

# Taking the guesswork out of using wheat and barley in broiler feeds

*Measuring the viscosity of grains allows nutritionists to predict the optimum dose of an enzyme product for the formulation of feeds on a least-cost basis. - Dr Milan Hruby*

**T**he feeding value of wheat and barley is notoriously variable. Since their contribution to the total energy content of poultry diets can be 60% or more, even small deviations from the expected feeding value used in the feed formulation may result in significant losses in bird performance. In addition, there are other problems associated with feeding wheat or barley, such as wet droppings, which can lead to hock burns, breast blisters and consequent carcass downgrades.

With the new harvest just around the corner in the Northern Hemisphere, nutritionists are asking, "What will the quality and consistency of the new crop wheat and barley be? What impact will this have on broiler performance? How can I anticipate and reduce the risks of reduced and inconsistent performance?"

The difficulty comes in trying to answer these questions. Traditionally, feed producers have relied upon measures of grain quality such as specific weight (bushel weight) and/or proximate analysis, e.g. starch and protein, but these parameters bear little or no relationship to broiler performance.

It is the effects of feeding wheat and barley on the 'stickiness' (viscosity) of the contents of the chicken's gut (digesta viscosity) that is the key to determining the quality of these grains. As much as 70-80% of variability in feed efficiency of broilers fed wheat-based diets may be due to the effect of this grain on digesta viscosity. As digesta viscosity increases, the apparent metabolisable energy (AME) of wheat and barley is reduced and consequently feed efficiency decreases.



Advanced technology is speeding up the turnaround time for wheat quality analysis

The application of xylanase and beta-glucanase feed enzymes in wheat and barley-based broiler diets, respectively, is well established as a means of reducing gut digesta viscosity. As a result, broiler feed efficiency and consistency are improved and the risk of wet litter and associated carcass downgrades reduced.

## Optimum enzyme dose

What is the optimum dose of enzyme? What effect does the quality of the wheat or barley have on optimum enzyme dose? With feed costs accounting for around 70% of broiler production costs, it is

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important to extract every nugget of profit from each ingredient. Feed enzymes are no exception. Only through the correct use of appropriate products can the full economic benefit of using wheat or barley in poultry diets be optimised. It is a balancing act between maximising performance and maximising profit.

For enzymes, finding that balance involves examining a tangled web of factors - including the feeding value of wheat or barley through measuring their viscosity levels, their level of inclusion in the feed and considering the costs of the enzyme and the feed.

Without knowing the quality of the wheat or barley used, feed producers may either err on the side of caution by using more enzyme than needed, thereby adding unnecessary cost to the diet; or, unaware that the standard recommended enzyme dose made by the manufacturer may in fact be insufficient, more likely inadvertently under-dose the enzyme, resulting in potential losses in bird performance and deterioration in litter quality.

The Finnfeeds Avicheck™ service provides an accurate means of estimating the quality of these grains by measuring their viscosity. It then matches enzyme dose to grain quality to provide an accurate estimate of the optimum dose rate for maximum economic return.

### Using viscosity to evaluate feed grains

By comparing wheat viscosity values from samples analysed - for example, between the end of one harvest year and the beginning of the new harvest - Avicheck can be used to establish optimum enzyme dose for these two qualities of wheat. The importance of matching enzyme dose to grain quality then becomes clear. For example, the average viscosity value for French wheat samples analysed at the end

of the 2000 harvest year was 12cPs but with a range of values from 6-13cPs. The corresponding viscosity of French wheat samples for the 2001 season - soon after harvest - averaged 21cPs, but with much more variability (3-31cPs).

For broiler feeds based on wheat from the 2000 harvest and assuming a feed cost of 215 Euros/t, the system predicts an optimum enzyme dose rate for the Finnfeeds' product, Avizyme 1300, of 840g/tonne feed. The predicted FCR improvement is 0.044 points (2.5%), compared to a feed without enzyme, and the net profit from using enzyme is 3.50 Euros/t feed.

However, with the poorer quality 2001 new harvest wheat, the system predicted the need to increase enzyme dose rate by approximately 15% to 950g/t feed in order to maximise profit. This is estimated to bring an improvement in FCR of 0.063 points (3.5%) and a rise in net profit to 5.30 Euros/t feed.

### Predictions for European feed grains this year

As the end of the 2001 harvest year draws to a close, the company's global analysis of grain samples indicates an average viscosity for wheat of around 10cPs, with a range of 3-31cPs. For barley, the average value is 89cPs and an even wider variability, 3-100cPs. So barley can pose a greater viscosity problem for broilers than wheat, but which can also be resolved with the correct type and dose of enzyme.

With the new 2002 harvest just around the corner, who knows what the quality will be? As soon as new harvest samples begin to arrive in the feed mill, it is advisable to assess grain quality and use this information to exploit the full economic potential from feed enzymes to minimise risks of reduced broiler performance and litter problems.

- Dr Milan Hruby is Technical Services Manager for Finnfeeds International Ltd, Marlborough, UK. Finnfeeds has further developed its laboratory wheat viscosity analysis service by introducing Near Infra-Red (NIR) spectroscopy calibration (AviNIRä). This offers feed manufacturers the opportunity to assess wheat quality in their own laboratory. The main benefit is more rapid management of wheat quality variation through adjustments to enzyme dose, particularly during the new harvest period.

**Key words:** Avizyme 1300, Avicheck, broiler, wheat, barley, xylanase, protease, viscosity, digesta viscosity