Comparison between two dosage regimens of enrofloxacin given in drinking water for treatment of induced air sacculitis in chicks

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Summary

Response to treatment of induced air sacculitis by a pathogenic strain of E coli with enrofloxacin when it was given by the recommended therapeutic concentration (50 mg/ml) for 3 days in drinking water was compared with the method of giving the same drug at double the above concentration for one time after a period of thirstiness . Athird group of infected bird was left without treatment while a non – infected group was left as a negative control .

Parameters of mortality , clinical symptoms, feed consumption , weight gain and feed conversion were measured to evaluate the effectiveness of either method of treatment . Also, after sacrifying of some birds one week and 3 weeks after infection , pathological lesions and air sacculitis index were considered .

The results showed significant differences in most parameters between infected and non – infected groups while either of the two infected treated groups were intermediate between them .

This result encourages the use of the suggested single method of treatment especially when cost of drug, full dosing and stability of drug are taken in consideration .

Introduction

Treatment of bacterial diseases in poultry industry is one of the important steps in improving the productivity of this process . Diseases of respiratory system are very common especially the chronic respiratory disease (CRD) that is usually

caused by *Mycoplasma spp* and *E coli* as a secondary invaders (1,2) . Many types of antibacterials or combinations of them have been used in Iraq to combat such problem (3) . Recently many fluoroquinolones especially enrofloxacin have been used for this purpose . This drug is usually , as with other antibacterial drugs, are given with drinking water for 3-5 days. This method despite its practicability has short comes of inaccurate dosing and loss of some drug activity by factors of atmosphere and other physical factors . Recently reports indicate the value of giving antibacterials, especially fluoroquinolones group, as a single dose in man for treatment of urinary tract infection (4) or gonorrhea (5) or in some laboratory animals (6,7,8) . This work was designed to compare the ordinary method of treatment by giving drug for one time with twice the concentration after a period of thirstiness in groups of layer chicks infected experimentally with a pathogenic strain of *E coli* in the air sacs assuming that this way represents to some extent the suggested single bolus dose .

Materials and Methods

A total of 60 layer , male chicks (obtained from Alghalabia Poultry Station) at 21 day age were divided into 4 equal groups. Three groups were infected with an unidentified pathogenic strain of *E. coli* (obtained from Algathra Poultry Clinic) by injecting each with a suspension of the microorganism into the posterior thoracic air sac. The fourth group was left as a control group . Two of the infected groups were treated with enrofloxacin (Enrosol , 5%, The Middle East Co . for Vet. Product, Syria) . The drug was either given in the recommended dose in drinking water at concentration of 50 mg/ml given continuously for 3 days or twice the concentration of the same drug given in drinking water for 2 hours after a period of 2 hours thirstiness .

Feed consumption was measured daily while weight gain was taken weekly and accordingly , feed conversion was calculated . Three birds from each group were killed after one and 3 weeks post infection; air sacs lesions index was recorded according to

(9) . Reisolation and identification of the preinjected microorganisms were made according to method of (10) from the blood and air sacs .

Results

Mortality of 10% was recorded among the infected groups, most of them died in the first 24 hours after infection , while the rest of the infected birds showed typical clinical symptoms of air sacculitis . Infected non – treated group consumed less amount of food than did the control group , while the treated group by either method were middle between them. Weight gain consequently showed similar pattern (table 1) . The were no significant differences among group in feed conversion (table 2) The lesions of air sacculitis as shown by the dependent index (table 3) also recorded high differences between infected and non – infected group while the treated groups were middle between them (table 3) . Reisolation of the causative microorganisms from the air sacs 3 weeks after infection was recorded in all 3 birds of untreated group and in 2 of 3 birds of either treated group while the control group was clear . Reisolation from blood was seen only in one of the untreated group .

Discussion

Antibacterials are commonly given to large herd of poultry in drinking water for a period of 3-5 days depending on the intensity of infection , In our study twice the recommended concentration of enrofloxacin which is one of the important fluoroquinolone currently used for respiratory affection in poultry, was given in drinking water for a short period (2 hours) after 2 hours thirstiness . This suggested method is assumed to resemble the currently used of single bolus dose of antibacterial drugs in human (4,5) and some laboratory animals (6,7,8) versus routine method of treatment .

The results of feed consumption and weight gain indicate significant differences between infected and non – infected groups which reflect the induction of experimental air sacculitis

by the pathogenic strain of *E. coli* in the thoracic air sacs . Others got similar results (11,12) . Treatment by either method in drinking water , were not significantly different between them in all parameters , but both were about middle between the two above – mentioned groups . feed conversion among all groups was the same as reduction in feed consumption followed by reduction in weight gain . Air sacculitis lesions index vary among groups, while air sacs were almost clear in the control group they showed different degree of opacity in the infected groups but were more intense in the infected non – treated group , while the two treated groups were middle in this respect but also showed no significant difference between them .

