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MICROBIAL AIR POLLUTION INSIDE SOME POULTRY HOUSES IN MONOFIA GOVERNORATE

(With 2 Tables)

By

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التلوث الميكروبي للهواء في عنابر الدواجـــــن
في محافظة المنوفية

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تم فحص ٧٠ عينة من حظائر الدواجن المختلفة في محافظة المنوفية بكتريولوجيا · وقـــد وجد أن متوسط العدد الكلي للبكتريا والمتوسط العام للعدد الإحتمالي الأكبر للبكتريا القولونيـة والمتوسط العام للعدد الإحتمالي الأكبر للمكورات السبحية البرازية هو ٨ × ١٠ ، ٤ر١٤١ و ٢ر٨٢ بكتريا في اللتر علي التوالي · وبالإضافة الي ذلك فقد أسفرت النتائج علي عزل أنواع مختلفة من البكتريا في العينات التي تم فحصها · وقد تم مناقشة تأثير الميكروبات التي تم عزلـــها علي الحالة الصحية للدواجن ·

SUMMARY

Seventy air samples collected from poultry houses located at different localities in Monofia Governorate and examined bacteriologically. It has been found that the mean value of total viable count, Coliform count (MPN) and faecal streptococci count (MPN) were $8X10^5$, 141.4 and 82.2 bacteria per liter respectively. In addition, the obtained results revealed the isolation of various kinds of bacteria from examined air samples. The effect of each isoalte on the healthy condition of poultry was discussed.

INTRODUCTION

Air may act as a vehicle in transmiting some pathogens and potentially pathogens which are considered as hazards to poultry. Mortality rate, feed consumption, weight gain and the carcass quality were found to be affected by the degree of air pollution (RUDY, 1985).

SOTOHY (1984) found that the total viable count in the air per cubic meter was 49.35×10^7 inside poultry houses. NANEVA et al. (1987) reported a steady increase of the viable count of bacteria present in air throughout the fattening period.

Different pathogenic and potentially pathogenic bacteria including Staphylococcus aureus, Streptococcus faecalis, Mycoplasma spp., Salmonella spp., E.coli, Arizona spp., Klebsiella spp. Proteus spp., Pseudomonas spp., Serratia spp., Providencia spp., Citrobacter spp., Enterobacter spp., Alcaligens faecalis and Alkalescens dispar were recovered from the air samples of the poultry houses by many workers as BESSARABOV et al., 1972; GARTNER, 1976; AIDAROUS, 1978; AHMED, 1979; ZAHRAN, 1981; AHMED et al., 1984; SOTOHY, 1984; REEM et al., 1984 and REEM & ISMAIL, 1986.

The purpose of this work is to determine the extent of air pollution by bacteria inside poultry houses and their effect on healthy condition of such birds.

MATERIAL and METHODS

A total of 70 air samples were collected from poultry houses located in Monofia Governorate. Of this 40 farms for layers and 30 farms for broilers.

Air sampler (MD_2M) was adjusted for sucking one liter of air inside the farm building.

Collected air samples were bacteriologically examined for the following items:

1- **Total viable count:** The number of viable bacteria at 37°C was done using the standard pour plate method as described by CRUICKSHANK et al. (1975).

2- **Coliform count (MPN):** The most probable number (MPN) of coliform organisms in each sample was determined by using the multiple tube fermintation technique proposed by OBLINGER and KOBURGER (1975).

3- **Faecal streptococci count (MPN):** The most probable number (MPN) of faecal streptococci was carried out using Bromocresol purple azide broth as recommended by HAJINA (1951).

4- **Isolation and identification of potentially pathogenic microorganisms:** Were fullfiled according to CRUICKSHANK et al. (1975); EDWARDS & EWING (1962) and BAILEY & SCOTT (1978).

RESULTS

Results are tabulated in Tables 1 & 2.

DISCUSSION

Table (1) reveals that the mean value of total viable count, Coliform count (MPN) and faecal streptococci count (MPN) were 8×10^5, 141.4 and 82.2 bacteria per liter of examined air respectively. Such high bacterial count obtained in this study may be attributed to the neglected sanitary measures prevailing inside poultry houses such as insufficient ventillation, overcrowding and stirring of dust carrying microorganisms (FALCA & CRAINICEANU 1982; REEM et al., 1984; RUDY, 1985 and SOTOHY, 1989).

