

# Implications of sorghum in broiler nutrition

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Sorghum is a common grown grain in Australia. Due to some antinutritional factors it is not much appreciated in chicken feeds. Kafirin seems to be the main problem.

Sorghum-based diets have been associated with inconsistent, and even sub-optimal, growth performance of broiler chickens.

Sorghum is unique in that it contains kafirin, phytate and may contain condensed tannin; these factors can negatively influence the nutritive properties of sorghum.

Both phytate and tannin have the capacity to complex proteins in the gut and depress protein digestibility and intestinal uptakes of dietary and endogenous amino acids (AA).

A substantial proportion of sorghum protein is composed of kafirin, which is relatively poorly digested and contains a paucity of lysine (lys). Therefore, as kafirin proportions of sorghum protein increase, digestibility of AA and lys concentrations decline.

Because of variable AA concentrations in sorghum protein, the accuracy with which intended dietary levels of AA are met in formulating sorghum-based diets may not be precise.

## **Starch digestibility**

Kafirin is also associated with harder grain textures and higher starch gelatinisation temperatures and the digestibility of starch in sorghum is generally inferior to other grains.

The particle size and method of grinding sorghum influences broiler performance but the optimal particle size appears to be dependent on grain texture.

Sorghum is vulnerable to 'moist-heat' because it induces disulphide cross-linkages in  $\beta$ - and  $\gamma$ -kafirin located in the periphery of protein bodies that represents a barrier to the more digestible, centrally located  $\alpha$ -kafirin component.

Starch granules are intimately associated with protein bodies and the protein matrix in sorghum endosperm and starch digestibility is also compromised by the formation of disulphide cross-linkages, which impede starch gelatinisation and enzymic degradation.

This raises the possibility that steam-pelleting sorghum-based diets at high temperatures may constitute sufficient 'moist-heat' to compromise nutrient utilisation.

## **Enzyme supplementation**

The identification of the most appropriate processing methods of sorghum-based diets should prove advantageous and inclusion of exogenous proteases with the capacity to degrade kafirin may hold promise.

In low-tannin, phytase-supplemented, sorghum-based diets the more important causes of inconsistent broiler performance may be the kafirin content, variable concentrations and digestibilities of AA and grain texture coupled with inappropriate processing methods.

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