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# Comparative survey of tiamulin and tylosin in control of *Mycoplasma gallisepticum* in broiler chickens

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**ABSTRACT**

*Mycoplasma gallisepticum (MG) is one of the most important diseases in Iranian poultry industry and all over the world. Mortality, poor weight gain and increasing of feed conversion ratio (FCR) were seen in MG infected flocks. Several drugs are used for prevention and control of MG, the purpose of this study was to investigate Tiamulin and Tylosin efficacy on MG, and its role on broilers performance. In this study, 240 Ross 308 broilers divided in 3 groups. In two groups Tiamulin and Tylosin was used in days 3 to 5 and later in days 19 to 21, 100 grams in 200 Litters of water and in last group placebo was used and that group mentioned as a control group. Gross lesions, mortality, and growth parameters include body weight gain, feed intake and FCR were calculated in all groups weekly. Results showed that in treatment groups mortality percent was significantly ($p<0.05$) lower than control group and pericarditis, perihepatitis and airsacculitis was sever in control groups in comparison to antibiotic treated groups. Also body weight and FCR was significantly were different between control group and Tylosin and Tiamulin groups ($p<0.05$). It can be concluded that usage of these antibiotics can be prevent MG economical losses in poultry, and in MG positive chickens use of this antibiotic in mentioned periods could improve broilers performance*

**Key words:** Mycoplasma Gallisepticum, Tiamulin, Tylosin, Ross 308, performance.

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## INTRODUCTION

*Mycoplasma gallisepticum* (MG) is one of the most important pathogens of the broiler chickens, which cause respiratory disease[13]. MG infection causes significant economic losses in the poultry industry due to downgrading of carcasses at slaughter because of air sacculitis, treatment costs, and due to its effect on flocks performance [15]. Because currently only a few vaccines are accessible, control of MG infection by vaccination is limited [16]. Control of MG infection by anti mycoplasma drugs, is the most practical way to decrease economic losses. Some antimicrobials, such as macrolides and lincosamides (tylosin), tiamulin, and fluoroquinolones, were effective against various veterinary mycoplasmas [6, 7, 11]. Tiamulin is the most effective agent against various mycoplasmas [11, 14], but it has a narrow spectrum of activity against the secondary infectious agents.

Abd El-Ghany (2009), indicated that Tilmicosin and tylosin had the lowest MICs than other antimicrobials, and they were recommended these antimicrobials for *in vivo* treatment and eradication programs of field MG infection in broilers [1]. One of the important factors in the control of MG infections is the precise selection and use of the antimicrobial to reach an effective concentration in the blood of a bird [1]. Decrease efficacy of antibiotics against MG is frequently observed in the field conditions, especially in broiler flocks because of antibiotic resistance [21].

Purpose of this study was to evaluate the efficacy of tiamulin and tylosin antimicrobials in the treatment of field MG infection in broiler chicken farm, and its effects on performance and mortality rate of MG positive broiler chickens.

## MATERIALS AND METHODS

In this study, 240 Ross 308 broilers divided in 3 groups, and each groups divided to 4 replication with 20 birds in each of them. In group-1 Tiamulin and group-2 Tylosin was used first in days 3, 4 and 5 then later in days 19, 20 and 21. The dosage of Tiamulin and Tylosin was 100 grams in 200 Litters of water. In last group placebo was used and that group mentioned as a control group. This study was performed in 42 days period and gross lesions, mortality, and growth parameters include body weight gain, feed intake and FCR were calculated in all groups weekly.

### Statistical Analysis

For comparison results between groups the data obtained were compared by One-way Analysis of variances (ANOVA) at 95% probability and in case of significantly statistic difference in ANOVA, Duncan test at alpha level 0.05 was performed.

## RESULTS AND DISCUSSION

Mycoplasma infections are important poultry disease that causes economical losses in poultry production, especially in broilers. Uses of anti-Mycoplasma drugs in broilers in prophylaxis is recommended[11]. Various antibiotics for prevention and treatment of Mycoplasma infections in poultry industry were used. Purpose of this study was to investigate the effects of two anti-Mycoplasma antibiotics in prevention of respiratory infections and also on performance of broiler chickens.

Clinical Signs were investigated daily in all groups and any changes were recorded, according to obtained data in all groups severity of conjunctivitis, nasal discharges, and respiratory reactions after 21 day olds were increased but in that groups antibiotics was used, the severity of clinical signs were less than Control group, Specially in tiamulin group. Gross lesions include hemorrhage in trachea, air-sacs thickening (airsacculitis) which after 21 days old perihepatitiis, pericarditis and purulent airsacculitis were seen in control group, and in treatment groups gross lesions were less than control group.

