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Comparative Study on the Efficacy of Some Antimycoplasma Drugs on the Performance of Commercial Broiler Flocks from Infected Breeders

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Abstract: In this field 3 trials, 60 000 Ross broiler chicks were used. Air sac lesion, cumulative mortality, average body weight gain, feed consumption, feed conversion rate and European efficacy factor were used to evaluate the efficacy of some antimycoplasma drugs on the performance of commercial broiler flocks derived from Mycoplasma infected breeders. Lincospectin, Pulmotil and Tylan were administered in drinking water at 1 day old and repeated at 19 days. Mycoplasma infection in the used chicks was confirmed by clinical signs, air sac lesions, positive results to serum agglutination test for Mycoplasma *gallisepticum (MG)* and *Mycoplasma synoviae (MS)*. MG antigen was detected in tracheal sections by immuno-histochemistry. The obtained results proved that the used antimycoplasma drugs still effective in controlling of Mycoplasmosis in broilers and their efficiency varied by repeated successive use in flocks reared in the same house. Pulmotil showed stable results, followed by Lincospectin and tylan. It was concluded that antimycoplasma drug administration in broiler from infected breeders have a marked role in improvement of their performance.

Key words: Mycoplasmosis · Antimycoplasma drugs · Broiler chickens · Lincospectin · Pulmotil · Tylan · Performance

INTRODUCTION

Both *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) are frequently incriminated to cause infectious chronic respiratory disease (CRD) in chickens characterized by respiratory signs, decreased growth and hatchability rates, decreased egg production, and downgrading of carcasses at slaughter due to airsacculitis and arthritis [1]. In the same time, the increased medication costs are additional factors which considered as source of economic losses that make this disease as one of the costliest problems confronting commercial poultry production [2].

Prevention and control programs of Mycoplasmosis include surveillance (serology, culture, isolation and identification) and vaccination, account for additional costs [3, 4]. A complete review of the approximate 25 year history of MG immunization in USA indicated that the economic loss due to downgrading, reduced feed efficiency, and medication costs make MG infection one of the costliest diseases confronting the poultry industry [5].

Both MG and MS were reported as a wide spread chicken pathogens among Egyptian chicken flocks by either serologically and /or isolation and identification methods [6-11].

Antimycoplasma drugs are used intensively to improve productivity and reproductivity of layers [12, 13] as well as broiler [4] flocks. The massive use of such drugs resulted in development of antimycoplasma resistant Ms and MG strains [14-17].

The current field studies in 3 trials; 4 flocks each; had been carried out to compare effect of 3 wide used antimycoplasma drugs including Lincospectin, Pulmotil and Tylan on performance of commercial broiler Ross breed flocks derived from infected breeders and show clinical signs, serological and immuno-histochemistry positive results.

MATERIALS AND METHODS

Chicken Flocks: This field study was carried out on 60 000 commercial broiler Ross breed chicks in 3 replicates. Each replicate 20 000 chicks in 4 closed houses

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Table 1: Drugs used doses, age of administration and concentration in drinking water

Drug	Dose at 1 day old (mg/bird)	Dose at 19 days (mg/k.gm)	Conc. in D.W (/200 L)
Lincospectin	0.1	0.2	150.0 gm
Pulmotil	2.0	15.0	60.0 ml
Tylan	35.0	70.0	100.0 gm

D.W: Drinking water

(5000 chicks/house). The chicks were obtained from breeder flock infected with Mycoplasma. All trials were done in successively same houses. Chicks were reared under similar management and environmental conditions.

Ration: The chicks were feed on prepared ration according to Ross broiler management manual and National Research Council [18] requirement for broiler. All housed chickens were given ration *adlibitum.*

Diagnosis of Mycoplasmosis: The used 1- day- old chicks were sampled (blood for serum 25 samples/ trial in addition to specimens from lungs and tracheae) and tested using the following methods:

1. Serum Plate agglutination (SPA) test. SPA-test was carried out using 0.02 ml of serum, mixed with 0.02 ml of stained antigen of MG or MS, clumping within 2-3 minute indicates positive result [1, 19]. Stained M.G and MS antigens for SPA test were obtained from "Intervet International BV Boximeer-Holland" (Table 2).
2. Immuno-histochemistry: It was carried out using peroxidase detection kit purchased from Novocastra Co. lot No. 711010 on sections of tracheae and lungs from chicks with suspected signs and lesions [20]. Results are shown in Fig. 2.
3. Air Sac Lesions: The air sacs of dead chickens and in slaughter house were examined [21].

