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## Effects of Microbial Phytase and Citric Acid on Utilization of Phytate Phosphorus and Growth of Chicken

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### Abstract

Improving phosphorus utilization has become increasingly important to reduce P-pollution from intensive animal production. The objective of the current experiments were to determine supplementation effects of microbial phytase in combination with citric acid in the presence of different activity of native phytase. A total of 360 day old chicks was used in growth experiments between 3–38 d (180 chicks) and 7–42 d (180 chicks), fed corn soybean meal (CSM) and wheat soybean meal (WSM) diets respectively. The corn and the wheat subjected to hydrothermal treatments with steam addition (100 °C for 10 minutes) and mixed in the diets of T<sub>1</sub> and T<sub>2</sub>. All the diets (control, T<sub>1</sub> and T<sub>2</sub>) were supplemented with 500 U/kg of microbial phytase (SP-1002ct) and applied in pelleted form. A mixture of citric acid:Na-citrate (1:1, w/w) was added (30 g/kg) to diet T<sub>2</sub>. The total phosphorus content of the diets was equal to 4.5 gP/kg and all diets were deficient in available phosphorus (1.5 g/kg).

Average daily gains were 36, 34 and 45 g/d (CSM) and 54, 46 and 55 g/d (WSM). Total phosphorus depositions were 5.75, 5.36 and 6.99 (CSM) and 8.15, 6.90 and 7.77 g (WSM) for control, T<sub>1</sub> and T<sub>2</sub> respectively. The results indicate that inclusion of citric acid in CSM-diet with a low activity of native phytase increased growth and P-deposition significantly. In WSM-diets, the heat treatment of the wheat reduced the native phytase activity dramatically. This effect was not completely compensated by phytase addition, but after application of additional microbial phytase and citric acid. It can be assumed that hydrothermal treatment of wheat resulted in a change of solubility of pentosans and antinutritive effects could influence the results.

Conclusion is that citric acid (30 g/kg) has an influence on the efficiency of microbial phytase during degradation of phytates in poultry. Further experiments are needed to clarify if these observations are effects of acidification, changes of solubility of phytates during passage of GIT and/or other conditions affecting the efficiency of supplemented microbial phytase.

**Keywords:** Citric acid, hydrothermal treatment, phosphorus pollution, phosphorus utilization, phytase, poultry