

Introduction

Phosphorus (P) is a key mineral in a large number of biological functions such as bone growth and maintenance, energy metabolism and acid-base balance in blood.

Like other nutrients, P contained in feedstuffs is not fully absorbed and utilized by the animal in any feedstuff, including inorganic feed phosphates.

Although P is among the most expensive nutrients in livestock diets, too little attention is dedicated to the evaluation of its real value.

One key aspect that determines the quality of a feed phosphate is its phosphorus value or the fraction of P which can be absorbed by the animal. P value = P content x P absorptability. Choosing inorganic feed phosphates with high P values will maximize P use efficiency and minimize P voiding.

This study aims at comparing the phosphorus value of three different inorganic feed phosphates for use in broiler diet formulation

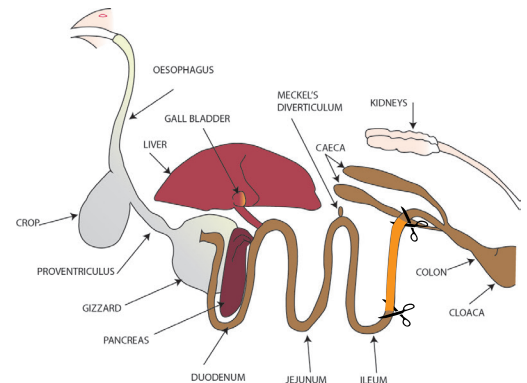
Methods

A total of 260 day-old Ross 308 chicks were used. A nutrient adequate broiler starter diet containing 214 g/kg crude protein; 11,9 MJ MEbroiler; 10 g/kg calcium (Ca) and 7,3 g/kg P, was offered from d1 to d14. From d14 to d23 or 24, birds were allotted to one of the four experimental diets in groups of 10 birds/cage, so that each diet was replicated 6 times, except the basal diet, which had 8 replicates. Experimental diets were formulated to meet or exceed CVB recommendations (CVB, 2011) for all nutrients, except Ca and P, which were, respectively, 1.7 and 2.3 g/kg for the basal diet and 3.2 and 1.5 g/kg for the experimental diets. TiO₂ was added as indigestible marker.

Experimental diets

Basal diet (BD) No inorganic feed phosphate added	BD + 6.6 g/kg feed of BOLIFOR [®] Monocalcium phosphate (BOLIFOR [®] MCP) Product description P: 227 g/kg Ca: 166 g/kg	BD + 8.3 g/kg feed of dihydrated dicalcium phosphate (DCPdihydrate) Product description P: 180 g/kg Ca: 250 g/kg	BD + 8.10 g/kg feed dicalcium phosphate (DCP) Product description P: 185 g/kg Ca: 230 g/kg
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Body weight of birds per pen was recorded at d14 and d23 or 24. Cumulative feed intake was determined from 0-14d and from 14-23 or 24d. Body weight gain and feed conversion ratio were calculated. Birds were euthanized at d23 or d24. The content of the terminal ileum (Figure 1) was collected from all birds. Diets and ileal digesta were analyzed for dry matter, Ca, P and the indigestible marker (TiO₂). Phosphorus pre-caecal absorptability (Ppca) was determined by linear regression. Pre-caecal absorbable P (Ppca x P content) was subjected to ANOVA analysis.



Results

Body weight gain, feed intake and feed conversion ratio did not differ among experimental diets, except for the basal diet which determined lower performance.

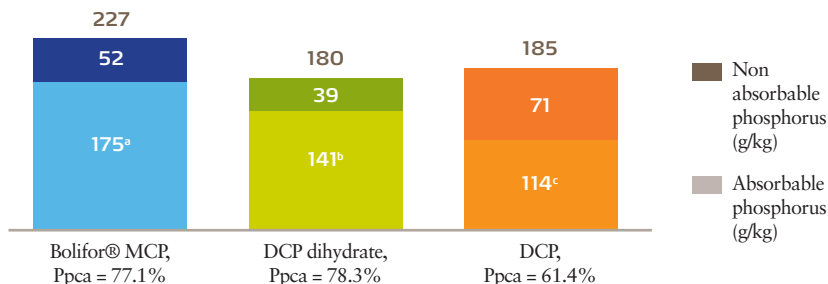


Figure 2. Phosphorus value (or pre-caecal absorbable and non-absorbable phosphorus content (g/kg) of the tested inorganic feed phosphates) in broilers. Total P content is showed on the top in g/kg. Phosphorus pre-caecal absorptability (Ppca) is showed on the X axis. a,b,c,d Values with different superscripts in the phosphorus value fraction differ significantly at p<0.05.

Conclusion

BOLIFOR[®] MCP, with a total P content of 22,7% and a P pre-caecal absorptability of 77,1% determined the greatest (p<0.05) pre-caecal absorbable phosphorus (175 g/kg) amongst the tested inorganic feed phosphates.

Using BOLIFOR[®] MCP will reduce the dietary inclusion dose by 24 and 54% compared to DCP dihydrate and DCP respectively.

BOLIFOR[®] MCP can contribute to reduce transport and storage costs.

According to the P pre-caecal absorptability and the P content of the different products, DCP dihydrate and DCP will need to be included at 24% and 54% greater rates than BOLIFOR[®] MCP to deliver the same amount of absorbable P.

For the same reason, transporting or storing the same amount of absorbable P would require more space for DCP dihydrate and DCP, respectively, compared to BOLIFOR[®] MCP.

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