Table 2: Results of SPA test on sera of 1 day old chicks against MG and MS colored antigens (n= 25 samples/trial)

Trial number	MG		MS	
	No. of positive	%	No. of positive	%
1	2	8	0	0
2	4	16	2	8
3	7	28	3	12

SPA: Serum Plate agglutination, MG: Mycoplasma gallisepticum, MS: Mycoplasma synoviae.

Drugs and Medication: The following commercial antimycoplasma products including combination of Lincomycin and Spectinomycin (Lincospectin®), Tilmilcosin (Pulmotil AC®) and Tylosin tarterate (Tylan®) were used. Each product was repeatedly used for chicks reared in the same house. Doses, age of administration and concentration in drinking water are shown in Table 1.

Broiler performance parameters: Broiler performance parameters including average cumulative mortality rate (CMR), body weight/g, cumulative feed intake/g (CFI/g), cumulative feed conversion rate (CFCR) and European efficacy factor (EEF) were used and calculated as shown in Table 3 Fig. 3-6 [22]. Good efficiency is considered to have an EEF > 280, while low efficiency has an EEF < 220.

RESULTS

Some chicks showed signs of ruffling; gasping of air, closed eye and difficult breathing from the 1st day of life (Fig. 1A) and post-mortem examination of scarified chicks reveals yellow casious material in air sacs (Fig. 1B). The tested tracheal sections with Immuno-histochemistry showed MG antigen in stained tracheae of such chicks (Fig. 2B).

Fig. 1: One-day -old chick from mycoplasma positive Ross broiler breeders showing:
A) Gasping of air, closed eye and difficult breathing; B) Yellow casious material in abdominal air sacs.

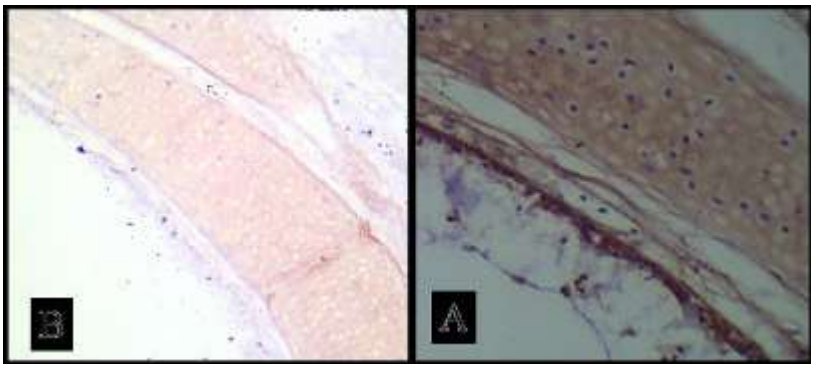

Fig. 2: Immuno-peroxidase stained tracheal sections with haematoxylin as counter stain showing:
A) Specific brown staining of M G antigen at the apical border of the lining epithelial cells (40 X)
B) Negative tracheal tissue (40 X)

Table 3: Effect of antimycoplasma drugs on productivity of seropositive broiler chicks

Trial No.	House No.	Treatment	Age/Days	CMR*	Body weight/gm	CFI/gm**	CFCR ***	EEF****
1	1	Lincospectin	35	1.44	2008	3218	1.60	351
	2	Pulmotil		1.12	1998	3191	1.60	350
	3	Tylan		1.12	1985	3184	1.60	347
	4	Control		1.51	1907	3131	1.64	325
2	1	Lincospectin	33	2.80	1735	2883	1.66	304
	2	Pulmotil		3.60	1809	2989	1.65	314
	3	Tylan		3.00	1806	2937	1.63	321
	4	Control		3.30	1639	2716	1.66	284
3	1	Lincospectin	34	4.40	1770	2891	1.63	299
	2	Pulmotil		3.00	1819	2794	1.53	339
	3	Tylan		4.70	1719	2893	1.68	282
	4	Control		3.30	1708	2815	1.65	290

