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Actaplanin: A new growth promoter for broilers

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ΑΞΙΟΛΟΓΗΣΗ ΣΤΗΝ ΠΡΑΞΗ ΤΗΣ ΕΝΕΣΙΜΗΣ ΑΠΡΑΜΥΚΙΝΗΣ ΓΙΑ ΤΟΝ ΕΛΕΓΧΟ ΤΗΣ ΚΟΛΟΒΑΚΤΗΡΙΑΔΙΑΣΕΩΣ ΤΩΝ ΜΟΣΧΑΡΙΩΝ

Σ. ΚΥΡΙΑΚΗ*, Κ. ΣΑΡΡΗ**, Ι. ΑΝΔΡΕΩΤΗ*, Κ. ΤΣΑΛΤΑ*

IN FIELD EVALUATION OF INJECTABLE APRAMYCIN FOR THE CONTROL OF NATURALLY OCCURRING COLIBACILLOSIS IN YOUNG CALVES

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SUMMARY

The efficacy of apramycin at 20mg/kg of body weight IM for 5 days was evaluated for the control of naturally occurring colibacillosis in young calves ($n_1=20$). Positive control calves ($n_2=20$) were treated with trimethoprim-sulphadiazine and when symptoms persisted or recurred with oxytetracycline and/or chloramphenicol IM at dosages and for periods recommended by the manufacturers.

Scored clinical observations and diarrhoea were generally comparable between the two treatment groups. Due to persistence or recurrence of diarrhoea, positive control calves required a total of 160 IM injections as compared to 100 IM injections for apramycin group. The average daily gain of the apramycin calves was greater, although not significant ($P>0.05$), for the periods 0-7 days and 7-14 days by 123.33% and 23.51% respectively. The overall improvement (0-14 days) was statistically significant ($P<0.05$) amounting to 44.6% over the controls. Mean serum immunoglobulin levels did not differ significantly ($P<0.05$) between the two treatment groups. From fecal swabs taken from all calves on trial days 0 and 5, *E. coli* was isolated and 9 strains were recognised enteropathogenic belonging to 4 serotypes.

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INTRODUCTION

Diarrhoea in newborn calves is a major cause of economic loss particularly where intensified calf production is practiced. The aetiology of calf diarrhoea is unclear and although *E. coli* has been accepted as the primary pathogen, the interplay between enteropathogenic *E. coli*, rotavirus, corona virus, *Salmonella* spp and several epidemiological factors such as immunity of calves, overcrowding and other stresses make the disease a complex syndrome (Blood, Henderson and Radostits, 1980).

Fluid therapy and antibacterials are given orally and/or parenterally for the treatment of colibacillosis.

The use of apramycin, an aminocyclitol antibiotic produced by a strain of *Streptomyces tenebrarius*, with a strong gram negative antibacterial activity including *E. coli* and *Salmonella*, (Wick and Welles, 1968, Ryden and Moore, 1977) has been evaluated as a treatment for naturally occurring enteritis and pneumoenteritis in young calves (Pankhurst et al. 1975; Stoforos et al. 1978).

The aim of this experiment was to evaluate the effectiveness of apramycin in comparison to a conventional treatment scheme used for the control of colibacillosis in young calves.

MATERIALS AND METHODS

This experiment was carried out at a commercial weaning-finishing farm where 300, 10 day old Holstein-Friesian male calves were shipped by air from Canada to Athens and then transported by trucks to the farm. Previous experience with similarly transported animals resulted in a significant occurrence of colibacillosis, usually within 2 to 3 days after arrival. Of these calves and 2 days after they were settled, 40 with symptoms of diarrhoea were selected out, identified by ear tags and weighed. They were then randomly allotted to 2 groups of 20 animals each and assigned to apramycin treatment and positive controls, respectively.

The calves were confined individually in pens in a row within an environmentally controlled house. The mean weight of the calves on trial day 0 was about 46 kg.

A commercially available, non-medicated milk replacer was bucketfed to calves twice a day. Hay and a grain based ration supplemented with fish meal, vitamins and minerals was provided *ad libitum*.

