Potential methodologies and strategies for the rapid assessment of feed-grain quality

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Abstract

The efficient use of grains for animal feed requires the use of analytical methods that can provide rapid indications of the suitability of the grain for animal nutrition. Ideally, these methods need to be applied at the site of grain receive within the tight time and cost confines of grain delivery. In addition, methods are needed in plant breeding to efficiently screen for target aspects of feed-grain quality to facilitate the development of genotypes with improved nutritional quality. This review describes a range of techniques that can fulfil these analytical requirements. These include visual examination of grain samples for species identification and for recognition of defects and contaminants. This long-standing approach is rapid, but it is subjective and dependent on the expertise of the operator. The newer technology of image analysis offers the prospect of providing similar information automatically and quantitatively, without the risk of operator bias. Near-infrared (NIR) analysis is already in general use for grain analysis at many receiveal depots in wheat-growing countries, mainly for the determination of moisture and protein content. There are promising indications that NIR can be extended to the determination of many other aspects of grain composition, both the positive aspects that contribute to feed quality, as well as components such as beta-glucan content that have negative contributions for non-ruminants. Furthermore, NIR is being developed to provide a direct indication of metabolisable energy for a range of grain types. Whereas NIR is primarily suited to the determination of quantitatively major components of the grain, without the requirement of significant sample preparation, immunological analyses are appropriate for the determination of specific and minor components, such as mycotoxins, lectins, alkaloids, and pesticide residues. These and other methods, suited for on-site analysis, need to be combined with effective sampling to ensure that the results of testing are representative of the whole of the grain consignment, and also integrated into a systematic strategy to ensure cost-effective testing.

Full Text