The Effect of Baytril against *Salmonella london* Infection in Chickens

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Summary

The purpose of this study was to obtain additional information regarding the effectiveness of Enrofloxacin (Baytril®) against artificially induced infection of *S. london* in chickens.

One hundred and sixty one day old chicks of mixed sex were divided equally into two groups A (treated group) and B (control, infected non-treated group). Chicks were reared on separated rooms on wood shavings litter, and given water and irradiated feed continuously for 55 days. All chickens were infected at 3 days with 4×10^5 *S. london*/ml in drinking water. The administration of salmonella was followed by intestinal colonization, detected by isolation of salmonella from cloacal swabs, caecal contents and quantitative numeration per grams of caecal contents, weekly for 8 weeks.

Group A was treated with Enrofloxacin (Baytril®) 0.5 ml/L drinking water on day 45 for 5 days. Twelve days after the end of the therapy the presence of salmonella could not be detected by cloacal swabs and in caecal contents.

This suggests that Baytril seems to have a good efficiency in total elimination of salmonella from the intestine of infected chickens.

تأثير البايترل ضد الإصابة بالسالمونيلا لندن في الدجاج

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الخلاصة

الهدف من هذه الدراسة كان الحصول على معلومات إضافية حول فعالية البايترول (الانروفلوكساسين) ضد الإصابة بالسلامونيلا لندن في أفراخ الدجاج.

تم شراء 160 فرخ دجاج لحم بعمر يوم واحد ووزعت بصورة متساوية إلى مجموعتين أ (مجموعة العلاج) و بـ (مجموعة السيطرة–مصابة–غير معالجة). ربيت الأفراخ في غرف منفصلة وعلى فرشة من نشارة الخشب وقد أعطيت ماء شرب وعلف تم تطهيره بأشعة كاما طيلة فترة التجربة البالغة 55 سوم. تم إصابة الأفراخ عند عمر ثلاثة أيام بجرعة مقدارها 4×10^5 من جراثيم السالمونيلا لندن لكل مللتر من ماء

الشرب. تم التحقق من حدوث الإصابة من خلال عزل السالمونيلا من نماذج أخذت من المسحات المخرجية ومحتويات الأعورين والعد الجرثومي للسالمونيلا في 1 غم من محتويات الأعورين أسبوعيًا ولمدة ثمانية أسابيع. عولجت المجموعة الأولى (أ) بمركب البايترل بجرعة 0.5 مللتر/لتر ماء شرب عند عمر 45 يوم ولمدة خمسة أيام. بعد مرور 12 يوم من انتهاء العلاج لم نستطع عزل السالمونيلا بواسطة المسحات المخرجية أو محتويات الأعورين.

إن هذه النتيجة تشير إلى فعالية البايترل في القضاء على جراثيم السالمونيلا بصورة كاملة من أمعاء الدجاج المصاب.

Introduction

Avian Salmonellosis exists frequently as a disease causing a chronic carrier state in the intestinal tract of infected birds. Salmonellosis in poultry flocks is a serious problem for many poultry farms and processors because of the health risk to the consumer [(1)] and production losses [(2)].

Through the years, many therapeutic measures have been tried in an effort to lessen the infections in poultry, however, no treatment has emerged from critical study without certain limitations [(3)]. The objective of the study reported herein was to obtain additional information regarding the effectiveness of Enrofloxacin (Baytril®) against artificially induced infections of *S. london* in chickens reared under semicommercial conditions.

Materials and Methods

Experimental Birds and Feed

One hundred and sixty one day old chicks of mixed sex were purchased from a commercial hatchery, and divided equally into two groups (A and B) and reared at the Dept. of Poultry and Fish Dis., Baghdad University, College of Veterinary Medicine. The chickens were reared in an environmentally-controlled house with concrete walls and floors. Each group of chickens were confined to an area of (3×3) m on wood shavings (5 cm deep) which was not changed during the rearing period. The temperature was maintained at 36°C for the first three weeks (room temp.) and at 20°C throughout the remainder of the rearing period. The chickens were kept for 55 days (slaughter age).

Diet

A commercial mesh diet (IPA Center, Baghdad) was used and tap water was supplied ad libitum. All feed given to the birds was irradiated to prevent, as far as possible, the introduction of salmonella with the feed(4). A 50 kg of the complete feed was distributed in the inner of two plastic bags and the top of the

bag tightly secured. The bags were then transported to the radiation centre in Baghdad for radiation using a dose of 1Mrad.

Inoculation of Chicks

The test serotype of *S. london* used was a recent isolation from a field investigation in Baghdad area in broiler chickens. In an invitro plate sensitivity test, growth of the culture was inhibited by Baytril disc [5]. *Salmonella london* was identified both biochemically and serological before being stored on TSI agar slop (Oxoid) at 4°C as described previously [6]. On the 3rd day chicks in groups A and B were infected with 4×10^5 viable cells of *S. london* ml of drinking water as described by Pivnick [7].

Administration of Baytril

Enrofloxacin (Baytril®) is a chemotherapeutic agent from a group of new quinolone carboxylic acid derivatives from the Bayer research division which was selected sololy for use in animals. Baytril, was added to the drinking water (0.5 ml/L) to group A at the age of 45 days which continued for 5 days. Group B served as infected un-medicated control group.

