The Occurrence of Deep Mycoses in Livestock at the University of Ibadan Farm

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SUMMARY

TO date, there is little or no information on fungal diseases of animals in Nigeria. This paper presents eight cases of deep-seated mycoses of livestock observed in Ibadan. They include two cases of phycomycosis and four of aspergillosis affecting cattle and sheep, and two cases of nocardiosis affecting cattle. The phycomycoses involved the alimentary tract and adjacent abdominal organs as well as the eye. The aspergilloses affected the respiratory system and the rumen and abomasum. Bovine nocardiosis affected lymph nodes, skin and mammary gland. As the infective organisms live in the soil and mouldy feeds, improved sanitation in the farm can help to reduce the incidence of these diseases which generally respond poorly to treatment.

INTRODUCTION

OF the groups of infectious diseases of animals, those due to fungi have probably received the least attention in the tropics, and as pointed out by Dawson (1972) a true incidence of animal mycoses cannot yet be established. One main reason for this is that the fungi do not appear to be responsible for any such major single disease as trypanosomiasis, rinderpest or haemorrhagic septicaemia which can affect entire herds. Nevertheless, and as was recently pointed out by Ainsworth and Austwick (1973), mycoses of animals merit serious and special study for some of them cause considerable and avoidable economic losses. These losses can only be avoided if the existence of these diseases is borne in mind and appropriate measures taken to prevent them.

Apart from avian aspergillosis (brooder pneumonia) which is well recognised,

there is no available information on the deep-seated or systemic mycoses of animals in Nigeria. This tends to give the impression that the diseases do not occur, although many of the pathogenic fungi are believed to be world-wide in distribution and human infections do occur in Nigeria (Martinson, 1972).

According to Soltys (1963) and Davis, Dulbecco, Eisen, Ginsberg and Wood (1970) the main classes of fungi known to be pathogenic to man and animals are:

Fungi Imperfecti — with septate hyphae and no sexual spores (the ringworm group)

Ascomycetes — with septate hyphae and sexual spores (e.g. *Aspergillus*)

Phycomycetes — with nonseptate hyphae and sexual spores (e.g. *Mucor*)

The actinomycetes, including *Nocardia* spp, are not true fungi but filamentous bacteria which produce diseases similar to those of some of the true fungi. They are therefore often grouped along with the mycoses in animal and human literature (Soltys, 1963; Wolstenholme and Porter, 1968; Jawetz, Melnick and Adelberg, 1970; Ainsworth and Austwick, 1973).

This report deals with cases of phycomycosis, ascomycosis and nocardiosis observed in livestock in Ibadan during the course of postmortem examination. De-

tails of the pathology of these and other mycoses of animals will be reported elsewhere.

MATERIALS AND METHOD

The cases include 4 cattle and 4 sheep, all but two of which were observed during the past 2 years. The animals originated from the University of Ibadan teaching and research farm.

Tissue specimens removed were processed routinely for histopathology. Spe-

cial stains employed included periodic acid-Schiff, Gomori's methenamine silver, Brown and Brenn, and modified Fite-Faraco technique (Luna, 1968). Specimens were also removed for standard microbiological and mycological examination.

RESULTS

There were 2 cases of phycomycosis, 4 of ascomycosis and 2 of nocardiosis (Table 1).

TABLE 1

Deep Mycoses of Livestock at Ibadan University Farm

<i>Type of Mycosis</i>	<i>Animal Case</i>						
	<i>No.</i>	<i>Affected</i>	<i>Breed</i>	<i>Age</i>	<i>Sex</i>	<i>Organs Affected</i>	<i>Concurrent Disease</i>
Phycomycosis (Mucormycosis)	1	Cattle	Ndama	4 yr.	F	Rumen, reticulum, omasum, omentum, mesentery, spleen urinary bladder	None
	2	Sheep	W.A.D.*	2 yr.	M	Eye	Trypanosomiasis
	3	Cattle	Germ.** Brown	2 yr.	F	Lung	Heartwater
Ascomycosis (Aspergillosis)	4	Sheep	W.A.D.*	3 yr.	F	Lung, bronchial lymph nodes	Mange
	5	Sheep	W.A.D.*	2 mo	F	Rumen	Retropharyngeal abscess
	6	Sheep	W.A.D.*	4 days	F	Abomasum	Pneumonic Pasteurellosis
Nocardiosis	7	Cattle	W.F.**	8 yr.	F	Lymph nodes	None
	8	Cattle	W.F.***	Adult	F	Mammary Gland, Skin	None

*W.A.D. = West African Dwarf

**Germ. Brown = German Brown

***W.F. = White Fulani.

PHYCOMYCOSES

Case 1

A four-year old Ndama cow was presented for necropsy with a history suggesting intestinal obstruction. All animals

in the group had been poorly cared for for a few days because of a labour dispute. At necropsy, extensive haemorrhagic infarcts were found involving more than 75% of the wall of the rumen, omasum and reticulum and their peritoneal covering.

The omentum, mesentery, spleen and urinary bladder were also affected. Histologically, there were extensive necrosis and moderate neutrophilic inflammatory reaction around numerous fungal hyphae present in the tissues and in thrombosed blood vessels. The hyphae were broad, nonseptate and branching at right angles (Fig. 1). The organism could not, however, be cultured. The case was diagnosed as a primary alimentary mucormycosis (Symmers, 1968; Jubb and Kennedy, 1970; Meyer and Armstrong, 1973).

