

Effect of Supplemental Zinc and Phytase on Nutrient Utilization and Mineral Balance in Growing Crossbred (Hampshire×Assam Local) Pigs

A. Saikia*, D.N. Sarma, R. Bhuyan, B.C. Sarmah and D. Kalita

Department of Animal Nutrition, College of Veterinary Science, Assam Agricultural University, Khanapara- 781 022, India

*Correspondence: drasishsaikia@gmail.com

SUMMARY: This study examined the influence of dietary zinc (0 or 50 ppm/kg) and phytase (0 or 200 FTU phytase units/kg) supplementation on the nutrient utilization and mineral balance in growing pigs. Twenty four castrated weaned (42 days, 11.39kg) pigs were used in a 2×2 factorial experiment. Supplementation of phytase has shown higher weight gain than the unsupplemented group. Significant influence of phytase was observed on DM, CP, OM and NFE digestibility of pigs. Significant influence was observed in respect of phytase level as well as zinc level on EE digestibility. N, Ca, P and Zn balance of all animals have shown positive balance. The retention was found higher in phytase supplemented groups. These results indicated that supplementation of higher level of zinc along with phytase in the grower ration could improve the nutrient utilization and mineral balances.

Keywords: Mineral balance, Nutrient utilization, Pig, Phytase, Zinc

BACKGROUND

Zinc is an essential component of around 1000 metalloenzymes involved in a range of biochemical functions within the body. Its absorption is influenced by the level and source as well as presence of interfering substance like phytate (Selle and Ravindran, 2008). The two third of phosphorus in cereal feeds are in the form of phytate i.e. ionositolhexaphosphate and pentaphosphate, but, only a small portion of it can be utilized by pig that producing negligible amount of phytase, so exogenous supplementation of phytase is an alternative for enhancing the performance. Hence, present study was planned to assess the general effects of zinc supplementation with and without phytase on the nutrient utilization and mineral balance of crossbred (Hampshire × Assam local) pigs in the hot-humid condition of Assam.

METHODOLOGY

Twenty four weaned castrated (42d, 11.39kg) crossbred (Hampshire x Assam local) piglets were randomly divided into 4 groups of 6 animals in each viz T₁, T₂, T₃ and T₄ and offered *ad lib.* feed (CP-18.5%, ME-3.16 Mcal/kg) containing maize 55, wheat bran 14, DGNC 16, soyabean 6, fish meal 6, mineral mixture 2.5 and common salt 0.5 percent to meet NRC (1988) requirements during the experimental period of five months. The zinc content in the grower diet was 50.9 ppm. No additional zinc and phytase was supplemented in the diet of T₁ and acted as control. In the diet of T₂ phytase was added at 200 unit/kg diet. Zinc was supplemented in the diet of T₃ as ZnSO₄.7H₂O to make it 100 ppm. In T₄, both zinc and phytase, as above mentioned dose was supplemented in feed. During the growth period three animals from each treatment groups were selected randomly for metabolic trial and digestibility of nutrients, retention of N, Ca, P and Zn were determined. Samples of feed, faeces and urine were collected and analysed following AOAC (2000). Ca and P were estimated as per the modified method Talapatra *et al.* (1940) while Zn was estimated with the help of Atomic Absorption Spectrophotometer (GBC932AAA).

RESULTS

Statistically significant difference (P<0.05) in respect of zinc level was found to have influence on average daily body weight gain among the experimental groups. Phytase supplemented group has shown higher weight gain than

Table: Effect of supplemental zinc and phytase on nutrient utilization and mineral balance in growing crossbred pigs

Parameters	Treatment				
	T 1	T 2	T 3	T 4	SEM
<i>Growth</i>					
Initial BW (kg)	11.82	11.10	11.37	11.30	0.79
Final BW (kg)	47.45	50.47	49.87	52.21	3.02
ADG (g)	237 ^a	262 ^b	256 ^b	273 ^c	14.16
<i>Nitrogen balance</i>					
Intake (g)	32.25	38.50	38.20	38.51	0.35
Balance (g)	16.45	21.51	20.17	21.97	0.38
Retention (% intake)	51.02 ^a	55.90 ^b	52.82 ^{ab}	57.03 ^{bc}	0.92
<i>Calcium balance</i>					
Intake (g)	15.79	18.89	18.85	18.74	0.55
Balance (g)	5.12	8.28	6.30	8.44	0.36
Retention (% intake)	32.42 ^a	43.88 ^b	39.13 ^b	46.05 ^c	0.50
<i>Phosphorus balance</i>					
Intake (g)	10.35	12.28	12.34	12.36	0.36
Balance (g)	3.14	5.95	3.99	6.10	0.16
Retention (% intake)	30.37 ^a	48.45 ^b	32.36 ^a	49.35 ^b	0.44
<i>Zinc balance</i>					
Intake (g)	55.44	65.80	130.43	131.34	3.30
Balance (g)	17.61	23.53	48.01	53.93	2.09
Retention (% intake)	31.75 ^a	35.70 ^b	36.75 ^b	41.00 ^c	0.95

Means with different superscript in a row differ (P<0.05) significantly

unsupplemented. Digestibility of DM, CP, EE, OM and NFE by pigs was increased (P<0.05) in phytase supplemented groups. However, CF digestibility was not affected by supplementation of zinc and phytase. The N, Ca, P and Zn balance among all the groups were in positive balance. Retention was highest by the pigs supplemented with 50 ppm zinc and 200FTU/kg diet.

CONCLUSION

It was concluded that 100 ppm zinc with 200 FTU phytase per kg diet in the grower ration of crossbred pig have significantly better nutrient digestibility and mineral balance of N, Ca, P and Zn and can be recommended for optimum growth without any adverse effect.

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