* CMR: Cumulative Mortality Rate, ** CFI/gm.: Cumulative Feed intake/grams, *** CFCR: Cumulative Feed Conversion Rate,
**** EEF: European Efficacy Factor.

The tested diluted sera of 1 day old chicks showed positive results to SPA -test against stained antigen of MG in 2/25 (8%), 4/25 (16%) and 7/25 (28%) and for MS in 0/25 (0%), 2/25 (8%) and 3/25 (12%) in trial 1, 2 and 3; respectively (Table 2).

Air sac lesions in dead and during processing were varied from apparent normal to slight turbidity without marked difference between medicated groups. Non medicated controls showed thickened air sac wall sometimes with fibrinous exudates.

CMR in medicated houses are lower than that of their non medicated control (Table 3, Fig. 3). Pulmotil medicated house showed the lowest CMR, while Lincospectin and tylan groups are higher.

Average body weights/g (Fig. 4) in medicated houses is higher than their non medicated controls. Pulmotil groups are the highest in trial 2 and 3 as compared with tylan. Lincospectin showed variable results.

CFI/gm in control houses was lower than those of medicated ones in all trials. Pulmotil in trial 1and 3 showed lower feed intake as compared with other treatments.

CFCR of non medicated house was generally lower than medicated (Table 3) in all trials, except that of tylan in trial 3 that is lowest, as compared with medicated and non medicated in all trials. The highest CFCR was that of tylan in trial 2 and Pulmotil in trial 3.

EEF of treated and non medicated houses > 280 can be evaluated as good. Medicated houses in trials 1 and 2 were higher than non medicated (Fig. 6).

Pulmotil was the most effective and gives relatively stable results followed by Lincospectin and tylan.

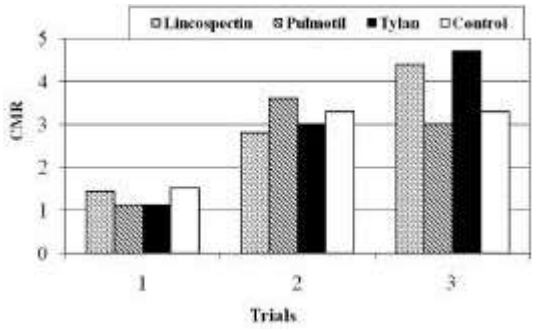

Fig. 3: Effect of antimycoplasma drugs on cumulative mortality rate (CMR) of seropositive broiler chicks

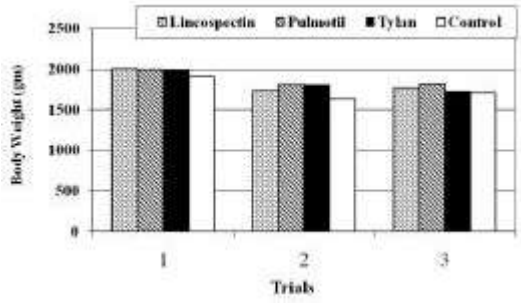

Fig. 4: Effect of antimycoplasma drugs on body weight/gm of seropositive broiler chicks

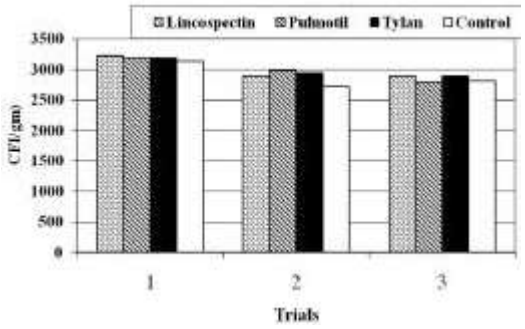

Fig. 5: Effect of antimycoplasma drugs on cumulative feed intake (CFI)/gm of seropositive broiler chicks

