قسم : الصحة.
كلية : الطب البيطرى - جامعة أسيوط.
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دراسة عن توزيع الجزئيات الحاملة للميكروبات داخل حظائر الدواجن

ريم د سوقي ، عبد المعز اسماعيل

تم فحص عدد ١٨٧ عينة هواء من حظائر الدواجن المختلفة والمحيطة بمدينة أسيوط. وقد أخذت العينات بإستخدام جهاز الترشيح وعلى مستويات ثلاث داخل الحظائر.

كما اختبر تأثير المراوح على توزيع الجزئيات الحاملة للميكروبات داخل حظيرة الدواجن المغلقة.

وقد وجد من فحص هذه العينات أن المستوى الأول (ببعد ١٠ اسم عن أرضية الحظيرة) يحتوى على أكبر عدد من الجزئيات الحاملة للميكروبات، بينما المستوى الثاني (ببعد ١٨٠ سم عن أرضية الحظيرة) يحتوى على أقل عدد وقد وجد من الفحص أيضا أن المراوح لها تأثير كبير على تجديد الهواء وازالة مابه من شوائب.

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HYGIENIC STUDIES ON THE DISTRIBUTION OF AIRBORNE PARTICLES IN POULTRY HOUSES
(With One Table & Two Figs.)

By
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SUMMARY

A total of 187 air samples were collected at three levels in poultry houses using the two membrane filters method. The result showed that the airborne fine particles was more at the 1st level than the 3rd level.

The effect of fans on the distribution of airborne particles was discussed.

INTRODUCTION

Dust particles are considered as one of the main sources of air pollutants. The emission of these particles from their different sources as well as their dispersion as a pollutant in the air are controlled by many factors, the size of dust particle as well as the air velocity, turbulant and microclimatic condition has a decisive enfleunce on the dispersion of the sum particle as a pollutant in the air (KANZ, 1967 and WALDBOTT, 1978).

Gravity is one of the most important mechanism in the removal of the dust particles from the air. It causes large sized particle with diameter greater than 10 um to settle rapidly on the ground near the emitting sources. The rate of sedimentation of such particle is depend mainly on its size. GRUNDMAN (1952) stated that the sedimentation rate of 1 um particle is 2 cm/min while the sedimentation rate of 10 um particle is 30 cm/min.

The effect of fans on the distribution of dust particle are discussed by KLEIN, 1977 who stated that fans considered as an important mean for diluting, cleaning and removing the excess of heat and moisture from the air.

The aim of this work is to determine the distribution of large and small sized particle in the atmosphere of poultry houses as well as to evaluate the effect of fans on the dispersion of these airborne particles.

MATERIAL and METHODS

A total of 187 air samples were collected from 31 broilers and laying hen poultry houses at the vecinity of Assiut city.

The membrane filter (pore size 0.1 um) were used and the air samples were collected at three different levels of each houses (90 cm, 180 cm and 270 cm from the floor).

The technique discribed by WIESER & MULLER, 1976 and KLEIN, 1977 was applied. Two membrane filter holders were used for each level. One of these membranes was directed upward while the second one was directed downwards. Then all the membrane filter holders were connected with air pump (flow rate 10 liter/min). The membrane filters were plated on nutrient agar media. The inoculated plates were incubated at 37°C for 24 hr. The colonies were counted using bacterial counter.

In order to detect the effect of fans on the distribution of particles in the atmosphere of poultry houses, 18 air samples were collected from a poultry house of 25,000 birds and provided with 8 fans. The technique adopted by KLEIN, 1977 was applied. The two membrane filters method was used for each of the forementioned levels. The 1st sample was taken when the fans were on. The 2nd and 3rd samples were collected 15 min and 35 min. after the fans were off. The 4th were collected at the time of reworking of the fans. 5th and 6th samples were taken after 15, 25 min after the fans reworked.

RESULTS and DISCUSSION

The results are obtained in table I and Figures I & II.

Table I represents the data of the mean C.F.M/L. at three levels in different poultry houses. The higher c.f.u. detected was at the 1st level (mean 328 c.f.u./L) followed by the 3rd level (mean 303 c.f.u/L). The 2nd level contain the lowest count (mean 228.5 c.f.u/L). This finding are disagree with the result of KLEIN (1977) who found that the 3rd level (270 cm) contain the more bacterial count. The presence of high c.f.u/L in the 1st level may be attributed to the dust arise as a result of the activity of poultry stock and attendants. The lower c.f.u. at the 2nd level may be due to the cross ventillation produced by the windows which are found at the same distance may dilute the air in this position.

The fine particles obtained in our experiments was moderatly high (the mean c.f.u. of fine particles at the 1st level was 227.4/L, 2nd level was 136.2/L and at the 3rd level was 220/L). The mean count of large sized particles at the 1st level 101.4, 2nd level 95 and at the 3rd level 72.8. The distribution of the dust particles in any house depends on the system of the house in use, type of feed and method of feeding in one side and the ventiliation system and the activity of the birds and workers in the other side (SCHIFF & FONROBERT, 1971; BRESK & STOLPE, 1975 and MULLER, et al. 1976).