Apramycin, (Apralan Elanco) at a dose of 20 mg/kg was administered IM once daily for the first 5 days (trial days 0 to 5). Positive control animals were initially treated with trimethoprim-sulphadiazine (Tribrissen, 48% Inj., Wellcome) at 1 ml/30Kg IM for the first 5 days. In case the symptoms did not resolve or recurred, treatment was repeated by using oxytetracycline (Terramycin - 100 Inj., Pfizer) at 5 mg/kg IM for 5 days or chloramphenicol (Certaphenicol 25% Certa) at 50 mg/10 kg for 4 days. Supportive therapy, when required,

was common to all animals regardless of treatment and consisted of solutions of electrolytes (Duphalyte, Duphar) at 6 ml/kg, administered IV.

Temperatures and clinical observations including attitude, body condition, dehydration, appetite, respiratory rate, cough, nasal discharge and diarrhoea were recorded daily up to trial day 14. Numerical values from 0 (normal) to 3 (fairly abnormal) given and clinical observation comprised the data base for clinical evaluation.

On days 0 and 5 fecal swabs were taken from all animals in an attempt to isolate *E. coli* and *Samonellae*. Conventional bacterial isolation methods were followed for these microbes. *E. coli* isolates were serotyped using the scheme of Sojka (1973).

On day 0, immunoglobulin concentrations were measured on the sera of all calves by the ZST test (McEwan et al., 1970).

All calves were again weighed on trial days 7 and 14 and the «student's t test» was used for statistical analysis of average daily gain.

RESULTS

No mortality was observed throughout the trial period. The general sickness score in both treatment groups was generally low (Fig. 1). A slight increa-

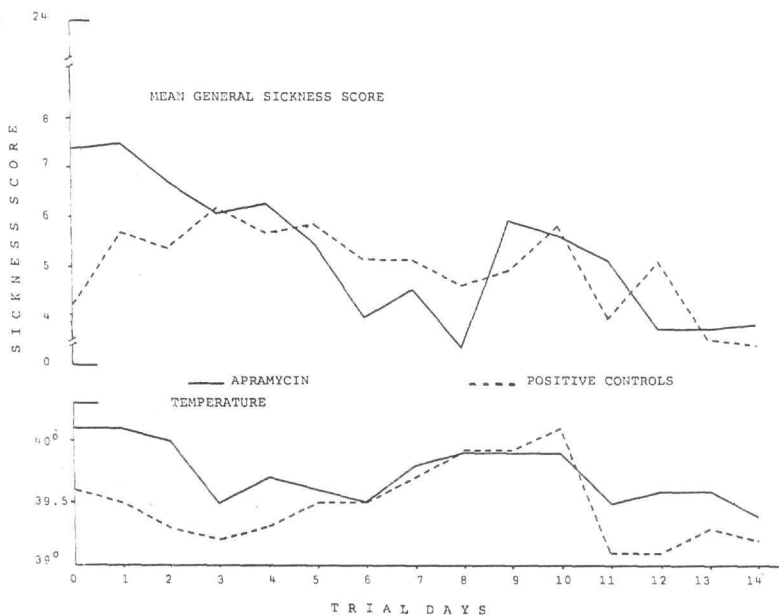


FIGURE 1

Mean general sickness scores and temperature diagramme of the apramycin and positive control groups.

se observed early during the second week accompanied by an elevation in temperatures, as seen in Fig. 1, was caused mainly by respiratory symptoms. Diarrhoea which was present at the onset of the trial reduced constantly and was minimal at the end of the trial in both groups (Fig. 2).

