Use of a dynamic mechanistic broiler model to reduce environmental footprint

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Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

**Introduction**

digestive physiology and metabolism of avian species

N and P concentration in poultry manure is high

adequate dietary N (AAs)

phytic acid bounded form of P
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Halas et al. (2017), Dukhta et al. (unpublished)
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**Optimal dietary CP as suggested by the model and the CP content of the feeds in different phases of two scenarios**

Sc1 – Ross recommendations, Sc2 – multiple phases feeding
req Sc1, 2 – available P requirements within scenarios 1 and 2, respectively
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Optimal dietary CP as suggested by the model and the CP content of the feeds in different phases of two scenarios

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5-7 June, 2019
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Optimal dietary available P as suggested by the model and the avP content of the feeds in different phases of two scenarios

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Distribution of N

- N Intake Sc1
- N Intake Sc2
- digN Intake Sc1
- digN Intake Sc2
- retained N Sc1
- retained N Sc2
- N excreted Sc1
- N excreted Sc2
- obl N loss Sc1
- obl N loss Sc2

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Table:

<table>
<thead>
<tr>
<th>Age, days</th>
<th>N Intake Sc1</th>
<th>N Intake Sc2</th>
<th>digN Intake Sc1</th>
<th>digN Intake Sc2</th>
<th>retained N Sc1</th>
<th>retained N Sc2</th>
<th>N excreted Sc1</th>
<th>N excreted Sc2</th>
<th>obl N loss Sc1</th>
<th>obl N loss Sc2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7 June, 2019</td>
<td>152.3 g</td>
<td>121.8 g</td>
<td>75.7 g</td>
<td>132.37 g</td>
<td>106.2 g</td>
<td>75.7 g</td>
<td>15.7 g</td>
<td>30.4 g</td>
<td>18.1 g</td>
<td>15.7 g</td>
</tr>
</tbody>
</table>

Graphs showing the distribution of N over time.
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**Distribution of P**

- P Intake Sc1
- P Intake Sc2
- digP Intake Sc1
- digP Intake Sc2
- retained P Sc1
- retained P Sc2

Age, d | P, g/d
---|---
0 | RETAINED P
10 | 12.9 g
20 | 15.8 g
30 | 35.1 g
40 | 42.7 g

P Intake Sc1 | 19.2 g
P Intake Sc2 | 12.9 g

Age, d | P, g/d
---|---
0 | P excreted Sc1
10 | 3.5 g
20 | 6.4 g
30 | 12.9 g
40 | 42.7 g

P excreted Sc1 | 12.9 g
P excreted Sc2 | 2.9 g

Age, d | P, g/d
---|---
0 | obl P loss Sc1
10 | 0.8 g
20 | 2.9 g
30 | 3.5 g
40 | 12.9 g

obl P loss Sc1 | 0.8 g
obl P loss Sc2 | 2.9 g
Conclusion

Since the levels of digestible N and available P in the feeds are known, the distribution of absorbed nutrients in the metabolism can be simulated.

This approach may allow a better understanding of the concept of feed use mechanism for the decision to be taken.

The model is an excellent tool to design alternative feeding strategies for animal production with a low environmental footprint.
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(www.feed-a-gene.eu)