



Dose-response of OptiPhos® Plus on bone ash and ileal digestibility of phytate, phosphorus and protein in broilers

Trial description

1 Set-up

- **Location:** ILVO (Institute for Agricultural and Fishery Research), Belgium
- **Trial period:** March – June 2018
- **Animals:** 192 male Ross 308 broilers
- **Set-Up:**
 - day 0: chick placement in one group and fed same starter feed (floor pen)
 - day 9: start grower feed and distribution of chicks per treatment (floor pens)
 - day 17: transfer to 48 cages (4 birds/cage; 8 treatments with 6 repetitions)
 - day 27: collection of ileal samples and bones (right tibia)
- **Feeds (Table 1):**
 - Starter: 21 % CP; 11.6 % dig. Lys; 3000 kCal AME broiler/kg; 0.85 % Ca; 0.4 % aP
 - Grower:
 - positive control: 20.0 % CP; 1.0 % dig. Lys; 3000 kCal AME broiler/kg; 0.8 % Ca; 0.38 % aP
 - negative control: 20.0 % CP; 1.0 % dig. Lys; 3000Cal AME broiler/kg; 0.65 % Ca; 0.13 % aP

2 Treatments

- Positive control
- Negative control
- Negative control + OptiPhos® Plus at 250, 500, 750, 1000, 1250 or 1500 FTU/kg

3 Measurements

- On ileal samples: digestibility of P, phytate-P and protein
- On tibia: bone ash on fat free dry matter

Results

- Increasing levels of OptiPhos® Plus increased bone ash significantly, yielding a 81.1 % digestibility of phytate-P at 1500 FTU/kg (Table 2). It also tended to increase protein digestibility with up to 3.3 % (at 1000 FTU/kg).
- Based on the digestibility data for P and on the bones ash analysis, the calculated equivalency between added doses of OptiPhos® Plus and dig. P or aP value rises up to 1.86 g dig. P or 2.08 g aP per kg feed at an inclusion of 1500 FTU/kg (Table 3).

Table 1. Feed composition and analysis

Feed materials	Starter (d 1 to 5)	Grower (d 6 to end)	
		Pos. control	Neg. Control
Corn	529	594	596
Soybean meal 49 % CP	331	235	235
Rapeseed meal 33 % CP	50	100	100
Animal fat	35	20	20
Soybean oil	15.0	13.5	12.5
Limestone	6.1	8.0	17.5
MCP	12.6	11.0	0.0
Others*	21.3	13.5	13.3
Nutritional value (g/kg)			
Crude protein	210	200	200
Crude fibre	44	35	35
Crude fat	85	60	59
Crude ash	55	57	55
Starch	323	412	413
Dig. Lysine	11.6	10.0	10.0
Calcium	8.5	8.0	6.5
Av. Phosphorus	4.0	3.8	1.3
Total P	7.1	6.5	4
ME (kcal/kg)	3000	3000	3000

* Salt, Sodium Bicarbonate, Synthetic Amino Acids and vitamin/mineral premix

Table 2. Doses response of OptiPhos® Plus on bone ash, phytate-P and protein digestibility (%)

	Bone ash	Phytate-P dig.	Protein dig.
Positive control	45.5 ^a	41.1 ^a	77.4
Negative control (NC)	36.3 ^e	37.6 ^b	77.4
NC + 250 FTU	39.5 ^d	61.2 ^{bc}	77.3
NC + 500 FTU	42.0 ^{bcd}	62.3 ^{bc}	77.8
NC + 750 FTU	42.3 ^{bcd}	66.6 ^{bc}	79.4
NC + 1000 FTU	43.6 ^{abc}	69.8 ^{bcd}	80.7
NC + 1250 FTU	43.6 ^{abc}	74.3 ^{cd}	78.4
NC + 1500 FTU	43.9 ^{ab}	81.1 ^d	79.5

a,e: values in a column followed by different superscript are sign. different ($p < 0.05$)

Table 3. Improvement on dig. P (ileal digestibility analysis) or on aP (bone ash analysis) by increasing levels of OptiPhos® Plus

Treatment	Dig. P (g/kg)	P as MCP (g/kg)
250 FTU	1.03	0.41
500 FTU	1.27	1.26
750 FTU	1.50	1.56
1000 FTU	1.60	1.64
1250 FTU	1.65	2.00
1500 FTU	1.86	2.08

Conclusion

- Increasing levels of OptiPhos® Plus lead to increased degradation of phytate-P, yielding a dig. P value of 1.86 g and an aP value of 2.08 g at 1500 FTU/kg inclusion level.
- Protein digestibility is enhanced by increasing levels of OptiPhos® Plus up to 3.3 % which equals 6.6 g protein per kg feed assuming feed protein level of 20 %.