The amount of bacteria in the semiclosed system [at the 1st level (mean 308), 2nd (mean 249), 3rd (mean 335)] were more or less higher than those detected in the closed system [1st level (mean 150), 2nd (mean 102) and the 3rd (mean 107)]. This results are agreed with the results of BEAR, et al. 1974; GARTINER, 1975 and HARLMAN, 1980.

As shown in Fig. I the airborne particles collected by membrane filters are depend upon its direction. The membrane filter directed upwards collect more airborne particles than the membrane filter directed downwards, a result which agree with the finding of KLEIN, 1977. It is also clear from this Fig. that there is also a distinct decline in the number of the particle in the 2nd and 3rd level.

Fig. II represents the effect of fans on the distribution of airborne particles. It is obavious from this Fig. that there is a marked increasing in the number of the particles when the fans become off, a result which agree with the finding of RECKZEH & DONTENWILL, 1973 and KLEIN, 1977. The decrease in the number of c.f.u. during the function of the fans may

be due to the regular air exchange which dilute and remove the excess of heat and moisture as well as air contaminant.

The maintanance of healthy atmosphere inside the animal buildings could be obtained by periodical cleaning of the stable, good mangement, adequate building design and selection of fans with suitable speed and good position.

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Table (I)
The mean colony forming units at three levels in the different poultry systems

Type of the house	No. of houses	Mean c.f.u/liter 1st level			Mean c.f.u/liter 2nd level			Mean c.f.u/liter 3rd level		
		Upward S+D	Downward D	S	Upward S+D	Downward D	S	Upward S+D	Downward D	S
Broilers	17	367.3	244	123.3	269	166	103.6	411.3	262	149.3
Laying hen "semiclosed system"	12	350	249	100.6	295	134	102.3	260	243	44
Laying hen "closed system"	2	150	112	38	102	54	48	107	78	29
Mean count	-	328.9	227.4	101.4	228.5	136.2	95	303	220	72.8

N.B.: S: Large sized particle
D: Small sized particle

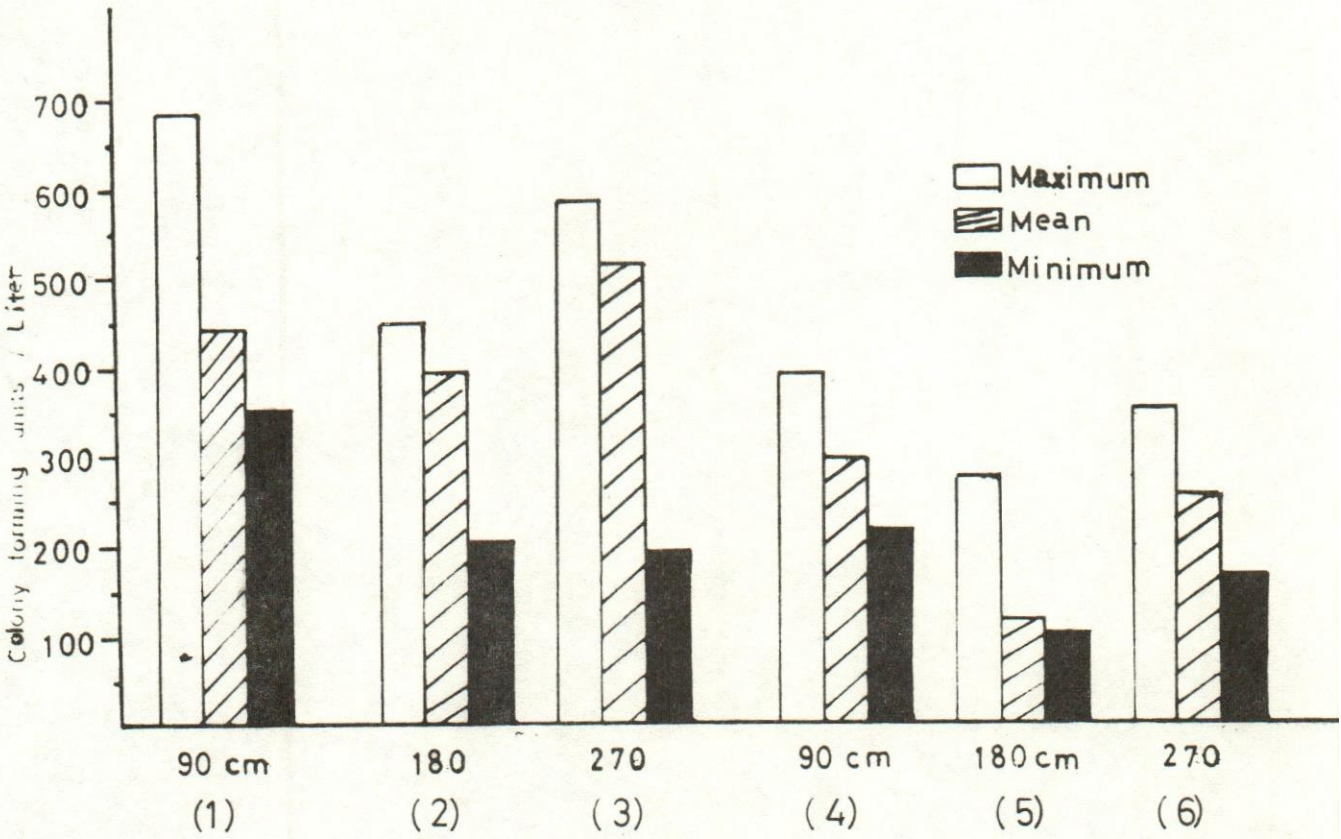

Fig. I THE LINE DIAGRAME OF THE MIN., MAX., AND MEAN COLONY FORMING UNITS /LITER AT THREE LEVELS OF POULTRY HOUSES.