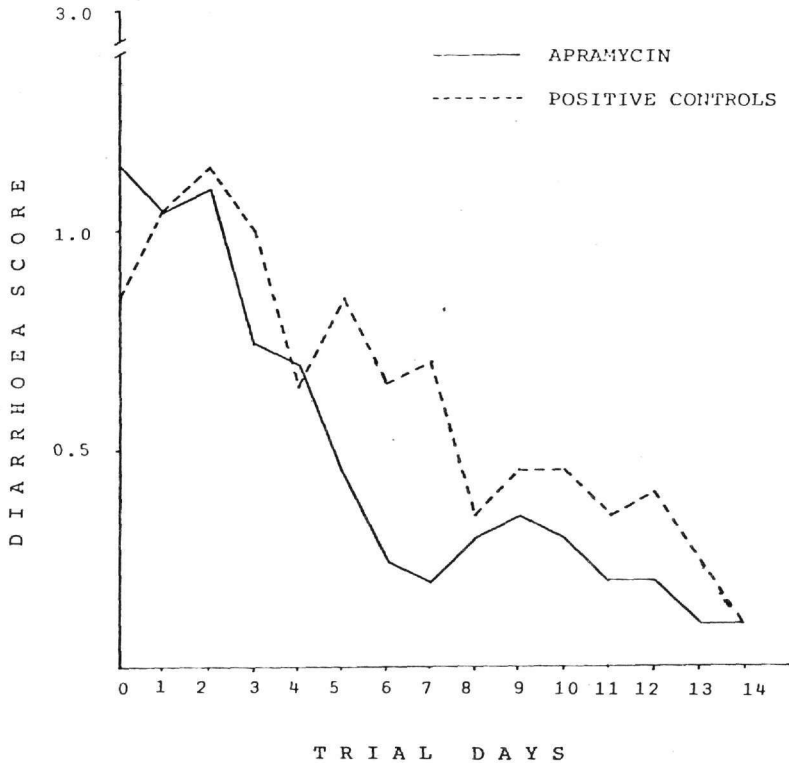


FIGURE 2.

Mean daily diarrhoea scores of both treatment groups.

Positive control animals were initially treated with trimethoprim-sulphadiazine on trial days 0 to 5. Immediately following the 5 - day treatment period, eight of the calves required an additional treatment with oxytetracycline due to persistence of symptoms and in 5 of these, treatment was again repeated by using chloramphenicol for the same reasons. As a consequence, the treatment period for these 5 animals was from day 0 up to day 13 of the trial. Therefore, an extra 60 doses of antibiotic were used in the positive control calves since both groups initially were given 100 injections. Electrolyte (Duphalyte) supportive therapy was given to 12 apramycin treated calves on trial days 1

and 2; to 10 positive control calves on days 1 and 2; to 6 calves upon initiation of the oxytetracycline treatment for 2 consecutive days (trial days 5 and 6) and repeated again in 5 of these on trial days 10 and 11.

Performance data are summarized in Table 1. As compared to the positive controls, the average daily gain (ADG) of the calves that had been treated with apramycin was better-though not significant - by 123.33% and 23.51% for the periods 0-7 days and 7-14 days, respectively. The overall improvement in ADG was, however, significant amounting to 44.6%.

E. coli was isolated from all animals of both groups from fecal swabs taken on days 0 and 5. From these isolates 9 strains were recognised enteropathogenic belonging to groups 0149:K91, K88ac; OV17: K «V17»; 064: K «V142» and 08: K «P16» (table 2).

TABLE 1

Summary of growth performance data of the apramycin and positive control groups.

Parameter	Period (days)	Treatment means		
		Positive Control	Apramycin	Change (%)
Initial weight (kg)	0	46.3 ^a	46.7 ^a	
Final weight	14	49.3 ^a	51.0 ^a	
ADG (g)	0-7	90 ^a	201 ^a	123.33
ADG (g)	7-14	336 ^a	415 ^a	23.51
ADG (g)	0-14	213 ^a	308 ^b	44.60

Means in a row with different superscript letters differ significantly (P<0.05).

