

Impact of dietary Ca on the efficacy of a 6-phytase from *Buttiauxella* spp. in broilers

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Phytase efficacy may be altered by the formation of Ca-phytate complexes in the digestive tract, which is pH dependent, and influenced by Ca concentration and inorganic Ca solubility. Effects of Ca on the efficacy of a new 6-phytase derived from *Buttiauxella* spp. and expressed in *Trichoderma reesei* were evaluated in two broiler experiments (Exp) using different Ca concentrations and/or limestone particle sizes. For each Exp, a corn SBM basal diet containing no inorganic P was mixed. Limestone (particle size: 0.42mm in Exp 1 and 2, or pulverized to less than 0.037mm in Exp 2) was added to achieve analyzed Ca of 0.77, 0.93, and 1.11% and 0.68, 0.91, and 1.08% in Exp 1 and 2, respectively. Analyzed phytase was 714 (Exp 1) or 1,108 FTU/kg (Exp 2). Test diets were fed to 26 d old Hubbard 99M x Cobb 500F broilers (9 replicates, 3 birds/replicate) and apparent ileal P digestibility (AID) determined after 32h. In Exp 1, increasing Ca from 0.77% to 1.11% reduced P AID ($P < 0.01$) in diets with or without phytase. Adding phytase improved P AID ($P < 0.01$) resulting in an average contribution of 0.191% digestible P. In Exp 2, when diets with 0.42 mm limestone were fed, there was no effect of Ca level on P AID regardless of phytase inclusion but phytase addition resulted in 0.163% more P digested at the ileal level. In contrast, in diets with pulverized limestone, increasing Ca from 0.68 to 1.08% had no effect on P AID in the absence of phytase. When phytase was added, there was a step wise decrease in P AID as Ca increased, reducing the respective increment in digested P resulting from added phytase from 0.197 to 0.140%. In summary, the effect of Ca level had little influence on P contributions from phytase when diets contained limestone with a particle size of 0.42mm, but reduced P contributions from phytase when pulverized limestone was used.

Key words: limestone particle size, calcium, phosphorus, phytase, broiler

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