Supplementing layer diets with phytase to reduce the use of meat and bone meal

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In Australia much of the phosphorus in layer diets is supplied by the inclusion of meat and bone meal (MBM). With increasing community concern of the occurrence of BSE in Europe, it is important to find other strategies to meet phosphorus requirements and reduce the use of MBM in diets. A possible approach is the supplementation of diets with phytase to release phosphorus bound within dietary ingredients as phytate. A number of studies have demonstrated that phytase improves phytate P utilization in layer diets (Carlos *et al.* 1998; Um *et al.* 1999). These studies have used corn/soybean meal diets that do not reflect the diets used in Australia. The objective of this study was to examine the influence of supplementing diets with phytase to reduce the need for the use of MBM in Australian layer diets.

The experimental diets were plant based and formulated to contain: a) a standard level of available phosphorus (0.4%) with MBM (Diet 1) or without MBM (Diet 2). Diet 3 was derived from Diet 2 and supplemented with phytase; b) a medium level of available phosphorus (0.29%) without MBM (Diet 4). Diet 5 was derived from Diet 4 and supplemented with phytase; c) a low level of available phosphorus (0.18%) without MBM (Diet 6). Diet 7 was derived from Diet 6 and supplemented with phytase. The phytase was added at level of 450 FTU/kg diet. Phytate–phosphorus contents were similar across all diets. All other nutrients met the requirements recommended by NRC (1994). The experimental diets were fed to 9 replicates of 27 ISA Brown laying hens from 77 – 89 weeks of age. In addition to production and egg quality parameters, toe ash, excreta phosphorus and the apparent ileal digestibility of energy and amino acids were determined. The data were statistically analysed by the GLM procedure (MINITAB 1996).

Growth, egg production and feed conversion ratios of the hens remained normal throughout the experimental period. The use of phytase and the removal of meat meal from the diets did not affect egg production, feed conversion ratios, shell thickness or apparent ileal digestibility coefficients of energy and amino acids (P>0.05; Table 1). Interestingly, there was a highly significant effect of dietary available phosphorus level on ileal amino acid digestibility. These results indicate that the phosphorus requirements of laying hens can be met from plant based diets without supplementing phytase.

Carlos, A.B. and Edwards, H.M. (1998). The effect of 1,25–dihydroxychloecalciferol and phytase on the natural phytate phosphorus utilization of laying hens. *Poultry Science* 77, 850–858.

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Um, J.S. and Paik, I.K. (1999). Effects of microbial phytase supplementation on egg production, eggshell quality, and mineral retention of laying hens fed different levels of phosphorus. *Poultry Science* 78, 75–79.

Table 1 Effect of diets with or without meat and bone meal (MBM) or phytase on performance and nutrient utilisation in layers.

Main effect	HD egg production (%)	FCR (g feed/g egg)	Shell thickness (mm)	Toe ash (%DM)	Apparent ileal digestibility coefficients		Excreta Phosphorus (mg/g)
					Amino acid	DE	
+ MBM	70	2.27	0.305	13.2	0.77	0.79	19.7
– MBM	66	2.28	0.305	13.3	0.79	0.75	18.1
SEM				0.33	0.016	0.022	0.75
P value	0.33	0.96	0.61	0.79	0.22	0.25	0.18
– phytase	69	2.34	0.301	13.6	0.75	0.76	15.0
+phytase	68	2.20	0.310	13.4	0.75	0.76	15.5
SEM				0.21	0.017	0.009	0.97
P value	0.76	0.43	0.15	0.43	0.95	0.99	0.751