TABLE 2

Identified serotypes of *E. coli* isolates from fecal swabs taken on trial days 0 and 5

APRAMYCIN TREATED				POSITIVE CONTROLS			
DAY 0		DAY 5		DAY 0		DAY 5	
SEROTYPE	No of calves	SEROTYPE	No of calves	SEROTYPE	No of calves	SEROTYPE	No of calves
0149:K91.K88 ac	3	08:K «P16»	1	OV17:K «V17»	1	08:K «P16»	1
OV17:K «V17»	1	064:K «V142»	1				
064:K «V142»	1						

The mean serum immunoglobulin concentration expressed as ZST units was 12.3 (range 13.3) for the apramycin treated group and 11.9 (range 16.3) for the positive controls. The difference between the two treatment groups was not statistically significant ($P > 0.05$).

DISCUSSION

The results of this study, where we had a typical field infection of colibacillosis in calves with isolation of pathogenic *E. coli* strains, confirms previous reports (Pankhurst et al, 1975; Stoforos et al. 1978). The clinical response in both groups of animals was similar. The ADG in the apramycin group was numerically superior for both weeks of trial and significantly improved-overall.

Both groups had similar mean immunoglobulin levels. Although an extra 60 doses of antibiotic were used in the positive control calves no further antibiotic therapy was necessary in the apramycin group.

Apramycin IM at 20 mg/kg once daily for 5 days has both clinical and practical advantages over alternative treatments commonly used in Greece for coliform diarrhoea in calves.

ΠΕΡΙΛΗΨΗ

Έγινε αξιολόγηση της αποτελεσματικότητας της άπραμυκίνης στη δόση των 20mg/kg ζ.β., ενδομυκικά, επί 5 ημέρες, για τον έλεγχο της κολοβακτηριδιάσεως σε 20 μικρά μοσχάρια ηλικίας 12-13 ημερών περίπου. Χρησιμοποιήθηκε ίδιος αριθμός μαρτύρων των οποίων η θεραπευτική αγωγή περιλάμβανε αρχικά χορήγηση trimethoprim-sulphadiazine και στη συνέχεια, όταν τα συμπτώματα δεν υποχωρούσαν ή επανεμφανίζονταν, δεξυτετρακυκλίνη ή και χλωραμφενικόλη. Η χορήγηση των αντιβιοτικών αυτών γίνονταν ενδομυκικά, σε δόσεις και διάρκεια θεραπείας που συνιστούσαν οι παρασκευαστές οίκοι.

Οι διαβαθμίσεις των κλινικών συμπτωμάτων και της διάρροιας ήταν παρόμοιες στις δύο θεραπευτικές ομάδες. Η διάρκεια όμως ή και η επανεμφάνιση της διάρροιας στους μάρτυρες έκανε απαραίτητη την επιπρόσθετη χορήγηση 60 δόσεων αντιβιοτικών· ώστε, ο συνολικός αριθμός των ενδομυκικών ενέσεων να φθάσει τους 160, σε σύγκριση με τους 100 της ομάδας της άπραμυκίνης. Η Μέση Ημερήσια Αύξηση Βάρους (ΜΗΑΒ) των μοσχαριών της ομάδας της άπραμυκίνης ήταν αριθμητικά μεγαλύτερη — όχι όμως στατιστικά σημαντική ($P > 0.05$) — σε σύγκριση με τους μάρτυρες, κατά 123.33% για τη περίοδο 0-7 ημέρες και 23.51% για τη περίοδο 7-14 ημέρες. Η συνολική (0-14 ημέρες) όμως βελτίωση της ΜΗΑΒ ήταν στατιστικά σημαντική ($P < 0.05$) και κατά 44.6% μεγαλύτερη από αυτή των μαρτύρων. Οι διαφορές των μέσων τιμών των συγκεντρώσεων των ανοσοσφαιρινών στον όρο των μόσχων των δύο θεραπευτικών ομάδων δεν ήταν στατιστικά σημαντικές ($P > 0.05$). Στελέχη *E. coli* απομονώθηκαν από τα κόπρανα όλων των ζώων τις ημέρες 0 και 5 του πειραματισμού. Από την όρολογική ταυτοποίηση που έπακολούθησε, 9 από αυτά τα στελέχη ανήκαν σε 4 έντεροπαθογόνες όρολογικές ομάδες.

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