PERFORMANCE AND NUTRIENT DIGESTIBILITY IN BROILERS IN RESPONSE TO INCREASING DOSES OF PHYTASE

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Y. DERSJANT-LI, A.L. WEALLEANS AND L.F. ROMERO

Danisco Animal Nutrition, DuPont Industrial Biosciences, Marlborough, UK
Introduction

Background:

- Phytase is traditionally used at a standard dose of 500FTU/kg
- High phytase doses result in extra-phosphoric effect
- Different generation phytases may vary in bio-efficacy due to the characteristics of the phytases

Objectives:

- To determine dose response of a new generation phytase (*Buttiauxella* sp phytase produced in *Trichoderma reesei*) on performance and P digestibility in broilers
- To compare efficacy of *Buttiauxella* phytase with an *E. coli* phytase
Methods: meta-analysis of several trial data

1: Dose response

- Data from 7 trials were collected
- Five treatments:
  - PC (adequate in all nutrients)
  - NC (reduced 0.2 MJ/kg ME, 0.17 % AvP, 0.15 % Ca vs PC)
  - NC+ 500, 1000 and 2000 FTU/kg *Buttiauxella* phytase
- Diets based mainly on corn and soybean meal
- Performance parameters: 0-21 and 0-42 days; digestibility: 21 day

2: Compare phytase sources

- Data from 4 trials were collected
- Five treatments:
  - PC (adequate in all nutrients)
  - NC (reduced 0.2 MJ/kg ME, 0.17 % AvP, 0.16 % Ca vs PC)
  - NC+ 250, 500 and 1000 FTU/kg either *Buttiauxella* or *E. coli* phytase.
- Diets based mainly on corn and soybean meal
- Birds were fed test diets from 0-42 days

Statistics conducted using the Fit Model Platform of JMP 11, trial code was included in the model as a random effect. Tukey’s HSD test was used for means separation.
Results: dose response 500-2000FTU/kg *Buttiauxella* phytase

- Ileal P digestibility (%) and bone ash plateaued at about 1000FTU/kg phytase

- P and Ca deficient NC diet reduced all performance parameters

- Increasing phytase dose linearly / quadratically improved ADG and feed / energy efficiency
Results: dose response (continued)

<table>
<thead>
<tr>
<th></th>
<th>PC</th>
<th>NC</th>
<th>Butiauxella Phytase dose, FTU/kg</th>
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<th>PC</th>
<th>NC</th>
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<td>500</td>
<td>1000</td>
<td>2000</td>
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<tr>
<td>ADG, g</td>
<td>39.0a</td>
<td>32.3b</td>
<td>38.5a</td>
<td>39.3a</td>
<td>40.0a</td>
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<tr>
<td>ADFI, g</td>
<td>52.6a</td>
<td>46.6b</td>
<td>52.3a</td>
<td>52.5a</td>
<td>53.6a</td>
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<tr>
<td>FCR</td>
<td>1.36b</td>
<td>1.47a</td>
<td>1.37b</td>
<td>1.34b</td>
<td>1.35b</td>
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<tr>
<td>FCRc*</td>
<td>1.36b</td>
<td>1.51a</td>
<td>1.37b</td>
<td>1.34b</td>
<td>1.34b</td>
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<tr>
<td>E conv**</td>
<td>17.5b</td>
<td>18.7a</td>
<td>17.3b</td>
<td>17.0b</td>
<td>17.1b</td>
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<tr>
<td>Bone Ash, %</td>
<td>35.6a</td>
<td>31.0b</td>
<td>34.5a</td>
<td>34.7a</td>
<td>34.4a</td>
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0-21d

|                  |     |     |                   |                   |     |     |                   |                   |
| ADG, g           | 71.3b| 63.9c| 72.9b             | 73.7ab            | 75.9a|     |                   |                   |
| ADFI, g          | 120.9b| 112.0c| 125.2b            | 124.8b            | 130.2a|     |                   |                   |
| FCR              | 1.694b| 1.753a| 1.718b            | 1.694b            | 1.716b|     |                   |                   |
| FCRc*            | 1.694b| 1.846a| 1.700b            | 1.665b            | 1.660b|     |                   |                   |
| E conv**         | 22.6ab| 22.8a| 22.3ab            | 22.0b             | 22.3b|     |                   |                   |
| Prod day***      | 42.0| 46.9| 41.2              | 40.7              | 39.5|     |                   |                   |

0-42d

1 0-21d performance: 7 trials; 0-42d performance: one trial; ileal P digestibility: 3 trials, bone ash: 5 trials
a,b,c Values within rows with the same superscript are not significantly different (P < 0.05)
* FCRc: correction of 3 points for each 100g body weight difference from PC.
** Energy conversion: MJ/ kg body weight gain
***Production day: days needed to produce 3000g live BW broilers estimated based on ADG
Results: comparison of phytase sources, 0-42d

**Buttiauxella** phytase at 1000 FTU/kg improved FCRc* by 4 points vs PC

**Buttiauxella** phytase improved efficacy compared to *E. coli* phytase

* FCRc: body weight corrected feed conversion ratio, correction of 3 points for each 100g body weight difference from PC
Conclusions

- *Buttiauxella* or *E. coli* phytase at a level equal or above 500 FTU/kg replaced 0.17 % available P, 0.15 % total Ca and 0.2 MJ/kg ME in broiler diets.

- Phytase dose at 1000-2000 FTU/kg further improved ADFI, ADG, feed and energy efficiency, and reduced rearing days to reach market size in broilers fed a low energy, available P and Ca diet.

- The extra phosphoric effect at high dose may result in economic benefit.

- Both phytases were effective; however, *Buttiauxella* phytase had a significantly higher efficacy (FCRc, P < 0.05) than *E. coli* phytase at 500-1000 FTU/kg.
Thank you for your time

Questions