Journal of
Advanced Veterinary Research
Volume 3 (2013) 98-101 **Original Research**

Fungal Contamination of Some Poultry Houses in Kaduna State, Nigeria

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Accepted 10 July 2013

Abstract

The study was conducted to assess the level of fungal contamination of poultry houses with emphasis on Aspergillus species contamination of litter, feeders, drinkers and the housing materials. Ten swabs each from ten locations and materials (100) of the 10 poultry houses were collected for fungal isolation. A total of 126 fungi belonging to 5 genera were isolated from the different parts of the poultry environment viz; Aspergillus, Mucor, Candida, Rhizopusand Penecillium species with Aspergillus and Candida species having the highest frequency of isolation, 69 (54.76%) and 27 (20.93%) respectively. Three species of Aspergillus were isolated *A. fumigatus* (22), *A. flavus* (22) and *A. niger* (18). Fungi were isolated from all parts of the poultry sampled with a higher rate of isolation from the doors, window nets, roof and feeders. The presence of Aspergillus and Candida species which are important poultry pathogens i.e causing Aspergillosis, mycotoxicosis and Candidaisis indicates an economic threat the farmers as well as to the health of the bird.

Keywords: Contamination; fungi; poultry house; Zaria; Kaduna State Nigeria

Introduction

Raising birds under confined structures, with intensive feeding is important in achieving maximal production (Fulleringer *et al*., 2006). This system of production however, has its disadvantages as microorganisms can easily accumulate in such building, posing a threat to the birds. Fungal diseases have emerged in recent times as a major concern to the health of poultry and its workers (Shin *et al*., 2004;Sajid *et al*., 2006). Fungal spores are ubiquitous in nature and can easily be introduced into the poultry house. The warm and humid environment of the poultry house favors the growth and development of a variety of fungi, making it easy for colonization and spread of such fungi. The spores or toxins of these fungi may contaminate the environment of the poultry house or the poultry feed posing a threat to both birds and humans that work in the poultry house. Bird may inhale the spores or ingest the toxins may resulting in disease especially in immunocompromised birds or birds that inhale a high dose of the spores. Factors such as poor ventilation, malnutrition, vaccination, and long term use of corticosteroids may precipitate mycosis in birds. The infection in poultry may occur if litter, feed, feeders, drinkers or the environment of the poultry house is contaminated by pathogenic fungi. This study was conducted to assess the level of fungal contamination of poultry houses with emphasis on Aspergillus species contamination of litter, feeders, drinkers and the housing materials.

Materials and methods

Study Area

The study area was farms located in Zaria and Kaduna of Kaduna State, Nigeria. Kaduna State is located between latitudes 11032' and 9020'N and longitude 8o50' and 6o51'E.the State is positioned in the Northern Guinea Savannah zone of Nigeria.4 The area is characterized by three climatic seasons which consists of the cold dry season (November-February), hot-dry season (March-April) and the

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ISSN: 2090-6277/2090-6269, www.advetresearch.com

wet/rainy season (May-October) (Ayo *et al*., 1999). The annual rainfall peaks in the month of August with the average of 146 mm. The average humidity is highest in August with 75.6 mm/Hg and lowest at the months of December- January with 38.2 mm/Hg. The mean temperatures for the zone are 10.7^0C and 38.75^0C minimum and maximum respectively (Agbogu *et al*., 2006).

Study Population

Ten poultry farms were selected based on clinical records of the farms from the Poultry Ambulatory Unit of the Veterinary Teaching Hospital, Ahmadu Bello University Zaria.

Ten swabs each from ten locations and materials (100) of the 10 poultry houses were collected. The swabs were taken from 10cm sq area of each of the sites and materials which were door, pole, window net, roof, feeder, drinker, litter, feathers, feces and wall of the poultry house. All the samples were labeled and taken to the laboratory for culture and isolation of fungi.

Fungal Isolation and Identification

The isolation of fungi was done using Sabouraud's Dextrose Agar (SDA) (Oxoid UK) medium, which was prepared according to the manufacturer's specification (Oxoid UK) with addition of 0.05 g/ml of chloramphenicol to control bacterial contamination (Ainstworth and Austwick, 1973). The SDA was then dispensed in 10 ml aliquots into universal bottles and stored in the refrigerator until used. Each swab was inoculated on the SDA slant, labeled and incubated at room temperature and observed for fungi growth daily for a period of 7 days. All the samples that had no fungal growth were discarded after seven days (Ainstworth and Austwick, 1973).

The growths from the cultures were observed for the colonial morphologies i.e. size, color, topography and aerial growth and these characteristics were used to identify the genus and species (Guinea *et al*., 2006). The growths were prepared for microscopic observation by staining them on glass slides using lactophenol cotton blue stain. The stained slides were observed under ×10 magnification using a light microscope (Olympus Inc. USA).Characteristics of fungi such as hyphae, conidial heads and the arrangement of the conidia where observed. All yeast- like growths were Gram stained and. Photographs of colonies and microscopic morphology were taken.

Results

Fungi from poultry houses

Seven fungi species ascribed to 5 genera were isolated from different parts of the ten poultry houses and they were Aspergillus, Mucorspp, Rhizopusspp, Candida spp and Penicillium spp. Out of the 5 fungi isolated Aspergillusspp and Candida spp were the most frequently isolated. The rate of fungi isolation varied from one poultry house to the other. Some samples yielded more than one isolate (Table 1).

