

## EFFECT OF FREE-CHOICE FEEDING OF THREE DIFFERENT BONE MEAL PARTICLE SIZES ON EGG QUALITY CHARACTERISTICS OF COMMERCIAL LAYERS

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The study reported herein was conducted to determine the influence of free-choice feeding of bone meal (BM) and BM particle sizes on performance and egg quality parameters of laying hens. A total of 56-weeks old, 128 Hy-line White layers (BW  $\pm$  SD; 1500  $\pm$  18g) were randomly assigned into 16 cages of 8 birds each. Four dietary treatments (Layer or Control diet; Layer diet + 1–2mm BM; Layer diet + 2–3mm BM and Layer diet + 3–4mm BM) based on three BM particle sizes were provided *ad-libitum* over five weeks. Bone meal samples were analyzed for dry matter (DM), calcium (Ca), total phosphorus (TP) and ash. Particle size distributions of BM and *in-vitro* solubility of BM particle sizes were tested. Bird's performance was assessed and twenty eggs from each treatment were collected every 4<sup>th</sup> day of the week and were analyzed for egg quality characteristics. The data were subjected to ANOVA procedures. The DM, Ca, TP and ash content of BM were 89.3, 7.9, 4.4 and 47.6%, respectively. The geometric mean diameter (GMD) and geometric standard deviation (GSD) of BM were 1.7 and 1.6 mm, respectively. *In-vitro* solubility of 1–2 mm, 2–3 mm and 3–4 mm BM particles were 56.25, 47.45 and 39.8%, respectively. Feeding BM increased BM intake, Ca intake, reduced damaged egg percentage and increased laying percentage in layers. Feeding BM had no effect ( $p > 0.05$ ) on feed conversion ratio and body weight gain of layers. The birds fed BM had 2–3 mm particles performed best in improving bird's performance. Of the external egg quality traits tested BM supplementation had no effect ( $p > 0.05$ ) on egg weight. BM supplementation significantly ( $p < 0.05$ ) improved egg shell thickness with maximum egg shell thickness recorded from the birds fed BM had 2–3 mm particle size. Feeding BM had both 2–3 and 3–4 mm particles maximally contributed in improving shell ratio and unit surface shell weight. Feeding BM or its particle sizes had no effect ( $p > 0.05$ ) on improving either albumen or yolk characteristics. The present data demonstrated that feeding BM having 2–3 mm particle size perform best in improving overall performance and egg quality parameters of commercial layers.

**Keywords:** Bone meal, Calcium, Egg shell, Egg quality, Particle size