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Chemical and physical characteristics of grains related to variability in energy and amino acid availability in poultry

R. J. Hughes[A] and M. Choct[B]

[A]*South Australian Research and Development Institute (SARDI), Pig and Poultry Institute, Nutrition Research Laboratory, The University of Adelaide, Roseworthy Campus, Roseworthy, SA, 5371, Australia.*
[B]*Department of Animal Science, School of Rural Science and Natural Resources, University of New England, Armidale, NSW 2351, Australia*

Abstract

Grains such as wheat and barley, combined with legumes and oilseed meals, provide not only the bulk of essential nutrients for commercial poultry production and reproduction, but are also the prime source of anti-nutritive components, which are likely to have significant bearing on how effectively all dietary components are utilised by poultry. Sources of variation in the physical and chemical characteristics of grains used in poultry diets include variety, seasonal effects, and growth sites, crop treatment and grain fumigants, and post-harvest storage conditions and period of storage. The available energy and protein contents of grains fed to poultry, which best represent nutritive value, are extremely wide and in consequence there is an urgent need to develop rapid and objective tests for the assessment of nutritive value prior to including grains in poultry diets. Variation in the available energy and protein content of grains can be attributed to a wide range of anti-nutritive factors such as non-starch polysaccharides (NSP), enzyme activity, tannins, alkyl resorcinols, protease inhibitors, α-amylase inhibitors, phytohaemagglutinins, alkaloids, saponins, and lathyrogens. The relative importance of such factors will also differ according to the type of grain in question. However, NSP seem to be the predominant factor in Australia over the past few years given the volume of published literature on this topic. This argument is strongly supported by the fact that NSP-degrading enzymes are routinely used in monogastric diets with great success throughout the world. Numerous attempts over a long period have failed to provide unequivocal evidence that nutritive value in grains for poultry can be predicted with sufficient accuracy and precision by simple, low-cost physico-chemical measurements used singly or in combination. Nevertheless, it is highly desirable to continue to explore these simple measurements in the expectation that useful statistical relationships with more complex measurements will emerge, or that simple measurements can be used to fine-tune prediction equations based on more powerful techniques such as near infrared spectrophotometry.

Finally, the nutritive value of grains for poultry will be determined not only by the chemical and physical properties of grains but also by the way that these interact with the processes of ingestion, digestion, absorption, and metabolism in birds. For this reason it is imperative that plant and animal scientists join forces to improve the nutritive value of plant material as feed for animals for the benefit of grain growers and producers of livestock.

Full Text

http://www.publish.csiro.au/nid/40/paper/AR98161.htm