OptiPhos® Plus improves performance, bone ash and ileal digestibility of phytate, phosphorus and protein in a dose-responsive way

Trial description

1 Set-up

- **Location:** University of Warmia and Mazury, Poland
- **Trial period:** May - June 2018
- **Animals:** 1666 male Ross 308 broilers distributed over 98 pens
- **Feeds** *(Table 1; pelleted)*
  - Starter (d 0-5): 21.5 % CP; 1.1 % dig. Lys; 2985 kCal AME broiler/kg; 0.90 % Ca; 0.45 % aP fed to all treatments
  - Grower (d 5-21): 20.5 % CP; 1.02 % dig. Lys; 3100 kCal AME broiler/kg; 0.60 % Ca; 0.15 % aP
  - Finisher (d 21-35): 19.4 % CP; 0.095 % dig. Lys; 3156 kCal AME broiler/kg; 0.60 % Ca; 0.15 % aP

2 Treatments (only grower and finisher)

- Control feed (as above)
- Control feed with extra Ca (+ 1.5 g) and P as MCP (+ 1.7 aP)
- Control feed with extra Ca (+ 1.5 g) and P as MCP (+ 2.7 g aP)
- Control feed + OptiPhos® Plus at 250, 500, 750 and 1000 FTU/kg

3 Measurements

- Technical result: growth, feed intake and FCR.
- At day 21: per pen 2 birds were selected of which the right tibia was removed (pooled to one sample) followed by determination of tibia ash on fat free dry matter.
- At day 35: sampling of ileal material from each pen to determine digestibility of P, phytate-P and protein. Samples were taken from the ileum between the diverticulum of Meckel and 10 cm before the ileal/cloacal junction (pooled sample of 3 birds per pen).

Results

- Increasing the levels of MCP or OptiPhos® Plus increased the final body weight and reduced FCR significantly (Fig. 1). The FCR was already re-established to the level of the P sufficient diet at an inclusion level of 500 FTU OptiPhos® Plus.
- The supplementation of OptiPhos® Plus increased bone ash in a dose dependent way, while protein digestibility was increased strongly (> 5 % vs P sufficient controls; Table 2).
- 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 rose up to 1.53 g dig. P or 2.04 g aP per kg feed at an inclusion of 1000 FTU/kg (Table 3).

Table 1. Feed composition and analysis

Feed Material	Starter (d 1-5)	Grower (d 6-21)			Finisher (d 21-35)		
		Control	Control + 1.7 g aP and +1.5 g Ca	Control + 2.7 g aP and +1.5 g Ca	Control	Control + 1.7 g aP and +1.5 g Ca	Control + 2.7 g aP and +1.5 g Ca
Corn	275	59	280	277	318	302	298
Wheat	300	300	300	300	300	300	300
Soybean meal 49 % CP	285	242	245	245	197	200	200
Rapeseed meal 33 % CP	30	40	40	40	60	60	60
Sunflower meal HP	20	30	30	30	30	30	30
Animal fat	10	40	40	40	40	40	40
Soybean oil	38.0	23.0	28.5	30.0	29.0	34.5	36.0
Limestone	14.5	13.6	14.0	11.9	12.0	12.9	10.7
MCP	14.2	1.0	8.6	13.0	1.2	7.8	12.3
Others*	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Nutritional value (g/kg)							
Crude protein (g/kg)	216	204	204	204	191	191	190
Crude ash (g/kg)	62	47	57	55	44	52	54
Dig. lysine (g/kg)	11.0	10.2	10.2	10.2	9.5	9.5	9.5
Calcium (g/kg)	9.0	6.5	8.0	8.0	6.0	7.5	7.5
Av. Phosphorus (g/kg)	4.5	1.5	3.2	4.2	1.5	3.0	4.0
Total P (g/kg)	7.2	4.2	5.9	6.9	4.2	5.7	6.7
ME (kcal/kg)	2985	3110	3109	3109	3156	3156	3156

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

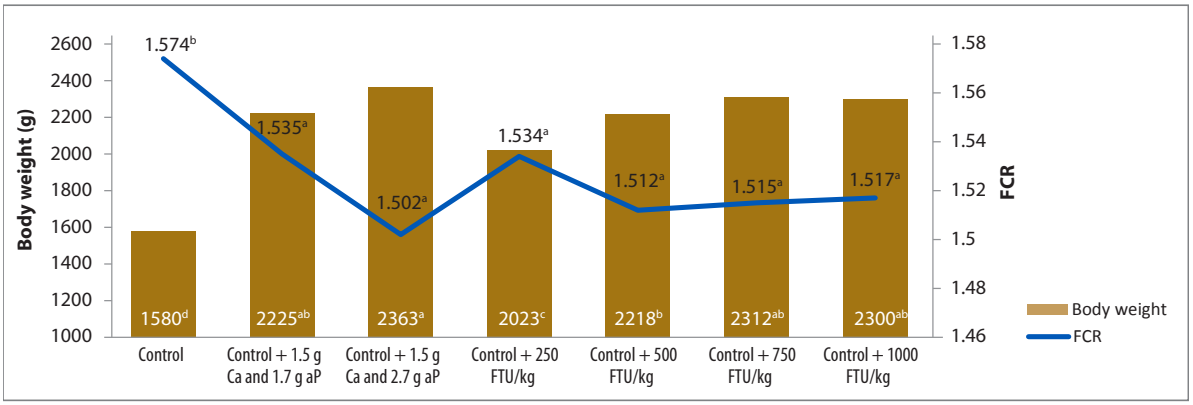

Fig. 1. Doses response of OptiPhos® Plus on bone ash, phytate-P and protein digestibility (%); (a,d values of line or column followed by different letter are sign. different (p< 0.05))

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

	Bone ash	Protein digestibility
Control	36.9^{e}	69.8^{c}
Control + 1.5 g Ca and 1.7 g aP	47.9^{a}	73.5^{b}
Control + 1.5 g Ca and 2.7 g aP	45.7^{b}	74.4^{b}
Control + 250 FTU/kg	40.1^{d}	78.9^{a}
Control + 500 FTU/kg	42.8^{c}	79.2^{a}
Control + 750 FTU/kg	43.8^{c}	77.8^{a}
Control + 1000 FTU/kg	45.9^{b}	77.6^{a}

a,c: values in a column with different superscripts 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)
OptiPhos Plus @ 250 FTU	1.00	0.66
OptiPhos Plus @ 500 FTU	1.12	1.30
OptiPhos Plus @ 750 FTU	1.54	1.54
OptiPhos Plus @ 1000 FTU	1.53	2.04

Conclusion

- Increasing levels of OptiPhos® Plus led to increased degradation of phytate-P, yielding a dig. P value of 1.53 g and an aP value of 2.04 g at 1000 FTU/kg inclusion level.
- Protein digestibility is enhanced up to 5 % by increasing levels of OptiPhos® Plus. This equals 1 % protein per kg feed savings assuming a feed protein level of 20 %.