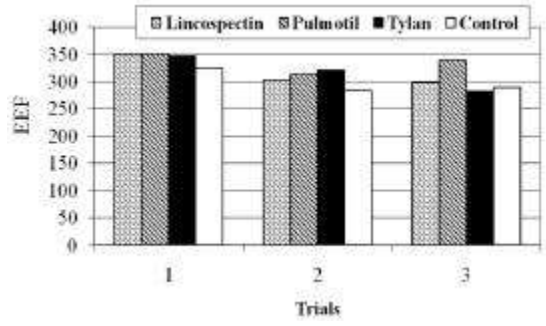

Fig. 6: Effect of antimycoplasma drugs on European Efficacy Factor (EEF) of seropositive broiler chicks

DISCUSSION

The used chicken flocks in this study were proved to be infected with mycoplasma according to the recorded signs (Fig. 1A), air sac lesions (Fig. 1B) and results of SPA as well as Immuno- histochemistry (Fig. 2) that agree with [4].

The recorded gross lesions in dead and during processing as the prevalence of air sac lesions were varied from apparent normal to slight turbidity without marked difference between medicated groups, while non medicated control showed thickened air sac wall with fibrinous exudates. The result indicated that the used drugs played a role in controlling infection [4, 23] and limitation of gross lesions [15, 23-25]. Also the 3 used drugs still effective [26, 27].

Cumulative mortality rate (CMR) in medicated houses trials 1 (1.44, 1.12, and 1.12) and trials 2 (2.80, 3.60 and 3.00) are lower than those of their non medicated controls (1.51, 3.30 and 3.30); respectively. The results indicated that administration of lincospectin, Pulmotil and tylan have value in reducing mortalities in mycoplasma infected chickens [28].

CMR recorded in trial 3 showing that value of Pulmotil medicated house (3.0) is the lowest, while Lincospectin (4.40) and tylan (4.70) groups are higher than Pulmotil (3.00) and non medicated control (3.30). This result indicated that repeated use of Pulmotil still effective, while efficacy of lincospectin and tylan in the 3^{ed} repeated use in the same house started to be lower. This observation is agreed with literature [15, 28].

Average body weights/g (Table 3, Fig. 4) in medicated houses of trial 1 (2008, 1998, and 1985) and trial 2 (1735, 1809 and 1806) and trial 3 (1770, 1819 and 1719) are higher than non medicated control houses; 1907, 1639 and 1708; respectively. Values in Pulmotil treated groups are the highest [29, 30] in trial 2 and 3 as compared with the lowest value in tylan houses [31], while results of lincospectin are variable.

Comparing cumulative feed intake/g (CFI/g.) in control houses was lower than those of medicated ones in all trials. Pulmotil in trials 1and 3 showed lower feed intake as compared with the other two drugs.

Cumulative feed conversion rate (CFCR) of Lincospectin and Pulmotil medicated houses were lower than non medicated in all trials. Tylan medicated house in trial 3 that showed the lowest CFCR (1.68) as compared with medicated and non medicated houses in all trials. The highest CFCR was that of Pulmotil (1.53) in trial 3.

Generally; the calculated European Efficacy Factor (EEF) of treated and non medicated houses > 280 (Table

3, Fig. 6) can be evaluated as good. The medicated houses in trial 1 and 2 are higher than non medicated, Lincospectin (351), tylan (321) and Pulmotil (339) in trial 1, 2 and 3; respectively.

It was clear that the average mortality and feed intake were higher with lower body weights and conversions in non medicated than medicated [32]. These results supported the use of such drugs in improvement of infected broilers and in agreement with available data [4, 28, 31].

In conclusion, the used antimycoplasma drugs still effective in controlling of Mycoplasmosis in broilers derived from infected breeders, and the efficiency varied by repeated use in successive flocks. Pulmotil was the most effective and stabled one followed by Lincospectin and tylan.

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