The effect of *Bacillus subtilis* based probiotic on bone health in broiler chickens

F. F. Yan*, W. C. Wang*, R. Wolfenden§, and H. W. Cheng†

*Department of Animal Sciences, Purdue University, West Lafayette, IN 47907.
†USDA-ARS, Livestock Behavior Research Unit, West Lafayette, IN 47907.

Introduction:

Some probiotics have been reported to regulate bone health in humans and various animal models. The objective of this study was to determine the effect of dietary supplementation of a *Bacillus subtilis* based probiotic on broiler bone health.

Material and Methods:

One hundred and twenty 1-d-old Ross 708 broilers were assigned to 24 floor pens based on their body weights. The broilers were fed either a basal diet or the basal diet mixed with a commercial *Bacillus subtilis* based probiotic product (250ppm, 1 x 10^6 cfu/g of feed) for 6 wks (n=12). Room temperature was gradually decreased from 35°C on d 1 to 21°C by 0.5°C/day, and maintained at 21°C for the rest of the experimental period. At d 43, the tibias and femurs were collected for mineral content and morphometric characteristic analyses; serum was collected for determining the levels of osteocalcin, cross-linked C-terminal telopeptide of type I collagen (CTX), calcium, and phosphorus. Latency to lie (LTL) as a leg strength indicator was performed at d 44. Data were subjected to an ANOVA of SAS (9.4). Tukey-kramer test was used for comparison.

Results:

Compared to controls, the tibias and femurs of probiotic fed broilers had significantly greater mineral density, mineral content, wall thickness, mineral area, length, width, and weight (P < 0.05). In addition, broilers fed with the probiotic had a trend to have lower serum CTX levels (P = 0.08), a bone resorption indicator. Serum osteocalcin, calcium, and phosphorus levels as well as leg strength were not affected by the dietary probiotic supplementation. These results indicate that dietary supplementation of *Bacillus subtilis* based probiotic has a significant improvement on broiler bone health, and this effect may be via down regulating bone resorption. Dietary probiotic supplementation may be a management strategy for improving skeletal health and welfare in broiler chickens.

Acknowledgements:

Thanks to the Center for Animal Welfare Science for supporting me to attend the 2016 Poultry Science Annual Meeting. Giving an oral presentation not only improved my academic skills, but also provided invaluable feedback from the audience.