SHORT COMMUNICATION

Efficacy of a monensin-duokvin combination against *Eimeria acervulina* in chickens

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Abstract. Anticoccidial efficacy of a drug combination containing monensin at 8 p.p.m. plus the new antioxidant duokvin at 120 p.p.m. in the feed was compared with that of monensin alone at the recommended level of 100 p.p.m. against a field isolate of the coccidium *Eimeria acervulina* Tyzzer, 1929 in a battery study. Both monensin and monensin duokvin combination were effective against *E. acervulina* when judged by weight gain, feed conversion and faecal scores. There was no significant difference in the chemoprophylactic activity of either treatments. Neither monensin at 100 p.p.m. nor the combination proved effective in terms of oocyst production. In accordance with the earlier findings with *E. tenella*, the combination seems appropriate for field trials.

Ionophorous anticoccidials used in the poultry industry show a toxic interaction with some feed ingredients and therapeutic compounds (reviewed by Dowling 1992). Growth decrease in chickens due to simultaneous administration of the antioxidant dihydroquinoline XAX-M(2,2-bis[2,2,4,4-Trimethyl-1,2-dihydroquinoline-6-yl]-ethane) and monensin was first reported by Pietsch and Ruffe (1986). They also showed elimination of the untoward effects of the interaction by reducing of the dose of monensin from 100 to 30 p.p.m. Inclusion of TD antioxidant (6,6'Ethyliden-bis[2,2,4-Trimethyl-1,2-dihydroquinoline) with salinomycin or monensin in the diet caused a strong or a moderate growth depression, respectively (Proházska et al. 1987). Lasalocid or EMQ antioxidant (6-Ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline) failed to exert any growth-depressing effect upon the chicken. When two molecules of the prototype (6-Ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline) were linked with an alkyl group (methyldiene, ethyldiene, or propyldiene), the anticoccidial efficacy of both salinomycin and monensin was increased such that a 25 % dose was as effective as the recommended dose (60 p.p.m. and 100 p.p.m., respectively) if used alone. The use of structurally related synergists demonstrated the broader application of the principle with other but not all polyethers (Proházska and Rosznyai 1990). The new antioxidant duokvin (2,2-bis[2,2,4-Trimethyl-1,2-dihydroquinoline-6-yl]-propane) at 120 p.p.m. alone showed no appreciable anticoccidial efficacy against the coccidia *Eimeria tenella* (Raillet and Lucet, 1891) Fantham 1909 and *E. mitis* Tyzzer, 1929 (Varga et al. 1994). Inclusion of duokvin in the diet allowed a reduction of the recommended dose of monensin, salinomycin and narasin to approximately 12 % of the registered dose and that of maduramycin to approx. 50 %. Lasalocid and semduramicin proved compatible with duokvin allowing not more than 50 % reduction of their dietary level to control caecal coccidiosis adequately (Varga et al. 1995).

As *E. acervulina* Tyzzer, 1929 is the most common species in the poultry industry, the present study was undertaken to learn whether a combination of monensin with duokvin in the feed was effective in controlling the effects of this parasite which dwells within the upper small intestine.

MATERIALS AND METHODS

A battery trial was conducted with Arbor Acres cockerels with four replicates (4 x 12 chickens per group). One-day-old birds were housed in coccidia-free, electrically heated batteries with continuous illumination. Feed and water were available *ad libitum*. At the age of 6 days (D1), the chickens were individually weighed, wing-tagged and allocated to groups of 12 birds per cage by means of a computer program to obtain groups with similar body weight and standard deviation. From that time on, the animals received either a basal ration (uninfected, untreated control, UUC; infected, untreated control, IUC) or a diet containing monensin (Elancoban, Eli Lilly & Elanco Co., Indianapolis, Indiana, U.S.A.) at approved level of 100 p.p.m. in the feed (M) or monensin at 8 p.p.m. plus duokvin (Material Chemical Co., Budapest.
Fig. 1. Comparison of the anticoccidial efficacy of monensin-duokvin combination against *Eimeria acervulina* in chickens. Birds in group (n = 48) UUC and IUC were fed basal ration; M received 100 p.p.m. monensin; MD received 8 p.p.m. monensin plus 120 p.p.m. duokvin in feed. Mean body weight gain in UUC: 156 g; mean faecal score in IUC: 2.87; mean F.C.R. in IUC: 4.53 kg/kg; mean oocyst production per bird in MD: 16.2 (×10⁶).

Hungary at 120 p.p.m in the feed (MD). At the age of 7 days (D0), the chickens were inoculated orally with 10⁶ sporulated oocysts of *Eimeria acervulina* (approximately 90%) and *E. mitis* (approximately 10%) that had been isolated from a local broiler farm (Babolna) and had been multiplied via two chicken passages in our laboratory. Faecal scores (0 = no effect, 3 = maximum of diarrhoea) were noted on post-infection days 4, 5, 6 and 7 (D4 to D7) as suggested by Morehouse and Baron (1970). Faeces were collected on D4 to D8 and the numbers of oocysts per gram of homogenised faeces (OPG) were determined by counting them in McMaster counting chambers. The numbers of oocysts recorded were expressed as the average number produced per chicken. On D8, the animals were weighed and sacrificed by bleeding after electrical stunning. Feed consumption between D1 to D8 was recorded for calculation of the feed conversion ratio (F.C.R.).

Parameters measured were as follows: (1) weight gain from D-1 to D-8 which was expressed as relative body weight gain (% of UUC), (2) F. C. R. (% of IUC) (3) faecal scores (% of IUC) and (4) oocyst production per chicken. Statistical comparisons were performed using analysis of variance followed by Duncan's multiple range test. Differences were considered significant when P < 0.05.

RESULTS AND DISCUSSION

Mortality did not occur and macroscopic lesions could not be detected in any group of chickens. However, there was a slight increase in the amount of mucus present in the duodenum and upper jejunum in the infected birds irrespective of the medication. Chickens medicated in either group produced more oocysts than those in IUC, although the difference among the 3 groups was not significant (Fig. 1). The weight gain was significantly higher, the faecal score was lower and the feed conversion was lower in medicated (M and MD) groups as compared to IUC (Fig. 1). The absence of significant difference between the above parameters of chickens that received 100 p.p.m. monensin and that of birds that received 8 p.p.m. monensin with 120 p.p.m. duokvin suggests that the sensitivity of *Eimeria acervulina* to the potentiated monensin is similar to that observed with *E. tenella* (Varga et al. 1994).

In view of the activity of the potentiated monensin against both *E. tenella* and *E. acervulina*, and also the decrease of toxic interaction with several chemotherapeutics used in broiler production (Laczay et al. 1994), we have come to the conclusion that potentiated monensin may lend itself to field experiments without causing undue risk of coccidiosis in a commercial operation.

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REFERENCES


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