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دراسة ميكروبيولوجية على ذرات الغبار في مساكن الحيوانات في صعيد مصر

فاروق أمين ، يوسف كامل ، حسني عبد الرحمن

بدراسة ٤٤ عينة هواء مأخوذة من ١٦ مكان من داخل مساكن حيوانات مختلفة ممثلة في حظائر الماشية والجاموس والاغنام ومساكن الدواجن والأرانب في محافظتي أسيوط والمنيا .

أمكن عزل العديد من الميكروبات والفطريات المرضية .

وقد اتضح أن عدد الميكروبات على بعد ٢٠ سم من سطح التربة أكثر منها على أبعاد ١٠٠ و ١٥٠ سم .

ويمكن أن يعزى سبب تواجد هذه الميكروبات في ذرات الغبار داخل المساكن الى سوء التهوية وعدم توافر اساسيات الصحة داخل مساكن الحيوانات .

وقد مناقشة خطورة هذه الميكروبات ومدى تأثيرها على صحة الحيوانات وكذلك العاملون بالمزارع .

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MICROBIAL STUDIES OF DUST PARTICLES IN FARM BUILDINGS IN UPPER EGYPT

(With 5 Tables)

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SUMMARY

Settling plate method was used for detection of the different types of the microganisms on the dust particles dispersed in the environment of five farm buildings.

The bacteriological examination of specimens revealed the isolation of Staphylococcus aureus; Staphylococcus epidermidis, Streptococcus faecalis, E. coli, Klebsiella pneumonia, Proteus species and Pseudomonas spp.

The mycological investigation of the samples recovered the isolation of Aspergillus fumigatus, A. niger, A. flavus, A. candidus, Penicillium citrinum, P. verrecosum, P. capsulatum, Mucor spp., Cladosporum spp., Alternaria spp. and Fusarium spp.

The higher incidence of microorganisms detected was more frequently obtained at level 30 cm. than the other two levels (100 and 150cm.).

INTRODUCTION

Environment of farm animals is one of the most important sources of many microbial pollutent. The main focus of such pollution is the dust particles loaded with different types of micro-organisms and which may be suspended and disseminated in the surrounding environment (WILSON and MILES, 1957). Consequently, there is no protect factor avoid air from carrying these disease producing agents and the infection may be easily introduced to animals especially to those housed in closed places.

The amount of dust bearing microorganisms in the environment of animal buildings is influenced by many factors as the type of flooring material and beeding as will as the rapidity of air currents (HILLIGER, 1966).

Many investigators examined the dust of environment inside large animal and poultry houses. The dust was found to be polluted with many micro-organisms especially Staphylococcus aureus, haemolytic Streptococci, E-coli, Proteus spp., klebsiella pneumonia, as well as different species of Pencillium, Asperigllus, Mucor, Cladosporum, Alternaria, Rhizobas, Monilia and Fusarium, (BARVAH, 1961; NEGULESCU et al. 1961; STEERAMULU, 1961; GORDON, 1963; DIMOV, 1972; FISER & SVITAVISKY, 1973; RAJAN & SIVADAS, 1973; ALEKSANDROV & PEEV, 1974; GARTNER, 1976 and LOPEZ, 1977).

The incentive of this work is to evaluate the hygienic condition of the environment in the closed animal and poultry houses.

MATERIAL and METHODS

A total of 44 specimens were collected from five large farms enclosed different species of animals and poultry located in both El-Minia and Assiut Governorates (Table 1).

Samples were obtained in the mid-day following the routin work and during the ordinary activity of the individuales enclosed in the houses. Settling plate method adopted by NEGU LESCU et al. (1961) was used. A set of petri dishes containing sheep blood agar, brilliant green agar and czapek were put at three levels from the floor of the animal houses (30, 100 and 150 cm). and exposed to the air for 5-10 minutes.

Sheep blood agar and brilliant green agar plates were incubated at 37°C for 24 houres and the suspected bacterial growth was examined and identified according to EDWARDS & EWING, 1962 and BAILEY & SCOTT, 1974, Czapek plates were incubated at 25°C for 10 days and the detectable fungal growth was identified according to RAPER & FENNEL, 1961; ARX, 1967; KULIK, 1968; and SCHIPPER, 1978.