Sixty nine (54.76%) of the total (126) fungi isolated were Aspergilli out of which 29 (42.00%) were *A. fumigatus* while 18 (26.10%) and 22

Table 1. Occurrence of fungi isolates in the ten sampled poultry houses

Poultry House	Total fungi isolated	*Aspergillus* Spp	*Candida* Spp	*Rhizopus* Spp	*Penicillium* Spp	*Mucor* spp
A	8	6	2	0	0	0
B	10	3	0	4	0	3
C	14	10	2	0	0	2
D	13	5	1	2	2	3
E	15	9	2	1	2	1
F	16	12	2	0	2	0
G	10	4	3	3	0	0
H	11	5	5	0	1	0
I	16	11	3	1	0	1
J	13	4	7	1	0	1
Total	126	69	27	12	7	11

Table 2. Occurrence of Aspergillusspp in the ten sampled poultry houses.

Poultry House	*Aspergillus* spp isolated (%)		
	A. fumigatus	*A. niger*	*A. flavus*
A	4(13.8)	2(11.1)	0
B	1(3.4)	2(11.1)	0
C	5(17.2)	4(22.2)	1(4.5)
D	1(3.4)	1(5.6)	3(13.6)
E	5(17.2)	1(5.6)	3(13.6)
F	2(6.9)	3(16.7)	7(31.8)
G	2(6.9)	0	2(9.1)
H	3(10.3)	0	2(9.1)
I	4(13.8)	3(16.7)	4(18.1)
J	2(6.9)	2(11.1)	0
Total	29(42.0)	18(26.1)	22(31.9)

Table 3. Aspergillusspp isolated from locations and materials

Locations	*Aspergillus*spp isolated			
	A. fumigatus	*A. flavus*	*A. niger*	Total
Wall	0	3	2	5
Roof	5	1	2	8
Litter	2	2	0	4
Poles	2	2	3	7
Doors	7	2	3	12
Window net	4	2	5	11
Drinker	2	4	0	6
Feeder	2	3	2	9
Feces	2	2	1	5
Feathers	3	0	0	3
Total	29	21	18	69

(31.90%) were *A. niger* and *A. flavus* respectively (Table 2).

The isolation rate of Aspergillus sppvaried with locations and materials with the door and wire net having the highest rates (Table 3).

Discussion

All the five genera of fungi isolated from the poultry houses in this study have been reported to be important in poultry production especially Aspergillus, Candida and Penicillium in the production of clinical disease and mycotoxicosis (Khosrav *et al*., 2009). The fungi isolated and their diversity between the poultry houses and materials in this study are in agreement with the findings of other workers (Garcia *et al*., 2007; Khosrav *et al*., 2009; Hashempour *et al*., 2011; Miljković *et al*., 2011). Aspergillosis and Candidiasis are the most common fungal infections of poultry (Greenacre *et al*., 1992). Aspergillosis caused by Aspergillus species is one of the most frequent infectious diseases affecting stressed and immunosuppressed birds (Carrasco *et al*., 2001). The three species isolated *A. fumigatus*, *A. niger* and *A. flavus* are important in producing Aspergillosis though *A. fumigatus* is the most predominant species causing the disease. The air borne spores of *A. fumigatus* gets inhaled by the birds and gets to the small bronchioles of the birds to produce aspergillus granulomas as it has been reported to resist killing by the avian avelolar macrophages (Van Waeyenberghe *et al*., 2006). The disseminated for of the disease as a result of haemtogenous spread can also produce disease /Aspergillus granulomas in other tissues and organs (Beernaert *et al*., 2010). *A. flavus* has been reported to be more important in mycotoxicosis. It contaminate poultry feed producing mycotoxin B1 aflatoxin which is consumed by the birds resulting in signs of toxicosis, high morbidity and mortality. Candida species are usually opportunistic pathogens that infectbirds suffering from primary infectious diseases ormalnutrition (Tully, 1995; Garcia *et al*., 2007). They cause clinical candidaisis especially of the crop called thrush in various species of birds and also affects ther animals. Clinical candidiasis has been reported to be on the increase in poultry (Garcia and Blanco, 2000; Blanco

et al., 2000; Garcia *et al*., 2007).Candidiasis usually manifests as pseudomembranous patches of necrotic tissue in the oral cavity, pharynx, esophagus, and crop. The term ‘‘Turkish towel’’ appearance often is ascribed to these lesions (Deem, 2003).

Penicillum has been associated with contamination of grains used for poultry feed production on the field (Azarakhsh *et al*., 2011). It produces mycotoxin such as penicillic acid, deoxynivalenol, patulin, citrinin, cyclopiazonic acid and zearalenone which ar potentially toxic to birds that consume feed produced from contaminated grains (Khosravi *et al*., 2008; Azarakhsh *et al*., 2011).

Conclusion

The findings of this study supports those of other researcher indicating that there is diversity in both genera and species of fungi in poultry houses. It also indicates the conducive nature of the poultry house environment in supporting the growth and collonization by fungi. The presence of these fungi pose a threat to the health of the birds as they have been reported to cause both mycosis and mycotoxicosis.

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