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The Effect of Monensin and Enrofloxacin Coadministration on Broiler Performance

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Abstract

The possibility of monensin intoxication during coadministration with enrofloxacin in broiler chicken was explored. Group-I, remained as untreated control. Group-II, treated with monensin 100ppm in feed from 1 day old to 41st day of age. Group-III, administered with enrofloxacin 10mg/kg body weight per os for three consecutive days on 33rd-35th day of age. Group-IV, coadministered with 100mg monensin/kg feed from 1 day old to the 41st day+10mg enrofloxacin/kg body weight, per os for 3 consecutive days on 33rd-35th day of age. Performance of broilers was not affected in either monensin or enrofloxacin alone treated groups. However, a significant reduction (p≤0.05) in feed intake and weight gain was noticed in monensin and enrofloxacin coadministered group, prompting to avoid this combinations.

Key words: Monensin, enrofloxacin, intoxication, broiler performance.

Monensin, a poly ether ionophore antibiotic is widely used as growth promoter and feed additive against coccidiosis in chickens due to its broad spectrum activity and slower resistance development despite of its low margin of safety (Dowling, 1992). Since monensin has narrow safety margin, any interactions affecting its therapeutic concentrations may lead to intoxication or therapeutic failure. Enrofloxacin, a fluorinated quinolone with broad spectrum activity is developed exclusively for animal use and used for treating mycoplasmosis, colibacillosis and pasteurellosis in chickens and turkeys (Barragry, 1994). Sureshkumar et al., (2004) found

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that enrofloxacin decreased the aniline hydroxylase, one of the cytochrome P450 (CYP450) dependent mono oxygenase systems in broilers. As enrofloxacin was found to be an inhibitor of mono oxygenase system there is every possibility of inhibition of monensin metabolism upon coadministration. Hence, the present study has been undertaken to explore the possible development of intoxication of monensin during coadministration with enrofloxacin.

Materials and Methods

Day old broiler chicks (Broiler strain B1) obtained from the Poultry Research Station, Nandanam, Chennai-35 were grouped into 6 chicks/group as follows: Group-I was kept as untreated control throughout the experimental period. Group-II was given monensin alone through feed at recommended 100 ppm dosage level from day one to the 41st day of age. Group-III was administered with enrofloxacin alone at recommended 10 mg/kg body weight dosage level per os for three consecutive days on 33rd, 34th and 35th day of age. Group-IV received monensin 100 ppm in feed starting from one day old to the 41st day of age and was simultaneously treated with 10 mg enrofloxacin/kg body weight per os for three consecutive days on the 33rd, 34th and 35th day of age.

Body weights were recorded in all the groups on 21st, 28th, 32nd, 35th, 38th and 41st day of age. Means of different groups were compared by analysis of variance (ANOVA) for their significance as per Snedecor and Cochran (1994).

Results and Discussion

Simultaneous administration of monensin and enrofloxacin caused significant reduction (p≤0.05) in feed intake and mean daily body weight gain when compared to control, monensin and enrofloxacin alone treated groups (Table I & II). This is in accordance with Weisman et al. (1980) who showed reduction in feed intake and depression of growth due to slower metabolic degradation of monensin in the presence of tiamulin. In the present study the development of significantly depressed feed intake and weight gain may be due to the consequence of accumulation of monensin in the body culminating intoxication. This postulation is supported by our earlier report that enrofloxacin inhibited aniline hydroxylase (Sureshkumar et al., loc. cit), one of the CYP450 dependent mono oxygenase systems, which belongs to the CYP450 III gene family (CYP3A) (Bourrie et al., 1996) and influences the metabolism of coadministered monensin through CYP3A, thereby leading to accumulation of monensin in the body which was manifested by the symptoms of toxicity. In contrast, performance of broilers, however, was not affected in either the monensin or enrofloxacin alone treated groups. Wagner et al. (1983) suggested that at recommended levels, monen-
The effect of monensin...

Table II. Effect of enrofloxacin and/or monensin on average daily weight gain, expressed as grams (Mean ± SE)

<table>
<thead>
<tr>
<th>Groups</th>
<th>7th day</th>
<th>14th day</th>
<th>21st day</th>
<th>28th day</th>
<th>32nd day</th>
<th>35th day</th>
<th>38th day</th>
<th>41st day</th>
<th>Overall Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-Control</td>
<td>6.429 ± 0.26</td>
<td>8.511 ± 0.61</td>
<td>17.380 ± 1.17</td>
<td>23.095 ± 1.01</td>
<td>25.830 ± 1.00</td>
<td>26.380 ± 2.49</td>
<td>27.777 ± 2.04</td>
<td>29.444 ± 0.98</td>
<td>20.605 ± 0.98</td>
</tr>
<tr>
<td>II-Monensin</td>
<td>7.024 ± 0.38</td>
<td>9.345 ± 0.88</td>
<td>17.440 ± 0.91</td>
<td>24.881 ± 0.87</td>
<td>26.040 ± 0.99</td>
<td>26.110 ± 2.60</td>
<td>28.055 ± 2.18</td>
<td>29.166 ± 0.93</td>
<td>21.007 ± 0.93</td>
</tr>
<tr>
<td>III-Enrofloxacin</td>
<td>6.369 ± 0.45</td>
<td>8.690 ± 0.56</td>
<td>17.500 ± 0.71</td>
<td>23.273 ± 1.48</td>
<td>25.273 ± 1.10</td>
<td>25.280 ± 0.94</td>
<td>27.777 ± 1.87</td>
<td>21.670 ± 5.91</td>
<td>20.408 ± 0.94</td>
</tr>
<tr>
<td>IV-Monensin +</td>
<td>± 0.83</td>
<td>± 0.95</td>
<td>± 1.50</td>
<td>± 1.13</td>
<td>± 1.27</td>
<td>± 1.86</td>
<td>± 2.55</td>
<td>± 2.05</td>
<td>± 0.90</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall means bearing different superscript (a, b) within the column differ significantly (P<0.05).

sin had no effect on weight gain in broilers and adverse effects.

In monensin and enrofloxacin coadministered group, on day 6 post-exposure with enrofloxacin, there was a tendency for feed intake and weight gain coming closer to the normal values. This may be due to the competitive inhibitory effect of quinolones on CYP450 (Suressh Kumar et al., loc. cit) and complete elimination of enrofloxacin from the body 6 days after treatment (Suressh Kumar 2012), thereby normal function of the CYP450 enzymes is restored. This is indicative of revival of monensin metabolism on day 6 post exposure with enrofloxacin.

Summary

The simultaneous administration of enrofloxacin and monensin even at recommended level could result in toxic interactions which would have an influence on performance of broilers.

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References


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