ACCELERATED POSTMORTEM DIAGNOSTIC TECHNIQUES AND CAUSE SPECIFIC MORTALITY RATES IN DOMESTIC FOWL.

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SUMMARY

Routine postmortem examination coupled with simple laboratory diagnostic tests appears to be an acceptable and relatively cheap way of diagnosing poultry diseases under field conditions. Cytological, histopathological and bacteriological techniques could be useful as long as common staining reagents and a light microscope are available. Some viral bacterial and protozoan infections which normally cause alarming mortalities in chicken were provisionally diagnosed by typical gross postmortem findings and the diagnosis was confirmed or supported by histopathology and cytological findings. Weather, housing, population and nutrition are known to influence the pattern of occurrence of infectious diseases in the flocks but were not assessed in this study. Internal parasitism seemed to be a common problem all the year round and occurred alone or secondary to other disease. The incidence of the infectious diseases was found to be coccidiosis 16%, Newcastle disease 14%, visceral gout 10%, colibacillosis 6.4%, salmonellosis 6%, infectious bursal disease 5.5%, egg peritonitis 5.5%, anaemia due to various causes 4% and yolk sac infection 3.8%. About 11% of the cases were considered non specific implying that no major diagnosis or cause of death could be determined at least by the methods used. Other causes of death occurred in relatively lower magnitudes all of which constituted about 11% of the cases.

INTRODUCTION

The domestic fowl (*Gallus domesticus*) is an important bird in Tanzania. There are probably over 20 million poultry in the country and while a proportion of these are kept under semi commercial conditions nearly 14 million constitute "indigenous chickens" and play a significant role in providing food for rural communities (United Republic of Tanzania,1988).

Despite the importance of poultry in Tanzania relatively little has been published on their causes of diseases, morbidity and mortality rates other than specific studies-for example on Newcastle disease (Minga and Nkini,1986). Data on postmortem findings are to be found in the reports of Veterinary Investigation Centres and in other Government reports but have usually not been published elsewhere.

Semi commercial farmers are uncertain of

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the reliability of poultry projects for fear of possible outbreak of infectious diseases which can not be diagnosed using available laboratory facilities in the District clinics (Natujwa 1992, personal communication).
In this paper the diagnostic techniques and the various causes of death in poultry and tbeir magnitudes are described, together with a list of findings in domestic fowl over a one year period from October 1991 to the end of September 1992. The effect of specific parameters like weather, housing, flock population and nutrition was not considered in this paper.

MATERIALS AND METHODS

This study include all domestic fowl submitted dead for postmortem examination at the Faculty of Veterinary Medicine Clinic during the period of October 1991 to September 1992 and fowis submitted alive which either died or were killed and examined postmortem.A total of 235 fowls was examined. Live birds that were examined clinically, and in many cases subjected to diagnostic tests and treatment but neither died nor were killed, are not covered in this paper.
The clinical history of each bird was taken and relevant information such as the origin, age, method of management, total number in the flock,number affected,and previous vaccinations and treatments, were recorded in a specially designed postmortem form.Each bird submitted had its own form. Each dead bird was put in a plastic bag and birds from the same flock suspected to have succumbed to a common disease are put in a large bucket to avoid contamination. Another plastic bucket was available for live birds awaiting examination.

Postmortem examinations were carried out in a systematic fashion.The bird was first examined externally, particular attention being paid to the body orifices, skin, plumage,head and feet. The carcass was opened and the intestinal organs were examined in situ and where appropriate samples were taken for laboratory investigation.

Wet preparations from caecum and rectum, and the intestinal contents were examined under the microscope for parasites.

The McMaster technique was carried out to count helminth eggs and coccidial oocysts. Where necessary, tissues, swabs,or exudates were plated on to bacteriological media for bacterial examination and identification by standard techniques. Only aerobic cultures were performed.Tissues from selected cases were fixed in buffered formalin and following trimming were embedded in paraffin for sectioning and staining with Haematoxylin and eosin. The histological sections were examined under the light microscope.

