# Impact of dietary phosphorus and calcium feeding strategies on intestinal gene expression of broilers

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Key-words: Phosphorus, Calcium, transporter, gene expression, broiler

## Abstract

A simultaneous decrease in dietary P and Ca levels during the grower phase is a relevant way to formulate more sustainable P diets without modifying final bird performance. This experiment was conducted to study the adaptive processes under such strategies. From d10 to d21, broilers were fed a diet with high or low nPP and Ca content (**HG**: 1.0% Ca, 0.45% nPP; **LG**: 0.6% Ca, 0.3% nPP). At d21, birds having received HG were fed a high nPP and Ca finisher diet (**HF**: 0.90% Ca, 0.35% nPP) and those having received LG were fed either HF, **MF** (0.70% Ca, 0.35% nPP) or **LF** (0.48% Ca, 0.24% nPP). At d21 and d35, the duodenal levels of mRNA coding for Ca (CALB1, SLC8A1 and ATP2B1) and P (SLC34A2 and SLC20A1) transport proteins were measured by RT-qPCR. At d21, with equivalent growth performance, bone mineralization was significantly reduced in LG compared to HG while ileal digestibility of P and Ca increased. Gene expression was not modified suggesting regulation at different timing or at the protein level. At d35, with equivalent growth performance and bone mineralization, P ileal digestibility was higher in LG-LF compared to others. In birds fed LG-LF, an increase in the level of expression of CALB1 (P=0.03), ATP2B1 (P=0.03), SLC8A1 (P=0.08) and SLC20A1 (P=0.01) was observed compared to LG-MF (from +20 to +50%). Across diets, tibia ash was negatively correlated to SLC20A1 expression ($P \leq 0.05$). Broilers are thus able to adapt to P and Ca deficiency through the stimulation of gut gene expression.