Sampling Procedure

1. ***Complete Ration***: Five handful of the complete ration were taken before the arrivals of the chicks using disposable polythene gloves. Ten grams of each were pre-enriched by incubating in 100 ml buffered peptone water at 37°C for 18 hours. Tem milliliters of the culture were then transferred to 100 ml of selenite broth.
2. ***Litter Samples***: The litter was sampled 10 days after the chicks were placed in the pens and then at weekly intervals thereafter. Five handfuls were taken from the surface if the litter using disposable polythene gloves. One to 1.5 g of each was added to 15 ml selenite broth.
3. ***Cloacal Swabs***: Cloacal swabs were taken from 10 randomly selected birds 10 days after the chicks were placed in the pens and at weekly intervals thereafter. The swabs were placed initially in charcoal transport medium and then into 15 ml selenite within one hour of collection.
4. ***Caecal Contents***: Ten birds, randomly selected from each pen, were killed by dislocating the neck. Each bird was dissected aseptically. One to 1.5 g of caecal contents were squeezed into 15 ml of selenite broth.
5. ***Salmonella Counting (most Probable Number)***: The most probable number (MPN) of salmonella were carried out according to the method described by Linton and others [8].
6. ***Isolation and Identification of Salmonella***: The selenite broths were incubated at 43°C [9]. Subculture were made to phenol red brilliant green agar [10] at 24 and 48 hours, the plates being incubated at 37°C for 24 hours.

Colonies typical of salmonella were selected and their identity confirmed by biochemical and serological techniques.

Statistical Methods

Chi-square test (χ^2) and t-test were used for the statistical analysis of the data.

Results

No salmonella were isolated neither from the feed samples nor litter samples examined before the arrival of the chicks.

Isolation of Salmonella from the Control and the Medicated Groups

The results of examining cloacal swabs and caecal contents of chickens treated for 5 days with Baytril (0.5 ml/L) and the non-medicated group, are summarized in Table (1).

1. ***Salmonella Isolated from Cloacal Swabs***: In groups A and B salmonella were isolated from 90% of the cloacal swabs examined on day 10. All samples examined after day 10 were positive for salmonella and declined thereafter. The shedding rate fluctuated between (20-90) % in group A and between (40-90) % in group B. With overall isolation rate of (44.5%) and (49%) in groups A and B respectively. Date accumulated throughout the experiment showed that there was no significant difference between these two groups (χ^2=0.17).
2. ***Salmonella Isolated from Caecal Contents***: In group A, salmonella isolation rate fluctuated between (40-90) % with an overall isolation rate of (53%) and between (20-100) % in group B with an overall isolation rate of (65.5%). Date accumulated throughout the experiment showed that there was no significant difference between these two groups (χ^2=1.1). However no salmonella were isolated after the administration of Baytril on day 45 for 5 days from group A when compared to group B.
3. Number of Salmonella/g Caecal Contents: The mean salmonella count/g caecal contents isolated from group A and group B are summarized in Table (2). The results showed that no significant difference was found between groups A and B from day 10 upto day 45, when the number of salmonella per gram caecal contents were compared, but there was a significant difference between groups A and B on day 52 and 55 ($t=2.35$; $P<0.05$) after the administration of Baytril.

Discussion

A symptomatic carriage of salmonellae in the intestines is common on poultry flocks. Products from infected flocks are thus an important source of human and environmental contamination [11]. From a public health point of view the incidence of excretion at the time of slaughter is of first importance. The most direct indicator of potential carcase contamination is the salmonella status of the caecal contents. This is supported by the work of Fanelli and others [12] who concluded that culture of the caecal contents provided the best evidence of colonization of the alimentary tract compared with cultures of cloacal swabs. This may reflect the presence of larger number of salmonella in caecal sontents compared with cloacal swabs. While, in general, the incidence of salmonella isolation was low or negative in litter and cloacal samples at seven weeks of life, the caecal contents continued to be positive for salmonella up to 10 weeks of life [13]. It has been suggested [14] that in order to reduce salmonella contamination in processing plants, it is important that chickens be uninfected when they reach market age ((7-8) weeks). The results of this trial, showed that a dose of 0.5 ml/L Baytril in drinking water for 5 days, at the age of 45 days, effectively eliminated salmonella from caecal contents and cloacal swabs. The results also showed that subsequently the overall isolation of salmonella from cloacal swabs and caecal contents in group A was lower than group B. The results of this study suggest that Baytril seems to have a good efficiency in total elimination of salmonella from the intestine of chickens, and this could be valuable in helping reduce the number of salmonella contaminated chickens entering plants and reducing environmental contamination

Table (1) Isolation of salmonella from cloacal swabs and caecal contents from groups A and B

Sample	Group	Age (days)								Total number of +ve samples	% of isolation
		10*1	17*2	24	31	38	45	52	55		
Cloacal Swabs	A	9	4	3	2	2	1*3	0	0	20/45	44.5
	B	9	4	4	3	2	0	0	0	23/45	49
Caecal Contents	A	9	4	3	3	3	2*3	0	0	24/45	53.5
	B	10	4	4	3	3	2	2	1	29/45	65.5

*1 = Number of samples positive for salmonella/10 samples examined.
*2 = Number of samples positive for salmonella/5 samples examined.
*3 = Administration of Baytril for 5 days.
A = Treated group.
B = Control group (non-medicated).

Table (2) Most probable number of salmonella isolated from caecal contents from groups A and B

Mean log_{10} salmonella count/g caecal contents								
Group	**Age (days)**							
	10	17	24	31	38	45	52	55
A	5.4*1	4.8*2	5.3	4	3	2*3	0	0
B	5.2	5.5	5.2	3.6	2.6	2.5	1.5	2

*1 = Values are mean of 10 samples examined.
*2 = Values are mean of 5 samples examined.
*3 = Administration of Baytril for 5 days.
A = Treated group.
B = Control group (non-medicated).

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