Case 2

A two-year old sheep experimentally infected intravenously with *Trypanosoma brucei* for about 2 months developed clinical kerato-conjunctivitis. The condition of the eye deteriorated rapidly and the animal was killed 3 weeks later and the eye examined histologically. There was severe granulomatous inflammation and necrosis of the cornea and conjunctiva. The inflammation extended deep into the anterior chamber and uvea and also involved the ocular muscles and the eyelids. Branching non-septate hyphae were present in the lesion. It was diagnosed as an ocular phycomycosis complicating trypanosomiasis.

ASCOMYCOSSES

Case 3

A two-year old German Brown cow died of heartwater about 10 days after calving. Apart from changes due to heartwater, there were yellowish-grey nodules in the right diaphragmatic lobe of the lung. Microscopically these nodules consisted of acute inflammatory cells and fluid exudate around mycelia of septate hyphae branching at acute angles (Fig. 2) and resembling *Aspergillus sp.* (Cousin;

Maloney, Bannatyne and Angus, 1973; Meyer and Armstrong, 1973).

Fig. 1. Photomicrograph of bovine rumen wall invaded by a phycomycete. Note the fungal branching at right angles. Gomori's methenamine silver. X 150 approx.

Fig. 2. Photomicrograph of bovine lung with an ascomycosis. Mycelial plugs in alveoli are invading the alveolar walls. Haematoxylin and eosin, X 350 approx.

Case 4

A three-year old ewe purchased for experimental purpose developed extensive psoroptic mange lesions on the skin before it could be used. The animal was left untreated and it died later. At necropsy, there was extensive dermatitis. In addition, there were large areas of necrosis in the lung as well as smaller nodules of abscessation. The whole of the right lung was affected and up to 70% of the left. The bronchial and anterior mediastinal lymph nodes were also affected. Histologically,

there was a necrotizing and purulent pneumonia and masses of fungal hyphae in the tissues and blood vessels. *Aspergillus fumigatus* was cultured from the lung lesion.

Case 5

A two-month old lamb was reported to be getting lean as a result of an abscess on the left side of the base of the tongue including the tonsil. It died despite treatment with antibiotics. At necropsy, there was a severe haemorrhagic necrosis (infarction) of the rumen wall. About 50% of the organ was affected, involving all the ventral walls and extending dorsally. There were multiple raised red areas about 0.5 cm in diameter on the mucosal surface and visible from the serosa. Histologically, there was acute haemorrhagic infarction of the rumen wall, extensive submucosal and subserosal oedema and vasculitis with thrombosis. Septate fungal hyphae were present in the lesion and *Aspergillus fumigatus* was isolated on culture.

Case 6

The subject was a newborn lamb which died 4 days after birth. There was bronchopneumonia due to *Pasteurella haemolytica* at necropsy. In addition there was acute haemorrhagic infarction of the wall of the abomasum similar to that of case 5. *Aspergillus fumigatus* was isolated from the tissue and also detected histologically.

NOCARDIOSIS

Case 7

An eight-year old White Fulani cow was slaughtered because it had progressive respiratory distress caused by a large swelling in the retropharyngeal region. At necropsy there were two prominent lymph nodes each measuring approximately 15 x 12 cm and one on the roof of the

glottis while the other was on the right side. In addition, there were several large nodules and miliary small ones present at the root of the tongue, the retropharyngeal and anterior neck region, and extending to the salivary glands. Each lymph node and nodule consisted of numerous confluent yellowish abscesses surrounded by prominent fibrous tissue and blood vessels. The pus was in the form of thick fluid or paste. Histologically, there was chronic purulent granulomatous inflammation of the lymph nodes, tonsil and salivary glands. A pure culture of *Nocardia sp.* was obtained from the lymph node.

Case 8

An aged cow had several skin nodules and a swelling in the mammary gland. The cause of death was not known but histological examination showed granulomatous dermatitis and mastitis typical of *Nocardia sp.* Partially acid-fast, gram positive, filamentous organisms were present in the tissues.

DISCUSSION

Evidence has been presented to show that diseases due to fungi (mycoses) occur in Nigerian Livestock. Some of the fungi are specific pathogens that are capable of causing the death of their hosts without the assistance of any known predisposing factors. Most of them, however, the so-called opportunistic fungi — are harmful only in animals which are debilitated from some other conditions such as trypanosomiasis, malnutrition, chronic parasitism or other bacterial or viral infections. The phycomycetes are mostly saprophytes growing in the soil. The fungi assume a pathogenic role when the right environment is created for them in the animal body. Improved sanitation in the farm

can help to reduce the incidence of some of the diseases they cause.

Inhalation and ingestion of infective spores in mouldy feed are the main methods by which aspergillosis is contracted in the field (Soltys, 1963; Ainsworth and Austwick, 1973; Angus, Gilmour and Dawson, 1973). The resulting lesions are therefore found mainly in the lungs, the alimentary tract and their draining lymph nodes. Therefore, apart from the well-known dangers of mycotoxicosis, mouldy feeds can also predispose to deep mycosis.

Nocardia organisms are believed to be saprophytes on decaying organic matter which are introduced into the body through abrasions (Jubb and Kennedy, 1970). Consequently, the skin and superficial lymph nodes are the organs most frequently affected in cattle. In a recent slaughter house survey in Ibadan, a fairly high incidence of localized lymphadenitis of the bovine head was found, the main causal agents being *Nocardia* sp. and *Mycobacterium* sp. (Ikede, unpublished data). Unlike the true fungi referred to above, nocardial infections would probably respond well to treatment with sulphonamides if the diagnosis was made early enough (Goodman and Koenig, 1970).

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