

**The Effect of Calcium Level, Microbial Phytase and Citric Acid on Performance Parameters and Eggshell Quality of Laying Hens Fed Corn Soybean Meal Diet**

Authors : [Ali Al-Sharafat](#), [Bassam Al-Desiet](#) and [Sultan Al-Kouri](#)

**Abstract:** A 2x2x2 factorial experiment was conducted to determine the effect of phytase enzyme, citric acid or both at two levels of calcium on the performance and egg shell quality of Lohman Brown-Classic laying hens. Eight dietary Treatments (T) consisted of the corn-SBM basal diets were fed to seventy two birds from the 23rd to 38th week of age. T<sub>1</sub> (Treatment 1) contained 3.8% calcium, T<sub>2</sub> contained 3.8% Ca + 300 FTU, T<sub>3</sub> contained 3.8 Ca% + 2.5% citric acid, T<sub>4</sub> contained 3.8% Ca + 300 FTU + 2.5% citric acid, T<sub>5</sub> contained 2.6% calcium, T<sub>6</sub> contained 2.6% Ca + 300 FTU (T<sub>7</sub>) contained 2.6% Ca + 2.5% citric acid and T<sub>8</sub> contained 2.6% Ca + 300 FTU + 2.5% citric acid. All diets were standardized at 0.11% NPP (total phosphorus: 0.33%). The performance criteria for evaluating the effect of dietary treatments were egg production, egg weight, egg mass, feed intake, feed conversion ratio, body weight, tibia ash, calcium in tibia ash, phosphorus in tibia ash, shell percentage and egg shell density. After the performance trial termination, the digest from the crop and the proximal small intestine was obtained from each hen and the total phosphorus disappearance was calculated using TiO<sub>2</sub> as an indigestible marker. All the investigated performance parameters except feed intake and phosphorus in tibia ash were depressed by feeding 2.6% calcium compared with 3.8% calcium. Feed conversion ratio and phosphorus in tibia ash were increased by adding citric acid, whereas, body weight and feed intake were decreased. Phytase supplementation significantly increased tibia ash and calcium in tibia ash. Microbial phytase in combination with citric acid has no effect on the performance parameters and egg shell quality of laying hens fed a corn-SBM diet containing 2.6% Calcium. High dietary calcium (3.8%) decreased phosphorus disappearance of the crop contents compared to 2.6% Ca. This study also indicated that the main site of microbial phytase activity in the digestive tract of laying hens is in the crop.

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