Comparison of mortality rates (table1) showed that from second weeks mortality percent was statistically different between groups and further analysis demonstrates statistical differences between control group with two other treated groups ($p<0.05$).

**Table1: Mortality rate comparison in groups. (Mean±SE)**

| | Weeks | | | | | | |
|---|---|---|---|---|---|---|---|
| Group | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Tiamulin | 3±0.28 | 1±0.29$^{*a}$ | 2±0.43$^{c}$ | 1±0.28$^{a}$ | 3±0.34$^{a}$ | 3±0.51$^{a}$ | 5±0.57$^{a}$ |
| Tylosin | 2±.08 | 2±0.14$^{b}$ | 3±0.25$^{a}$ | 3±0.57$^{b}$ | 3±0.28$^{a}$ | 4±0.28$^{a}$ | 5±0.57$^{a}$ |
| Control | 2.5±0.28 | 4±0.28$^{c}$ | 5±0.57$^{b}$ | 6±0.57$^{c}$ | 6±0.57$^{b}$ | 6±0.57$^{b}$ | 8±0.57$^{b}$ |
| p Value | 0.125 | 0.001 | 0.009 | 0.001 | 0.003 | 0.012 | 0.016 |

** Different letter in each column shows statistical difference between groups in that day.*

Body weight and FCR results demonstrates improvement in groups treated with antibiotics. More detailed body weight, FCR and Feed consumption results were noted in table 2. Body weight of treated groups were significantly higher than control group ($p<0.01$). Also FCR in tiamulin groups was lowest and in control group was highest, and there was significantly statistical difference between groups ($p<0.05$), but there was no significant difference between two treated groups in Body weight, FCR and Feed Consumption.

**Table2: Body weight, FCR and Feed Consumption (FC) comparison in groups. (Mean±SE)**

| | | Week | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Group | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Tiamulin | Body weight | 135±1.73$^{*b}$ | 310±5.77$^{b}$ | 700±6.35$^{b}$ | 1200±8.66$^{c}$ | 1500±9.81$^{b}$ | 1850±11.54$^{b}$ | 2200±12.54$^{b}$ |
| | FC | 128±2.59 | 410±7.21 | 987±14.43$^{b}$ | 2100±27.59$^{b}$ | 2850±51.90 | 3977±60.33 | 5390±60.33$^{b}$ |
| | FCR | 0.95±0.01$^{a}$ | 1.3±0.01$^{a}$ | 1.41±0.02 | 1.75±0.03$^{a}$ | 1.90±0.01$^{a}$ | 2.15±0.01 | 2.45±0.01$^{a}$ |
| Tylosin | Body weight | 130±2.30$^{b}$ | 318±6.35$^{b}$ | 690±8.08$^{b}$ | 1150±14.43$^{b}$ | 1470±10.96$^{b}$ | 1820±15.01$^{b}$ | 2150±16.97$^{b}$ |
| | FC | 125±3.75 | 420±1.68 | 980±16.16$^{b}$ | 2050±28.69$^{b}$ | 2900±57.67 | 4000±71.88 | 5450±71.88$^{b}$ |
| | FCR | 0.96±0.01$^{a}$ | 1.32±0.02$^{a}$ | 1.42±0.02 | 1.78±0.02$^{a}$ | 1.97±0.01$^{a}$ | 2.16±0.02 | 2.53±0.02$^{a}$ |
| Control | Body weight | 115±1.74$^{a}$ | 280±5.7$^{a}$ | 590±7.21$^{a}$ | 900±9.69$^{a}$ | 1300±15.81$^{a}$ | 1700±21.07$^{a}$ | 1950±22.81$^{a}$ |
| | FC | 120±2.60 | 400±8.37 | 880±20.61$^{a}$ | 1850±33.42$^{a}$ | 2700±52.75 | 3800±62.64 | 5100±62.44$^{a}$ |
| | FCR | 1.04±0.01$^{b}$ | 1.42±0.02$^{b}$ | 1.49±0.02 | 2.05±0.03$^{b}$ | 1.97±0.02$^{a}$ | 2.24±0.04 | 2.62±0.04$^{b}$ |

