

Genetics of phytate phosphorus bioavailability: heritability and genetic correlations with growth and feed utilization traits in a randombred chicken population

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Abstract:

A study was undertaken to estimate the variance components for phytate P bioavailability (PBA) and the genetic correlations among PBA with growth and feed utilization (or intake) traits in an unselected random mating chicken population. Pedigreed data from 901 Athens-Canadian random-bred chickens hatched from 26 sires, 71 dams, and 105 grandparents were used for estimation of genetic parameters. Birds were individually housed in metabolic cages at 4 weeks of age and fed a 0.35% P diet. After 3 days of acclimatization, excreta produced for 3 consecutive days were collected and feed consumed (FC) was measured. Individual 4-week body weight (BW) and BW gain (BWG) during the 3-day excreta collection period were also measured. Feed conversion ratios (FCR) were calculated. Phytate P bioavailability was estimated from the disappearance of phytate during the passage of feed through the gastrointestinal tract. The restricted maximum likelihood method (REML) with the average information matrix algorithm was used for the estimation of variance components. Delta method was used for estimation of the standard errors of genetic parameters. The heritability estimate for PBA was 0.09.03. Genetic correlations between PBA and BW, BWG, and FC were moderate and negative; indicating that improving the PBA utilization would moderately affect growth. The genetic correlation between PBA and FCR was negligible and suggested that selection for PBA would not adversely affect FCR. The economic implications of genetically modifying poultry to improve phytate P utilization are yet to be determined.