The improvement in feed consumption weight gain and index of air sacculitis and the disappearance of clinical symptoms and the relative differences in parameter of reisolation of the causative microorganism among the treated groups by either method indicates a fair response to treatment and as both methods were as equal as each other, the new method of giving the drug in relatively high concentration and for a short period after deprivation of water is worth to be further investigated as it may spare the cost of drug , when given for 3-5 days, also spares labor and possibility of destruction of drug by atmosphere and other physical factors .

Table – 1 Weekly feed consumption (FC) and weight gain (WG) of different experimental groups (grams ± SE)

Week after infection	Control group		Infected group					
			Single dose		Routine treatment		untreated	
	FC	WG	FC	WG	FC	WG	EC	WG
First	241±3 a	61±14 A	162±7b b	46±2 B	131±6 b	37±1 B	106±7 c	29+6 C
Second	268+17 a	81±5 A	197±5 b	55±9 B	171±6 b	49±7 B	124±7 c	35±8 C
Third	291±21 a	93±1 A	197±4 b	58±7 B	176±4 b	45+4 B	125±13 c	34±2 C
Fourth	340±47 a	100±5 A	210±8 b	61±7 B	180±6 b	46±3 B	133±10 c	37±7 C

1- Statistical evaluation among groups : Small letters for FC, Capitol letters for WG
2- Single bolus dose : Given for one time in drinking water at a concentration of 100 mg/ml after a period of thirstiness .
3- Routine treatment : Given the drug in drinking water at a concentration of 50 mg/ml .

Table – 2 Cumulative feed consumption and weight gain and feed conversion (mean ± SE) .

Group	Total feed consumption	Total weight gain (g)	Feed conversion
Control (uninfected)	1140	335	3.40±0.27
Single bolus dose	766	220	3.53±0.27
Routine treatment	658	177	3.71±0.05
Infected untreated	488	135	3.71±0.36

Single bolus dose : Given for one time at a concentration of 100 mg/kg in drinking Water after a period of thirstiness
Routine treatment : Given the drug at a concentration of 50 mg/kg in drinking water for 3 days .

Table – 3 Air sacculitis index among different experimental groups (mean ±SE) .

Group	Week after infection	
	First	Third
Control (uninfected)	0.0±0.0	0.3±0.3
Single bolus dose	2.0±0.0 b	3.3±0.3 b
Routine treatment	3.3±0.3 c	3.3±0.3 b
Infected untreated	7.0±0.6 d	5.6±0.7 c

Groups : as in table – 2

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علاج التهاب الأكياس الهوائية المحدث تجريبياً بالأشريكيا القولونية في أفراخ الدجاج البياض بالأنروفلوكساسين المعطى مع ماء الشرب بطرق مختلفة

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الخلاصة

تم مقارنة تأثير العلاج في مجاميع من أفراخ الدجاج البياض عمر 21 يوم المصابة تجريبياً بعترة مرضية من الأشريكيا القولونية عندما أعطيت الأنروفلوكساسين و بالتركيز العلاجي (50 ملغم/مل) مع ماء الشرب لمدة ثلاثة أيام أو عند إعطائها لمرة واحدة بعد فترة من التعطيش وبضعف التركيز العلاجي (100ملغم/مل) واعتبرت هذه الطريقة تمثل جرعة مفردة ، وقد تركت مجموعة ثالثة مخمجة بدون علاج واستخدمت مجموعة رابعة غير مخمجة كسيطرة .

تم اعتماد نسبة الهلاكات و العلامات السريرية وكمية استهلاك العلف واكتساب الوزن والتحويل العلفي كمعايير لجدوى العلاج كما اعتمدت أيضاً وبعد التضحية بعدد من الطيور ولفترة أسبوع و ثلاث أسابيع من الخمج معايير الآفات المرضية ومنسب التهاب الأكياس الهوائية . أظهرت النتائج فروق معنوية واضحة بين المجاميع المخمجة وغير المخمجة أما مجموعتي المعالجة وبأي من الطريقتين في ماء الشرب فكانتا وسط بين الاثنين أعلاه .

تشجع هذه النتائج على طريقة إعطاء الدواء لمرة واحدة بعد فترة من التعطيش إذا اخذ جانب تقليل الهدر وضبط الجرعة والحفاظ على فعالية الدواء في ماء الشرب بنظر الاعتبار .

البحث مستل من رسالة ماجستير