Antibiotics like Macrolides, Lincosamides, Tetracyclines and Tiamulin which inhibits protein synthesis, are used to treat MG infection [2]. Also antibiotic treatment in infected flocks and newly hatched chicks is essential in control of *Mycoplasma gallisepticum* and *Mycoplasma synoviae* infections [3]. Nevertheless antibiotic treatment could not eliminate this organism from flocks, but it can reduce clinical signs and gross lesions and economical losses due to low quality of carcass, and correct antibiotic therapy could reduce *Mycoplasma gallisepticum* and *Mycoplasma synoviae* population in respiratory system [8]. In some countries in prevention and eradication programs anti Mycoplasma drugs in use, yet [4]. Results of Bradbury, et al., (1994) showed that tylosin had best effects on *Mycoplasma gallisepticum* and after that lincomycin, oxytetracycline, and spectinomycin was effective on MG. also erythromycin has lowest effect, but *in vitro* results showed that lincomycin-spectinomycin was effective against MG [6]. Aivlosin, lincomycin-spectinomycin (2:1), tylosin, tiamulin, enrofloxacin and lincomycin generally very effective on fields isolates of MG [8]. Abd Wl-ghany (2009), mentioned that chicks that infected with Mycoplasma and treated with tiamulin and tilmycosin in comparison to control group had lower clinical signs, mortality and lesions in air sacs, and re-isolation rate of MG in treated groups were lower than control group, and body weight was significantly improved in treated groups [1]. The highest MIC level of tiamulin against MG in recent years is 16 times lower than that of lincomycin and 5 times lower than enrofloxacin, also tiamulin is a low inducer of resistance in mycoplasma over the last 25 years in comparison with tylosin and slower than oxytetracycline [17].

Moreover, Jordan *et al*. (1998) comparison of the different anti-mycoplasmal drugs with tiamulin showed that the lowest MICs were with tiamulin, followed by tylosin, enrofloxacin and a relatively high MIC for lincomycin/spectinomycin [10]. In addition, comparison of the MICs ranges of various antibiotics against the different Mycoplasma species demonstrates that the tiamulin was superior to tylosin, oxytetracycline, lincomycin and enrofloxacin [18]. *In-vitro* studies showed that efficacy of tiamulin, doxycycline and danofloxacin against almost all the isolates of both MG and MS was highest [18]. Also in vitro investigation results demonstrates high MICs for tylosin and tilmicosin and tiamulin, respectively [9]. Treatment of broilers inoculated by *Mycoplasma gallisepticum* showed that tiamulin is choice for treatment and followed by tylosin and oxytetracycline, respectively [12]. Evaluation efficacy of tiamulin, tylosin, spiramycin, oxytetracyline and dihydrostreptomycin at different dosages in layers infected with *Mycoplasma gallisepticum*, demonstrates that the treatment rate was statistically different ($p<0.05$) in treated groups than in un-treated group [4]. In Experimentally infected chickens and turkeys with avian *Mycoplasma*, tiamulin was more effective than other ones in preventing and eradicating airsacculitis caused by MG [5].

*In vitro* and *in vivo* comparisons of valnemulin, tiamulin, tylosin, enrofloxacin, and lincomycin/spectinomycin, indicated that mortality, clinical signs, and gross lesions were reduced significantly in the uninfected control group and infected treated groups in comparison to infected un-treated groups [10].

Evaluation of adding tiamulin and chlortetracycline in broiler feeds to control of chronic respiratory disease (CRD) denotes that mortality due to complicated CRD was lower in the tiamulin and chlortetracycline groups in comparison with the tylosin and the control group [19]. Study on tiamulin and pulmotil effects in preventing and controlling of CRD in broilers and layers indicated that these antibiotics decrease mortality and gross lesions due to CRD, and improve performance parameters in broilers and improve egg lay percent in layers [20].

## CONCLUSION

Our results indicated that in treated groups especially in tiamulin group severity of clinical signs and gross lesions were less than other groups, and in tylosin group in comparison to control group severity of signs were less than control group. Also mortality rate was significantly different ($p<0.05$) in weeks 2 to 7 between control group and two other groups. There was significant difference between control and treated groups in view of body weight gain in weeks 1-6, and FCR in some weeks. The results of our study in agreement with previous studies and also our results indicated that tiamulin was effective than tylosin in flocks conditions. Also uses of anti-mycoplasma antibiotics in first weeks of broilers production in MG positive flocks improve FCR and final body weight gain and decrease mortality rate.

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