Cytological examination was carried out where appropriate. Touch preparations (impression smear) of liver or spleen were made, fixed with methanol and stained with Giemsa or Hemacolor (Merck, Germany) and examined under the light microscope. Findings other than those relevant for immediate diagnosis were also recorded in order to provide additional information about the individual or flock and its health status.

RESULTS

The main findings are summarized in Table 1. There were 26 major diagnoses and/or causes of death and are arranged in the order of magnitude. The first ten causes of death in the list pose significant threat to poultry production due to the frequency of occurrence and they constitute a total of 82.4%: 11% of which were considered as "non specific" implying that no major diagnosis or cause of death could be determined. Diagnostic methods used for each cause of death are listed in the same table.

DISCUSSION

The protocol described for postmortem examination proved satisfactory and rapid. When there was high number of deaths in a flock, the rapidity was important because in many cases the owner of the bird was anxious to wait in the clinic while the examination was performed. The aim in each case was a rapid definitive or provisional diagnosis so that control methods could be initiated promptly. Gross postmortem findings can often provide a definitive or provisional diagnosis, and this frequently proved to be the case in this study.

Some conditions such as yolk sac infection, visceral gout,egg peritonitis, intussusception, obstruction and strangulation of gut were diagnosed satisfactorily on gross findings alone, and although they were sometimes confirmed by bacteriology, histology or cytology, such supporting tests were usually unnecessary. Diagnosis of some other conditions such as predation, snake bite and heat stress were based primarily upon gross findings but usually required careful analysis of history and /or meticulous dissection.

Some conditions such as coccidiosis and certain cases of infectious bursal disease (IBD), were strongly suspected on the basis of gross findings but generally required laboratory tests for confirmation. Diagnoses of diseases with obscure clinical signs such as avian leukosis, fatty liver and liver abscesses were only made as a result of bacteriological, cytological, or histological investigations. A few only such as skeletal disorders needed specialized techniques such as radiology. Bacteriological cultures of swabs and exudates enhanced diagnosis of salmonellosis and colibacillosis which might otherwise be mistaken for other bacterial infections.

Cytological examination proved particularly useful in the clinic and could be used in the field so long as stain and microscope are available. Cytological examination is cheaper and simpler than histopathology and provides an opportunity to examine cells from tissues, exudates, or transudate within a few minutes of taking samples.

Cytopathology is becoming well recognized as a diagnostic tool in "exotic" birds (Campbell, 1988) and this study confirm its value in poultry under tropical conditions. Some diagnoses were either not possible or could not be confirmed because of the limited laboratory support available. Thus, for example, the only viral infections diagnosed in this study were fowl pox, Newcastle disease infectious bursal disease,and leukosis.

Table 1: Causes of deaths and diagnostic methods used, percentages in parenthesis

Cause	Number of cases	Other findings	Method of diagnosis
Coccidiosis	38(16)	*Ascaridia galli)* (9) Yolk sac infection (3) Nephritis (1) Infectious bursal disease (4)	Gross lesions wet preparations and histopathology
Newcastle disease	33(14)	*Ascaridia galli* (6) *Heterakis* spp (11) Pox (1) Coccidiosis (3) Infectious bursal disease (IBD) (4) Egg peritonitis (1) Visceral gout (2)	Gross lesions, histopathology
Non specific	25(11)	Haemorrhagic enteritis (6) *Ascaridia galli* (7) Emaciation (1) Trauma (1)	Various methods
Visceral gout	23(10)	*Ascaridia galli* (10) Nephropathy (10) Gut blockage (1)	Gross lesions, histopathology
Colibacillosis	15(6.4)	Coccidiosis (2)	Gross lesions, bacteriology
Salmonellosis	14 (6)	Stick tight fleas (2) IBD (2) Hypovitaminosis A (1)	Gross lesions, bacteriology
IBD	13(5.5)	Coccidiosis (3) *Ascaridia galli* (7)	Gross lesions, histopathology
Peritonitis	13(5.5)	Infectious coryza (2)	Gross lesions, histopathology
Anaemia	10(4.2)	Gizzard ulcers (1) Ruptured liver (3) Broken wing (2) *Ascaridia galli* (2)	Gross lesions, histopathology

