Some physicochemical bone parameters of sows fed microbial phytase-supplemented diet

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Abstract

The aim of the present study was to determine the effect of microbial phytase addition to sow diets on a mineral content, mineralization level and geometric parameters of femoral and humeral bone. The studies were done on 75 sows assigned to 3 feeding groups. The animals from group I (positive control) were fed a diet of standard calcium and phosphorus dietary contents which complied with the requirements of the Polish Norms for Pig Nutrition (1993). The sows from group II (negative control) received a diet without an inorganic phosphorus content and finally, group III was provided with a diet without an inorganic phosphorus additive, but supplemented with microbial phytase (500 PU kg⁻¹) and formic acid. After lactation completion and piglet weaning, 4 sows were selected from each group for slaughter and laboratory evaluation of femoral and humeral bone samples. The bone samples were examined for a content of dry matter, crude ash and minerals (phosphorus, Ca⁺², Mg⁺², Mn⁺², Zn⁺², Cu⁺²). The isolated femurs were analyzed for a mineralization degree and geometric parameters. A combined microbial phytase with formic acid supplementation significantly increased manganese and zinc concentration in femoral bone and a level of phosphorus, calcium, zinc and iron in humeral bone of sows. There was also observed significantly higher trabecular bone mineral density (Td) in the femoral bone as well as the bone volume. The evaluation of geometric parameters and bone cortical indices showed a significant influence of the sow feedstuff supplementation with microbial phytase and formic acid on the parameters studied.

Key words: sows, phytase, bone, mineral

Introduction

About 85% of phosphorus is found in bones in the form of calcium phosphate and organic esters. A long-lasting deficiency of this element in growing animals results in rickets, while in adults it induces osteoporosis (Cromwell 1996, Burchardt 2002). Therefore, it is vital to provide this essential macro-element in appropriate amount in animal feedstuff. Phytase is an enzyme which not only improves the digestibility and availability of dietary phosphorus but has been shown to markedly heighten the availability of divalent metal cations, i.e. Ca⁺², Mg⁺², Fe⁺², Zn⁺², Cu⁺². Improvement of numerous minerals availability and digestibility is reflected in their increased levels not only in sow colostrum or milk (Grela and Kumek 2002) but