P207 Meta-analytic study of productive and nutritional interactions of supplementation with β-mannanase in broiler diets

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Objective
The objectives of this project were to study the various productive effects of supplementation of diets with β-mannanase for broilers, evaluating their interaction with animal nutrition.

Materials and methods
A database composed of 33 scientific publications dated between 2002 and 2013. The works included in the database totaled 31,869 broilers. The average number of animals per treatment was 242 birds. The gene was shown in 95 % of publications. These studies used 44% of poultry genetic Cobb, 35% and 9% Ross Arbor. The average stocking rate of 30 animals was used per housing unit. The initial mean age of the birds was 9 days and the median age of 31 days late. The average duration of the experiments was 22 days, the longest being 48 days. The majority (44 %) of the work used male broilers, 28 % and 28 % mixed batches did not describe the sex of the birds used. The majority of experimental diets (63 %) were formulated based on corn and soybean meal. The average nutritional composition of the diets is shown in Table 1.

About 28 % of the studies used at least one treatment with reduced energy levels in the diets.

Table 1. Description of the experimental diets and estimated daily intake of nutrients

<table>
<thead>
<tr>
<th>Ingredients inclusion</th>
<th>Media</th>
<th>CV, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean meal, %</td>
<td>28,4</td>
<td>14,6</td>
</tr>
<tr>
<td>Corn, %</td>
<td>60,5</td>
<td>8,38</td>
</tr>
</tbody>
</table>

**Nutritional composition**

| Metabolizable energy, kcal/kg | 3035 | 4,26  |
| Crude protein, %              | 20,4 | 6,90  |
| Total lysine, %               | 1,15 | 9,13  |
| Calcium, %                   | 0,91 | 8,70  |
| Total phosphorous, %          | 0,71 | 21,8  |

**Daily nutrient intake**

| Metabolizable energy, kcal/animal/day | 323 | 88,9 |
| Crude protein, g/animal/day           | 19,1 | 62,9 |
| Total lysine, g/animal/day            | 1,04 | 60,6 |

Results
Table 2 shows that the supplementation of diets for broilers with β-mannanase did not affect feed consumption, the average weight gain and final body weight of the animals. Intakes calculated metabolisable energy, crude protein and lysine were also not influenced by the presence of β-mannanase in the diets. However, broilers fed diets containing β-mannanase showed 5 % better feed conversion (P = 0.03) than the control group. Despite not change the productivity factor and uniformity of lots, supplementation with β-mannanase increased 3 % European efficiency factor (P = 0.03). A trend of increase of 1 % in the viability of the animals (P = 0.06) was also observed.
Table 2. Performance, productivity indices in broilers fed diets either supplemented or not with β-mannanase

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Control</th>
<th>β-mannanase</th>
<th>RSD2</th>
<th>Probability3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed intake, g/day</td>
<td>100</td>
<td>98.9</td>
<td>19.5</td>
<td>0.66</td>
</tr>
<tr>
<td>Daily weight gain, g/day</td>
<td>51.9</td>
<td>52.5</td>
<td>8.32</td>
<td>0.50</td>
</tr>
<tr>
<td>Feed conversion, g/g</td>
<td>1.77</td>
<td>1.69</td>
<td>0.18</td>
<td>0.03</td>
</tr>
<tr>
<td>Final body weight, g</td>
<td>1851</td>
<td>1880</td>
<td>66.6</td>
<td>0.68</td>
</tr>
<tr>
<td>Viability, %</td>
<td>96.9</td>
<td>97.6</td>
<td>1.64</td>
<td>0.06</td>
</tr>
<tr>
<td>European Productivity Efficiency Factor5</td>
<td>272</td>
<td>293</td>
<td>48.9</td>
<td>0.08</td>
</tr>
<tr>
<td>Uniformity, %</td>
<td>91.2</td>
<td>91.3</td>
<td>1.19</td>
<td>0.98</td>
</tr>
</tbody>
</table>

1 Final body weight means were adjusted with initial weight of the animals as a covariate.  
2 Residual standard deviation.  
3 Model considering treatment codings (control or supplemented with β-mannanase), article effect coding and dietary energy level coding (adequate metabolizable energy level or below nutritional recommended levels). Coding of effect of presented article P<0.05 in all of the analysis.  
4 Responses derived from other variables in the database.  
5 European Efficiency Factor = Mean live mass (kg)) * percent survivors * 100 / feed conversion*age(days)

Conclusions and implications

Figure 1 shows a plot of the data of daily weight gain as a function of dietary intake of metabolisable energy in control and supplemented broiler diets with β-mannanase. From these data and equations generated by analysis of covariance, it was possible to estimate the intake of 1 Mega calorie (1000 kcal) of metabolisable energy that accounted for 143.91 g of weight gain in the control animals (DWG = 10.54 + 143.91x; R² = 0.95; where ‘DWG’ is daily weight gain in grams, and ‘X’ is the intake of energy, expressed in mega calories) and 147.84 g is the weight gain in animals receiving diets supplemented with β-mannanase (DWG+ = 10.45 + 147.84 x; R² = 0.95). This relationship represents a saving of 2.7% in energy expenditure for growth. From these equations, we can estimate that supplementation of diets with β-mannanase enables a saving of 187 kcal per 1 kg of live weight gain in broilers.

Figure 1. Daily weight gain as a function of daily metabolizable energy intake in control broilers (ADG-, in black) and broilers that received diets supplemented with β-mannanase (GDP+, in red)
References