N.B. (1-2-3) THE MEMBRANE FILTER DIRECTED UPWARDS.

(4-5-6) THE MEMBRANE FILTER DIRECTED DOWNWARDS.

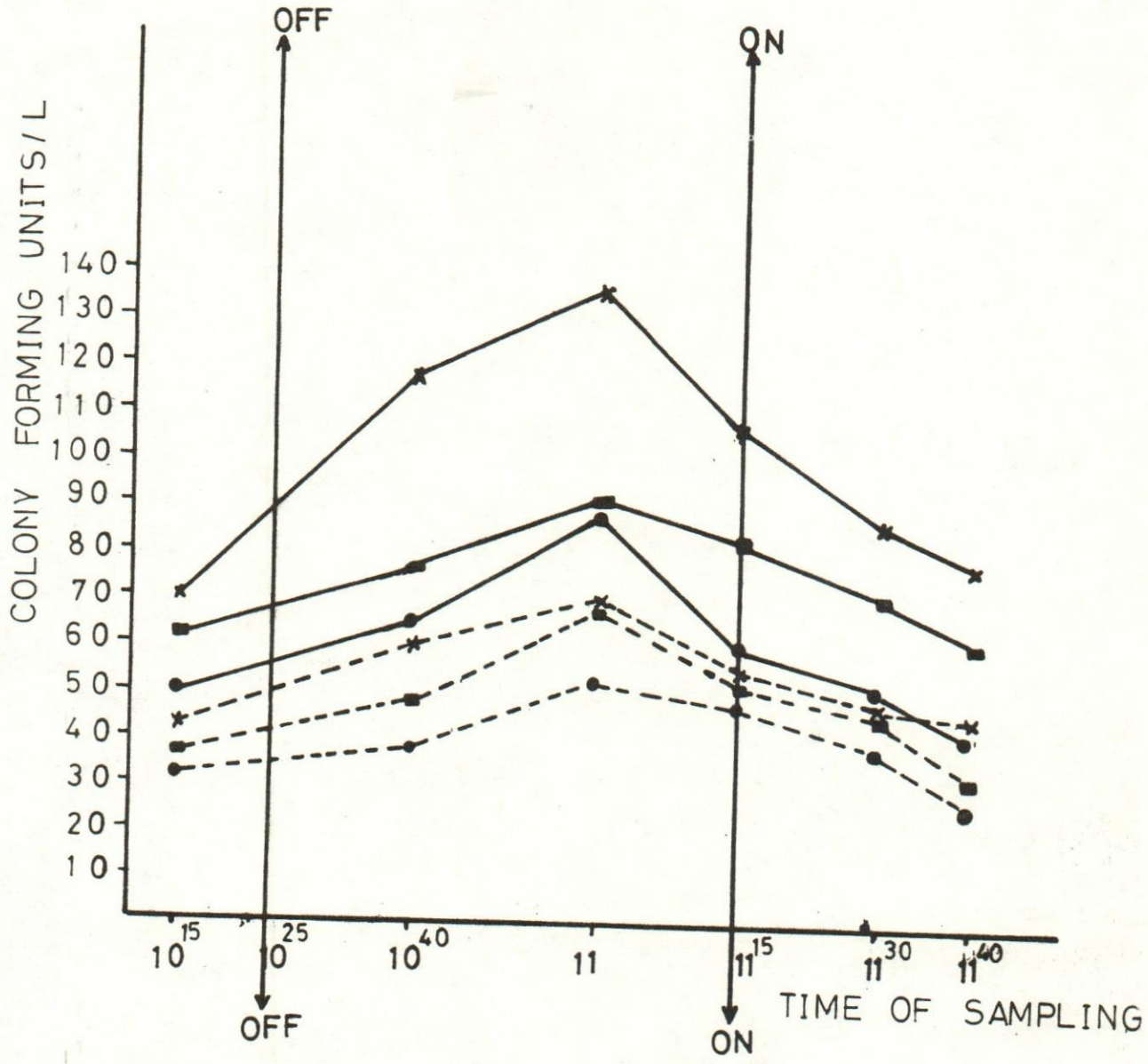

FIG. II THE EFFECT OF FANS ON THE DISTRIB UTION OF AIRBORNE PARTICLES

N.B.

X-X	LEVEL	270	UPWARDS
□-□	ss	180	ss
•-•	ss	90	ss
X.....X	ss	270	DOWNWARDS
□....□	ss	180	ss
o.....o	ss	90	ss