RESULTS and DISCUSSION

The obtained results are recorded in, Tables 2, 3, 4 and 5.

Tables (2 & 4) showed that the bacterial strains, as well as, the fungal spores were detected much higher in plates at level 30 cm than from those collected at the other levels (100 & 150 cm). This may be attributed to the presence of heavy dust particles arrised from the contaminated floor. However, the ultimate fate of air-borne microorganisms is governed by a complex circumstances including the atmospheric conditions, humidity, temperature, as well as, the size of particles bearing microorgansms (PELEAC & REID, 1958).

It is clearly evident from Tables (3 & 5) that the higher incidence of both bacterial strains and fungal spores detected was obtained from poultry houses (34.4 & 38.3%) followed by cattle byre (27.2 & 24.2%), Sheep Shelter (20.8 & 24.2%), buffalo pen (12.8 & 8.6%) and rabbit hutch (4.8 & 4.7%) respectively. This may be partly attributed to the amount of the stirred dust in the environment, which is differ largely according the species of the enclosed flock, density of the flock, type of floor, food and bedding used, as well as, the nature and behaviour of the flock (FENSKE et al. 1976).

Our results revealed the isolation of staphylococus aureus in an incidence of 8.8% (Table 2). The isolation of such organism is of considerable inportance. It indicate the pollution of air from diseassed or even carrier man and animal.

Streptococcus faecalis was detected in 8% of the samples examined (Table 2). This findings are in agree with the result of BESSARABOV, et al. (1972) who recovered Strept. faecalis in the air samples collected from large animal houses. However, the presence of such pathogen indicate the bad hygiene of animal and poultry houses.

Escherichia coli was isolated from 13.6% of the air samples examined. This percentage is more or less higher than that reported by FISER & SVITAVSKY (1973) who obtained this organism in 5.6% of the air samples collected from animal enclosures. The high incidence of this considered as a reliable index of high degree of faecal pollution.

Klebsiella pneumonia was recovered from 0.8% of the air samples. The percentage of this organism in the air is of animal health significant. It is one of the causative agents of respiratory affections. The droplets expelled from the affected animals are either floating in the air or settle out on the ground depending on their size. Dust particles, which contaminated with such droplets may suspended in the air and circulate by air currents, which inspired may transmit the infection to other suseptible animals (HARRY, 1956 and MCDADE & HALL, 1964).

The frequency of Proteus species 28.8% in air samples collected from animals and poutry houses was illustrated in (Table 2). The most promenant species was proteus rettegri 14.4% followed by P. morganii 11.2% and lastly P. mirabilis 3.2%. The higher incidence of these micro-rganisms indicate the bad hygienic conditions of animal and poultry houses (GOLOSOV, et al. 1974).

Pseudemonas species were encountered in 12% of the samples examined. (Table 2) these organism are introduced into the air from various substractes in which they flourish, mainly the intestinal contents of man and animals (BUCHANAN and GIBBONS, 1975).

The mycological examination of air revealed the isolation of different species of fungi, which recorded in (Table 4) including Aspergillus niger 16.4%, A. funigatus 10.1%, A. Candidus 3.9%, A. flavus 2.3% Penicillum citrium 18.7%, P. verrecosum 4.7% P. capsulatum 1.6%, Mucor spp. 21.1% Cladosporum spp. 12.5% Alternaria 7% and Fusarium spp. 1.6%. However, the detection of these different species of fungi indicate the insufficient ventilation. The increased amount of raising dust containing spores is considered undoubtedly as an important means, which increase air pollution inside animal and poultry houses (BARUAH, 1961).

From the results achieved, one can safely conclude that the air of the animal houses was found to be an important source of many species of pathogenic and potentially pathogenic microorganisms. Most of these bacterial and fungal isolates are considered as an etiologically signficant agents affecting man and animals (CRUICKSHANK et al. 1970, RAJAN & SIVADAS, 1973, and BUCHANAN & GIBBONS, 1975).

The high bacteria and fungal isolates met with, may be attributed to the neglected sanitary measures existing in our animal enclosures and poultry houses.

