. First INFPD/FAO electronic conference on family poultry, 7 December 1998 – 5 March 1999. <http://www.fao.org/ag/aga/info/subjects/en/infpd/documents/econ..>
21. Soulsby E J L 1986 *Helminths, arthropods and protozoa of domestic animals*. Ballière Tindall, London
22. Ssenyonga G S Z 1982 Prevalence of helminth parasites of domestic fowl (*Gallus domesticus*) in Uganda. *Tropical Animal Health and Production* 14: 163–166
23. Ssenyonga G S Z 1982 Efficacy of fenbendazole against helminth parasites of poultry in Uganda. *Tropical Animal Health and Production* 14: 201–204
24. Tegene N 1993 Prevalence of diseases, parasites and predators of local chickens in Leku, southern Ethiopia. *Bulletin Animal Health and Production in Africa* 41: 317–321