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The percentages of bacterial isolates from air of poultry houses are presented in Table (2). These bacteria comprised of 4(5.7%) Staphylococcus aureus, 14(20%) Streptococcus faecalis var faecalis, 7(10%) Streptococcus faecalis var zymogenes, 5(7.1%) Streptococcus faecalis var liquefaciens, 1(1.4%) Streptococcus bovis, 5(7.1%) Streptococcus durans, 15(21.4%), E.coli 1, 6(8.6%) Proteus vulgaris, 8(11.4%) Proteus morganii, 7(10%) Proteus rettgeri, 9(12.9%), Pseudomonas spp., 16(22.9%), Klebsiella spp., 3(4.3%) Shigella flexneri, 14(20%) Citrobacter spp., 12(17.1%) Providencia spp. and 6(8.6%) Alkalescence dispar. However, the failure of detection of other bacteria may be due to direct sunlight, radiation and low humidity which have an adverse effect on the bacteria suspended in air (GUNDERMANN, 1972).

The recovery of the different species of bacteria from air samples of poultry houses of considerable health significance. Staphylococcus aureus is the cause of synovitis and arthritis leading to swelling of joints (Bumble foot) and lamness (GOREN, 1973 and DEVRIES et al., 1975). Streptococci are responsible for streptococcal septicaemia in chikens with losses up to 50% (NORGARD and MOHLER, 1902).

The pollution of air by E.coli is an indication of bad hygienic measures (ZAKARIA et al., 1980). E.coli is also one of the significant agent in cases of colibacillosis, coligranuloma, peritonitis, salpingitis, synovitis and omphalitis (VERMAN and ADLAKA, 1971).

Members of the genus proteus were implicated in cases of pneumonia, septicaemia, egg - peritonitis, enteritis, retained yolk sac and chronic respiratory diseases (VERMAN and ADLAKA, 1971).

Pseudomoniasis is a disease caused by pseudomonas spp. It is characterized by profuse diarrhoea, oedema of the head and wattles (MAZZETTI, 1972) and generalized oedema (GOLDSBY and EVELTTH, 1950).

Klebsiella spp. are considered as index of air pollution with organic particles derived from animal origin (SOTOHY, 1989), they also considered as opportunistic pathogens in the respiratory and urinary systems (COWAN et al., 1960), omphalitis (VERNIMB et al., 1976) and septicaemia (VERMAN and ADLAKA, 1971).

The other species of the recovered bacteria including Shigella flexneri, Citrobacter spp., Providencia spp. and Alkalescens dispare are of no health significance on poultry. However, their presence in the examined air samples is an indication of faecal pollution (WHO, 1971 and Breed et al., 1978).

From the obtained results, it can be concluded that the air can play a dangerous role in transmitting some pathogens which are responsible for certain problems among poultry industry. Thus, poultry houses should be supplied with a good ventillation system, avoid over-crowding and stirring of dust inside the farm to provide the birds with a good air free from pathogens.

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Table (I): Mean values of total viable count, Coliform count (MPN) and Faecal streptococci count (MPN) per liter of air inside the investigated poultry houses.

Type of house	No. of houses	Total viable count			Coliform count(MPN)			Faecal strept. count(MPN)		
		Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
Layers	40	$4XIO^2$	$I9XIO^7$	$IIXIO^5$	85	500	I38.8	35	380	80.4
Broilers	30	$65XIO^2$	$2IXIO^6$	$5XIO^5$	65	520	I43	45	420	84
Total	70	$4XIO^2$	$I9XIO^7$	$8XIO^5$	65	520	I4I.4	35	420	82.2

Table (2) : Frequency and percentages of isolated bacteria from air samples of poultry houses .

Isolate	Layers			Broilers			Total		
	No. of samples	Freq.	%	No. of samples	Freq.	%	No. of samples	Freq.	%
Staphylococcus aureus	40	2	5	30	2	6.7	70	4	5.7
Streptococcus faecalis var faecalis	40	8	20	30	6	20	70	I4	20
Streptococcus faecalis var zymogenes	40	3	7.5	30	4	I3.5	70	7	I0
Streptococchs faecalis var liquefaciens	40	4	I0	30	I	3.3	70	5	7.I
Streptococcus bovis	40	I	2.5	30	0	0	70	I	I.4
Streptococcus durans	40	2	5	30	3	I0	70	5	7.I
E.coli I	40	8	20	30	7	23.3	70	I5	2I.4
Proteus vulgaris	40	4	I0	30	2	6.7	70	6	8.6
Proteus morganii	40	5	I2.5	30	3	I0	70	8	II.4
Proteus rettegri	40	4	I0	30	3	I0	70	7	I0
Pseudomonas spp.	40	6	I5	30	3	I0	70	9	I2.9
Klebsiella spp.	40	I2	30	30	4	I3.3	70	I6	22.9
Shigella flexneri	40	I	2.5	30	2	6.7	70	3	4.3
Citrobacter spp.	40	I0	2.5	30	4	I3.3	70	I4	20
Providencia spp.	40	I0	29	30	2	6.7	70	I2	I7.I
Alkalescence dispar	40	2	5	30	4	I3.3	70	6	8.6