The efecient ventilation and good sanitation inside animal and poultry houses may lead to favourable results.

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Table (1)
Lacalities and sites from which air samples were collected

Governoratre	Lacality of farm	Site of sampling	Number of air samples.
Assiut	Faculty of agriculture	Cattle byre (dairy).	3
		Sheep Shelter.	3
		Poultry house (laying).	3
		Rabbit hutch.	1
	Secondary agriculture	Cattle byre (dairy).	3
		Sheep pen.	3
		Poultry house (laying).	3
	El-Hawatka	Buffalo shed (dairy).	3
		Buffalo Calf pen.	3
		Sheep Shelter.	3
	Beni-Mor.	Poultry house (laying).	3
		Poultry house (broiler).	3
Minia	Faculty of Agriculture.	Cattle byre (dairy).	3
		Sheep pen.	3
		Poultry house (laying).	3
		Rabbit hutch.	1
		Total	**44**

Table (2)
Distribution and frequency percentage of the bacteria isolated from different levels

Types of isolates	No. of bacteria at			Total number	frequency %
	(30 cm.)	(100 cm.)	(150 cm.)		
Staph. aureus	5	4	2	11	8.8
Staph epidermidis	14	11	10	35	28
Staph. faecalis	3	5	2	10	8.0
Escherichia coli.	8	7	2	17	13.6
Klebsiella preumonia	0	1	0	1	0.8
Proteus rettegri.	10	5	3	18	14.4
Proteus morganii.	6	6	2	14	11.2
Proteus mirabilis.	2	1	1	4	3.2
Pseudomonas spp.	6	6	3	15	12.0
Total	**54**	**46**	**25**	**125**	

Table (3)
Type of bacteria isolated from animal and bird houses

Types of isolates	Cattle byre.	Buffalo pen.	Sheep shelter	Poultry house	Rabbit hutch.
Staph. aureus	2	2	3	4	0
Staph. epidermidis	9	5	8	11	2
Strept faecalis	4	2	0	3	1
Escherichia coli	3	3	4	7	0
Klebsiella preumonia	0	0	1	0	0
Proteus rettegri	6	2	4	5	1
Proteus morganii	5	1	3	5	0
Proteus mirabilis	2	1	0	1	0
Pseudomonas	3	0	3	7	2
Total	**34**	**16**	**26**	**43**	**6**
Frequency %	27.2	12.8	20.8	34.4	4.8

Table (4)
Distribution and frequency percentage of fungi isolated at the different levels

Types of isolates	No. of fungi at			Total	Frequency
	(30 cm.)	(100 cm.)	(150 cm.)	number	%
Aspergillus niger.	11	6	4	21	16.4
Aspergillus fumigatus	9	3	1	13	10.1
Aspergillus flavus	3	0	0	3	2.3
Aspergillus candidus	2	0	3	5	3.9
Penicillum citrinum	9	11	4	24	18.7
Penicillum verrecosum	3	3	0	6	4.7
Penicillum capsulatum	1	1	0	2	1.6
Mucor spp.	10	13	4	27	21.1
Cladosporum spp.	9	7	0	16	12.5
Alternaria	6	0	3	9	7.0
Fusarium spp.	1	1	0	2	1.6
Total	**64**	**45**	**19**	**128**	

Table (5)
Type of fungi isolated from the different houses of animals and birds

Types of isolates	Cattle byre.	Buffalo pen.	Sheep shelter.	Poultry house	Rabbit hutch.
Aspergillus niger.	4	0	6	9	2
Aspergillus fumigatus	2	2	4	4	1
Aspergillus flavus	1	0	0	2	0
Aspergillus condidus	2	1	1	1	0
Penicillum cittrinum	6	3	5	9	1
Penicillum verrecosum	1	0	3	2	0
Penicillum capsulatum	1	1	0	0	0
Mucor spp.	7	3	5	11	1
Cladosporrum spp.	3	1	4	8	0
Alternaria	3	0	2	3	1
Fusarium spp.	1	0	1	0	0
Total	**31**	**11**	**31**	**49**	**6**
Frequency %	24.4	8.6	24.2	38.3	4.7