THE USE OF PEANUT BY-PRODUCTS IN POULTRY DIETS

by

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DECLARATION

I certify that the substance of this thesis has not been already submitted for any award and is not currently being submitted for any other degree.

I certify that all help received in the preparation of this thesis, and all sources used, have been acknowledged.

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"A wise man will hear and increase learning, and a man of understanding will attain wise counsel."

(Proverbs 1:5)

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Summary

The use of a protein-rich feedstuff, peanut meal (mechanically extracted), and a waste by-product from the peanut industry, peanut shell, was evaluated in three dietary experiments with commercial broiler chickens, as a means of minimising dietary costs and providing alternative protein sources in developing countries such as Indonesia.

The experiments reported here demonstrated that peanut meal can be used to replace soybean meal at a rate of up to 15% in a diet containing meat and bone meal without any effects on bird performance. Even though peanut meal has inferior protein quality compared with soybean meal, similar nitrogen digestibility values were obtained. The apparent metabolisable energy (AME) of the diets improved ($P<0.05$), above 5% peanut meal inclusion. Peanut meal tended to be more digestible ($P<0.10$) in terms of energy than soybean meal and a significant ($r^2 = 99.4\%$; $P<0.001$) relationship existed between energy metabolisability and peanut meal inclusion. The peanut meal did not contain a significant amount of soluble complex polysaccharides, as shown by digesta viscosity values, and did not increase excreta moisture content.

Although peanut shell is poorly digested by chickens because of its fibre content, the use of 9% peanut shell in a diet was not sufficient to reduce the performance of broilers. Although the dry excreta volume produced was increased ($P<0.001$), peanut shell inclusion markedly reduced ($P<0.05$) excreta moisture.

A further study explored the interaction of peanut meal with different cereal grains: sorghum, barley, maize and wheat, compared with a soybean meal/sorghum diet. The soybean meal/sorghum diet produced the best bird performance ($P<0.01$). However, a similar feed conversion was achieved by using peanut meal/sorghum and peanut meal/wheat diets. Peanut meal/sorghum-fed chickens consumed less ($P<0.001$) feed and had lighter ($P<0.001$) body weights than soybean meal/sorghum-fed birds. The wheat-based diet was poorly consumed and produced the lightest bird body weights. The AME values of peanut meal diets were higher ($P<0.05$) than the value of the soybean meal/sorghum diet. The anti-nutritive effects of complex polysaccharides in wheat and barley were demonstrated through the decrease ($P<0.001$) in the energy

metabolisability and an increase ($P<0.001$) in digesta viscosity leading to poor bird performance.

The use of peanut meal and peanut shell did not affect bird mortality.

Peanut meal and peanut shell are adequate feed ingredients for use in broiler diets if several constraints, such as mould and aflatoxin contamination and poor amino acid profiles, are considered. It is recommended that peanut meal be used up to 15% in broiler starter diets containing an animal protein concentrate. The use of more than 15% of peanut meal may require synthetic amino acid supplementation. Peanut shell can be incorporated at a level of at least 9% in a diet.

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