Table 1 Continued: Causes of deaths and diagnostic methods used

Cause	Number of cases	Other findings	Method of diagnosis
Yolk sac infection	9(3.8)	None	Gross lesions, bacteriology
Ca/P deficiency	7	None	Gross findings, radiology
Infectious coryza	6	*Heterakis* spp (1) *Ascaridia galli* (1)	Gross lesions, histopathology
Obstruction of gut	4	None	Gross lesions, history
Avian leukosis	3	None	Gross lesions, histopathology
Hypovitaminosis A.	3	None	Gross lesions
Intussusception	2	None	Gross lesions
Predation	2	None	Gross lesions, history
Heat stress	2	None	Gross lesions, history
Encephalomyelitis/ Encephalomalacia	2	None	History, signs histopathology
Sulphur toxicity	2	None	Gross lesions, history
Cannibalism	2	None	Gross lesions
Liver abscess	2	None	Gross lesions, histopathology
Abscess (oviduct)	1	Peritonitis air sacculitis	Gross lesions, histopathology signs, histopathology
Candidiasis	1	None	Gross lesions, wet smears
Snake bite	1	None	Gross lesions, history
Intestinal strangulation	1	None	Gross lesions
Fatty liver	1	*Ascaridia galli*	Gross lesion, cytology
Total	235		

Birds with these diseases showed what were considered to be typical gross postmortem findings and usually the diagnosis was confirmed by histopathology or cytology. A more comprehensive range of tests would bave permitted diagnosis of other conditions, especially those due to viruses and mycoplasmas, but would increase the time and cost involved.

This study indicate that it is possible to provide satisfactory diagnostic service using available facilities in the field. Many diagnoses can be made on the basis gross postmortem examination and or simple laboratory tests. Performance of postmortem examination in a clinic environment can present problems and it is particularly important to minimize the risk of spread of infection from a dead bird to live ones that are still awaiting examination. This problem was addressed at the outset of our study by installing

large plastic buckets for live and dead birds respectively and by carrying out postmortem examinations on special trays with thorough disinfection at the end of the procedure. So far there has been no evidence of spread of infection.

The advantages of routine postmortem service as a diagnostic tool are many. First and foremost, it can provide a rapid diagnosis. Most owners are able to have an answer and advice within an hour of arrival at the clinic. Secondly, the service gives an excellent opportunity to train veterinary students and field officers who may be working in areas of the country where laboratory support facilities are minimal. Thirdly the methods described are cheap and easy to perform. This is particularly important when there are economic stringency or a shortage of laboratory materials. The simple cytological technique described alone provides a cheap way of examining tissues compared with the costly preparation of histological sections.

Finally it should be noted that performing postmortem examination and carrying laboratory tests under the circumstances described means that one can show the owner the findings. This has proved valuable at Sokoine University of Agriculture. Owners appear convinced of the need to treat their chicken for parasites if they are shown ascarid worms filling the intestines or of the need to vaccinate the flock when they see haemorrhage characteristic of Newcastle disease in the intestinal tract of dead in contact birds.

In this paper no distinction has been made between semi commercial and indigenous" (local) fowls although birds from both groups were examined. Future analyses will attempt to differentiate between them and to relate differences in diagnosis and findings to methods of management. This is important since some conditions, such as infestations with sticktight fleas (*E. gallinacea*) are rare in housed commercial fowls but often common under rural conditions (Cooper and Mellau, 1992). Other diseases such as infectious bursal disease, however, are almost invariably a feature of intensively reared commercial birds.

Poultry are likely to assume even more importance in Tanzania in years to come (Machangu *et al.*, 1992). A prime objective for the veterinary profession must be to keep such birds healthy and to diagnose diseases promptly at an early stage (Jordan, 1990). The use of routine postmortem examination, coupled with simple laboratory diagnostic tests, appears to be an acceptable and relatively cheap way of providing such diagnoses.

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