

# Higher available phosphorus requirements determined in young Ross 308 male broilers

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Wageningen UR Livestock Research conducted a doses-response study to determine the available P (aP) requirement of Ross 308 male broilers. Birds received diets with varying aP contents in the range of 75% to 137.5% of the current CVB (2012) recommendations.

A 4-phase feeding program was applied: phase 1 (day 1 – 10), phase 2

(day 11 – 21), phase 3 (day 22 – 30) and phase 4 (day 31 – 38). In phase 1, an aP content of 5.4 g/kg of feed was required for realizing maximal performance. Phase 2 required 4.3 g aP per kg of feed, and phase 4 2.6 g aP per kg of feed. In phase 3, performance of the broilers was not affected by dietary aP content, but for realizing maximal tibia ash content in this phase, 3.8 g aP per kg was required. It is concluded that the required dietary aP levels for maximal performance in phases 1 and 2 are about 30% higher than the current CVB (2012) recommendations. For these phases, aP recommendations should be reconsidered. Current recommendations for phase 3 and 4 meet the requirements for maximal performance.

## **Role of Phosphorus**

Phosphorus (P) is one of the essential minerals for all kind of animals. It plays a key role in cellular metabolism, as a part of the energy metabolism of the cell (adenosine triphosphate production), in cellular regulatory mechanisms, and in bone development. An adequate P supply allows animals to attain their optimum genetic potential in growth, feed efficiency and skeletal development.

## **Need to update requirements**

The current absorbable P (aP) recommendations of broilers in the Netherlands (CVB, 2012) are based on a report of Van der Klis and Blok (1997). Since then, however, performance level of broilers has been changed drastically. Broilers are continuously selected for high breast meat production and increased feed efficiency, which affects aP requirements. Van Krimpen et al. (2013) suggested that the aP recommendations of modern broilers is currently underestimated, especially at young age. Therefore, the aim of the current experiment was to determine the responses of broilers on incremental dietary P

contents, and the consequences of these responses for the aP-requirements in modern broilers.

## **Experimental design**

A trial was conducted to determine the aP requirements of male broiler chicks in four different periods: 1 to 10 (phase 1), 11 to 21 (phase 2), 22 to 30 (phase 3) and 31 to 38 (phase 4) days of age. The calcium/absorbable phosphorus ratio of all diets was kept constant at a ratio of 2.2:1. In total 6,510 Ross308 broilers were randomly allotted in a completely randomized design with 6 treatments, 5 replicate pens per treatment, and 217 birds per pen. In each phase, diets were provided with aP contents of 75%, 87.5%, 100%, 112.5%, 125%, or 137.5% of CVB (2012) recommendations. The calculated aP levels were based on CVB (2011) contents in feed ingredients. The experimental diets were mainly based on corn, wheat and soybean meal. The differences in Ca and aP content were realized by exchanging monocalciumphosphate and limestone by diamol, an inert filler ingredient without any nutritional value. Titanium dioxide was used as indigestible marker. The aP requirements were based on the aP intake levels necessary for realizing maximal body weight gain, feed conversion ratio and tibia ash contents, as estimated by a broken stick model.

## **Results**

In phase 1, 2 and 4, growth performance responded linear to incremental dietary aP contents. In phase 1 and 2, FCR responded also linear to incremental dietary aP contents, whereas FCR in phase 4 responded quadratic. In phase 4, the absolute tibia breaking strength responded linear to incremental dietary aP contents. In phase 1 and phase 2, the calculated dietary aP-levels for maximal BWG and minimal FCR according to the broken stick model were higher than the calculated aP-

level for maximal tibia ash content. In phase 3, performance of the broilers was not affected by dietary aP content, whereas for maximal tibia ash content, an aP-level of 3.8 g/kg was required. In phase 4, the calculated dietary aP-levels for maximal broiler performance and tibia ash content were similar (2.6 g/kg). Broilers were able to increase dietary P absorption at aP-levels below 112.5% (d21 and d30) or 125% (d10 and d38) of the CVB (2012) recommendations. P absorption was increased by increasing phytate degradation.

Tibia breaking strength, expressed per g tibia or per mm tibia section, was in most cases not affected by dietary aP-content. In 38 day-old broilers, the absolute tibia breaking strength, as well as the breaking strength expressed per mm tibia section, was lower in birds fed the 75% aP-diets compared to birds fed the other diets. Footpad lesions, feather quality, and litter quality were not affected by dietary aP-levels. Average carcass P content was 4.5, 4.8, 4.5, and 4.2 g/kg at d10, d21, d30, and d38, respectively. At d10 and d21, carcass P content tended to increase with increasing dietary aP-content. In birds dissected at d10 and d21, carcass Ca content increased with increasing dietary aP-content. At d30 and d38, carcass Ca content was not affected by dietary treatments; average carcass Ca content was 6.0 and 5.6 g/kg, respectively.

**More information:** Response of broilers on incremental dietary P content and consequences for P- requirements. [edepot.wur.nl/369977](https://edepot.wur.nl/369977)

Provided by Wageningen University

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